Dell PowerConnect 8024 Series Systems CLI Reference Guide

Regulatory Model: PC8024/PC8024F
Regulatory Type: XXXXX

Notes

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Contents

1 Command Groups 75

Introduction 75

Command Groups 76

Mode Types 79

Layer 2 Commands 81

Data Center Technology Commands 115

Layer 3 Commands 117

Utility Commands 143

2 Using the CLI 165

Introduction 165

Entering and Editing CLI Commands 165

CLI Command Modes 174

Starting the CLI 187

Using CLI Functions and Tools 195

3 Layer 2 Switching Commands 233

4 AAA Commands 235

Commands in this Chapter **236**

aaa authentication dot1x default **236**

aaa authentication enable **238**

aaa authentication login **239**

aaa authorization network default radius **241**

aaa ias-user username **242**

aaa new-model **243**

clear (IAS) **243**

enable authentication **244**

enable password **245**

ip http authentication **246**

ip https authentication **247**

login authentication **248**

password (aaa IAS User Configuration) **249**

password (Line Configuration) **250**

password (User EXEC) **251**

show aaa ias-users **252**

show authentication methods **253**

show users accounts **254**

show users login-history **256**

username. **257**

username password encrypted **258**

username unlock **260**

5 ACL Commands 263

ACL Logging **263**

Commands in this Chapter. **266**

access-list **266**

deny | permit (IP ACL) **268**

deny | permit (Mac-Access-List-Configuration) **270**

ip access-group **272**

mac access-group **273**

mac access-list extended **274**

mac access-list extended rename **275**

service-acl input. **276**

show service-acl interface **277**

show ip access-lists. **278**

show mac access-list **279**

6 Address Table Commands 281

Commands in this Chapter **281**

clear mac address-table **282**

mac address-table aging-time **283**

mac address-table multicast filtering **284**

mac address-table multicast forbidden address . . . **285**

mac address-table multicast forbidden forward-unregistered **286**

mac address-table multicast forward-all **287**

mac address-table multicast forward-unregistered **288**

mac address-table multicast static **289**

mac address-table static **291**

port security **292**

port security max **293**

show mac address-table multicast **293**

show mac address-table filtering **295**

show mac address-table **296**

show mac address-table address **297**

show mac address-table count **298**

show mac address-table dynamic **299**

show mac address-table interface **301**

show mac address-table static **302**

show mac address-table vlan **303**

show ports security **304**

show ports security addresses **305**

7 Auto-VoIP Commands 307

Commands in this Chapter **307**

show switchport voice **308**

switchport voice detect auto **310**

8 CDP Interoperability Commands 313

Commands in this Chapter **313**

clear isdp counters **313**

clear isdp table **314**

isdp advertise-v2 . . . . . **314**

isdp enable **315**

isdp holdtime **316**

isdp timer **317**

show isdp **317**

show isdp entry **318**

show isdp interface **320**

show isdp neighbors **321**

show isdp traffic **323**

9 DHCP Layer 2 Relay Commands 325

Commands in this Chapter **325**

dhcp l2relay (Global Configuration) **325**

dhcp l2relay (Interface Configuration) **326**

dhcp l2relay circuit-id **327**

dhcp l2relay remote-id **328**

dhcp l2relay trust **328**

dhcp l2relay vlan **329**

show dhcp l2relay all **330**

show dhcp l2relay interface **331**

show dhcp l2relay stats interface **332**

show dhcp l2relay subscription interface **333**

show dhcp l2relay agent-option vlan **334**

show dhcp l2relay vlan **335**

show dhcp l2relay circuit-id vlan **336**

show dhcp l2relay remote-id vlan **337**

clear dhcp l2relay statistics interface **338**

10 DHCP Management Interface Commands 341

Commands in this Chapter **341**

release dhcp **342**

renew dhcp **343**

debug dhcp packet **344**

show dhcp lease **345**

11 DHCP Snooping Commands 349

Commands in this Chapter **349**

clear ip dhcp snooping binding **350**

clear ip dhcp snooping statistics **351**

ip dhcp snooping **351**

ip dhcp snooping binding **352**

ip dhcp snooping database **353**

ip dhcp snooping database write-delay **354**

ip dhcp snooping limit **355**

ip dhcp snooping log-invalid **356**

ip dhcp snooping trust **356**

ip dhcp snooping verify mac-address **357**

show ip dhcp snooping **358**

show ip dhcp snooping binding **359**

show ip dhcp snooping database **360**

show ip dhcp snooping interfaces **361**

show ip dhcp snooping statistics **362**

12 Dynamic ARP Inspection Commands . . . 365

Commands in this Chapter **365**

arp access-list **365**

clear ip arp inspection statistics **366**

ip arp inspection filter **367**

ip arp inspection limit **367**

ip arp inspection trust **368**

ip arp inspection validate **369**

ip arp inspection vlan **370**

permit ip host mac host **371**

show arp access-list. **372**

show ip arp inspection. **372**

show ip arp inspection vlan **375**

13 Email Alerting Commands 379

Commands in this Chapter **379**

logging email. **380**

logging email urgent **382**

logging traps 383

logging email message-type to-addr 384

logging email from-addr 385

logging email message-type subject 385

logging email logtime 386

logging email test message-type 387

show logging email statistics 388

clear logging email statistics 388

security 389

mail-server ip-address | hostname 390

port (Mail Server Configuration Mode) 391

username (Mail Server Configuration Mode) 391

password (Mail Server Configuration Mode) 392

show mail-server 393

14 Ethernet Configuration Commands 395

Commands in this Chapter 396

clear counters 396

description 397

duplex 398

flowcontrol 399

interface 399

interface range 400

mtu 402

show interfaces advertise 403

show interfaces configuration 404

show interfaces counters 406

show interfaces description 409

show interfaces detail 410

show interfaces status 413

show statistics 414

show statistics switchport 419

show storm-control 421

shutdown 422

speed 423

storm-control broadcast 424

storm-control multicast 425

storm-control unicast 426

switchport protected 427

switchport protected name 428

show switchport protected 428

15 Ethernet CFM Commands 431

Commands in this Chapter 431

ethernet cfm domain 432

service 433

ethernet cfm cc level 434

ethernet cfm mep level 435

ethernet cfm mep enable 436

ethernet cfm mep active 437

ethernet cfm mep archive-hold-time 438

ethernet cfm mip level 438

ping ethernet cfm 439

traceroute ethernet cfm 440

show ethernet cfm errors 442

show ethernet cfm domain 442

show ethernet cfm maintenance-points local 443

show ethernet cfm maintenance-points remote 444

show ethernet cfm statistics 446

debug cfm 447

16 GVRP Commands 451

Commands in this Chapter 451

clear gvrp statistics 451

garp timer 452

gvrp enable (global) 453

gvrp enable (interface) **454**

gvrp registration-forbid **455**

gvrp vlan-creation-forbid **456**

show gvrp configuration **456**

show gvrp error-statistics **458**

show gvrp statistics **459**

17 IGMP Snooping Commands 461

Commands in this Chapter **462**

ip igmp snooping (global) **462**

ip igmp snooping (interface) **463**

ip igmp snooping host-time-out **464**

ip igmp snooping leave-time-out **464**

ip igmp snooping mrouter-time-out **465**

show ip igmp snooping **466**

show ip igmp snooping groups **467**

show ip igmp snooping interface **468**

show ip igmp snooping mrouter **469**

ip igmp snooping (VLAN) **469**

ip igmp snooping fast-leave **470**

ip igmp snooping groupmembership-interval **471**

ip igmp snooping maxresponse **472**

ip igmp snooping mcrtrexpiretime **473**

18 IGMP Snooping Querier Commands . . . 475

Commands in this Chapter **475**

ip igmp snooping querier **475**

ip igmp snooping querier election participate **477**

ip igmp snooping querier query-interval **478**

ip igmp snooping querier timer expiry **479**

ip igmp snooping querier version **479**

show ip igmp snooping querier **480**

19 IP Addressing Commands 483

Commands in this Chapter **483**

clear host **484**

clear ip address-conflict-detect **484**

ip address (Out-of-Band) **485**

ip address-conflict-detect run **486**

ip address dhcp (Interface Config) **487**

ip default-gateway **488**

ip domain-lookup **490**

ip domain-name **490**

ip host **491**

ip name-server **492**

ipv6 address (Interface Config) **493**

ipv6 address (OOB Port) **494**

ipv6 address dhcp **496**

ipv6 enable (Interface Config) **497**

ipv6 enable (OOB Config) **497**

ipv6 gateway (OOB Config) **498**

show hosts **499**

show ip address-conflict **500**

show ip helper-address **501**

show ipv6 dhcp interface out-of-band statistics . . . **502**

show ipv6 interface out-of-band. **503**

20 IPv6 Access List Commands 505

Commands in this Chapter **505**

{deny | permit} (IPv6 ACL) **506**

ipv6 access-list **508**

ipv6 access-list rename **509**

ipv6 traffic-filter **510**

show ipv6 access-lists. **511**

21 IPv6 MLD Snooping Commands 515

Commands in this Chapter **515**

ipv6 mld snooping immediate-leave **516**

ipv6 mld snooping groupmembership-interval **517**

ipv6 mld snooping maxresponse **517**

ipv6 mld snooping mcrtexpiretime **518**

ipv6 mld snooping (Global) **519**

ipv6 mld snooping (Interface) **520**

ipv6 mld snooping (VLAN) **521**

show ipv6 mld snooping **522**

show ipv6 mld snooping groups **523**

22 IPv6 MLD Snooping Querier Commands 527

Commands in this Chapter **527**

ipv6 mld snooping querier **528**

ipv6 mld snooping querier (VLAN mode) **528**

ipv6 mld snooping querier address **529**

ipv6 mld snooping querier election participate **530**

ipv6 mld snooping querier query-interval **530**

ipv6 mld snooping querier timer expiry **531**

show ipv6 mld snooping querier **532**

23 IP Source Guard Commands 535

Commands in this Chapter **535**

ip verify source **535**

ip verify source port-security **536**

ip verify binding **537**

show ip verify interface **537**

show ip verify source interface **538**

show ip source binding **538**

24 iSCSI Optimization Commands 541

Commands in this Chapter **542**

iscsi aging time **542**

iscsi cos **543**

iscsi enable **545**

iscsi target port **546**

show iscsi **548**

show iscsi sessions **549**

25 Link Dependency Commands 553

Commands in this Chapter **553**

action **553**

link-dependency group **554**

add gigabitethernet 555

add tengigabitethernet 555

add port-channel 556

depends-on 557

show link-dependency 558

26 LLDP Commands 561

Commands in this Chapter 562

clear lldp remote-data 562

clear lldp statistics 563

lldp notification 564

lldp notification-interval 564

lldp receive 565

lldp timers 566

lldp transmit 567

lldp transmit-mgmt 568

lldp transmit-tlv 568

show lldp 569

show lldp interface 570

show lldp local-device 571

show lldp remote-device 573

show lldp statistics 574

27 Multicast VLAN Registration Commands 577

Commands in this Chapter **578**

mvr **578**

mvr group **579**

mvr mode **580**

mvr querytime **580**

mvr vlan **582**

mvr immediate **582**

mvr type **583**

mvr vlan group **585**

show mvr **586**

show mvr members **588**

show mvr interface **589**

show mvr traffic **591**

28 Port Channel Commands 593

Static LAGS **593**

VLANs and LAGs **594**

LAG Thresholds **594**

Port Channels **594**

LAG Hashing **595**

Enhanced LAG Hashing **596**

Manual Aggregation of LAGs **597**

Manual Aggregation of LAGs **597**

Flexible Assignment of Ports to LAGs **597**

Commands in this Chapter **597**

channel-group **598**

interface port-channel **599**

interface range port-channel **599**

hashing-mode **600**

lacp port-priority **601**

lacp system-priority **602**

lacp timeout **603**

port-channel min-links **603**

show interfaces port-channel **604**

show lacp **605**

show statistics port-channel **607**

29 Port Monitor Commands 611

Commands in this Chapter **611**

monitor session **612**

show monitor session **613**

30 QoS Commands 615

Access Control Lists **615**

Layer 2 ACLs **616**

Layer 3/4 IPv4 ACLs **616**

Class of Service (CoS) **616**

Queue Mapping **617**

Commands in this Chapter **618**

assign-queue **619**

class **619**

class-map **620**

class-map rename **621**

classofservice dot1p-mapping **622**

classofservice ip-dscp-mapping **623**

classofservice trust **623**

conform-color **624**

cos-queue min-bandwidth **625**

cos-queue random-detect **626**

cos-queue strict **627**

diffserv **628**

drop **629**

mark cos **630**

mark ip-dscp **630**

mark ip-precedence **631**

match class-map **632**

match cos **633**

match destination-address mac **634**

match dstip **635**

match dstip6 . . . . . **636**

match dstl4port **636**

match ethertype **637**

match ip6flowlbl **638**

match ip dscp **639**

match ip precedence **640**

match ip tos **640**

match protocol **641**

match source-address mac **642**

match srcip **643**

match srcip6 . . . . . **644**

match srcl4port **644**

match vlan **645**

mirror **646**

police-simple **647**

policy-map 648

redirect 649

service-policy 650

show class-map 651

show classofservice dot1p-mapping 653

show classofservice ip-dscp-mapping 654

show classofservice trust 657

show diffserv 658

show diffserv service interface 659

show diffserv service interface port-channel 660

show diffserv service brief 661

show interfaces cos-queue 662

show interfaces random-detect 664

show policy-map 665

show policy-map interface 666

show service-policy 667

traffic-shape 668

31 RADIUS Commands 671

Commands in this Chapter 674

aaa accounting network default start-stop group radius 675

acct-port **675**

auth-port **676**

deadtime **677**

key **678**

msgauth **678**

name (RADIUS server) **679**

primary **680**

priority **681**

radius-server deadtime **682**

radius-server host **683**

radius-server key **684**

radius-server retransmit **685**

radius-server source-ip **685**

radius-server timeout **686**

retransmit **687**

show aaa servers **688**

show radius statistics **691**

source-ip **695**

timeout **696**

usage **697**

32 Spanning Tree Commands 699

Commands in this Chapter **700**

clear spanning-tree detected-protocols **701**

exit (mst) **701**

instance (mst) **702**

name (mst) **704**

revision (mst) **705**

show spanning-tree **705**

show spanning-tree summary **709**

spanning-tree **711**

spanning-tree auto-portfast **712**

spanning-tree bpdu flooding **712**

spanning-tree bpdu-protection **713**

spanning-tree cost **714**

spanning-tree disable **715**

spanning-tree forward-time **716**

spanning-tree guard **717**

spanning-tree loopguard **717**

spanning-tree max-age **718**

spanning-tree max-hops **719**

spanning-tree mode **720**

spanning-tree mst configuration **720**

spanning-tree mst cost **721**

spanning-tree mst port-priority **722**

spanning-tree mst priority **723**

spanning-tree portfast **724**

spanning-tree portfast bpdufilter default **725**

spanning-tree portfast default **726**

spanning-tree port-priority **727**

spanning-tree priority **728**

spanning-tree tcnguard **728**

spanning-tree transmit hold-count **729**

33 VLAN Commands 731

Double VLAN Mode **731**

Independent VLAN Learning **732**

Protocol Based VLANs **732**

IP Subnet Based VLANs **733**

MAC-Based VLANs **733**

Commands in this Chapter **733**

dvlan-tunnel ethertype **734**

interface vlan **735**

interface range vlan **736**

mode dvlan-tunnel **737**

name (VLAN Configuration) **738**

protocol group **739**

protocol vlan group **740**

protocol vlan group all **741**

show dvlan-tunnel **742**

show dvlan-tunnel interface **743**

show interfaces switchport **744**

show port protocol **748**

show vlan **749**

show vlan association mac **750**

show vlan association subnet **751**

switchport access vlan **752**

switchport forbidden vlan **753**

switchport general acceptable-frame-type tagged-only **754**

switchport general allowed vlan **754**

switchport general ingress-filtering disable **755**

switchport general pvid **756**

switchport mode **757**

switchport trunk **758**

vlan 760

vlan (Global Config) 761

vlan association mac 762

vlan association subnet 762

vlan database 763

vlan makestatic 764

vlan protocol group 765

vlan protocol group add protocol 766

vlan protocol group name 767

vlan protocol group remove 767

vlan routing 768

34 TACACS+ Commands 771

Commands in this Chapter 772

key 772

port 773

priority 773

show tacacs 774

tacacs-server host 775

tacacs-server key 776

tacacs-server timeout 777

timeout 777

35 Voice VLAN Commands 779

Commands in this Chapter **780**

voice vlan **780**

voice vlan (Interface) **780**

voice vlan data priority **782**

show voice vlan **782**

36 802.1x Commands. 785

Local 802.1X Authentication Server **785**

MAC Authentication Bypass. **786**

Guest VLAN. **787**

802.1x Monitor Mode. **787**

RADIUS-based Dynamic VLAN Assignment. **788**

Commands in this Chapter **788**

dot1x dynamic-vlan enable **789**

dot1x initialize **790**

dot1x mac-auth-bypass **790**

dot1x max-req **791**

dot1x max-users **792**

dot1x port-control **793**

dot1x re-authenticate **794**

dot1x reauthentication **795**

dot1x system-auth-control monitor **795**

dot1x timeout guest-vlan-period **796**

dot1x timeout quiet-period **797**

dot1x timeout re-authperiod **798**

dot1x timeout server-timeout **799**

dot1x timeout supp-timeout **800**

dot1x timeout tx-period **801**

show dot1x **802**

show dot1x authentication-history **803**

show dot1x clients **805**

show dot1x interface **807**

show dot1x statistics **809**

show dot1x users **811**

clear dot1x authentication–history **812**

dot1x guest-vlan **813**

dot1x unauth-vlan **814**

show dot1x advanced **815**

radius-server attribute 4 . . . . . **816**

37 Data Center Technology Commands . . . 819

38 Data Center Bridging Commands 821

Data Center Bridging Exchange Protocol **821**

Interoperability with IEEE DCBX **822**

Port Roles **822**

Commands in this Chapter **825**

datacenter-bridging **826**

lldp dcbx version **826**

lldp tlv-select dcbxp **828**

lldp dcbx port-role **829**

show lldp tlv-select **830**

show lldp dcbx **832**

39 FIP Snooping Commands 839

Setting Up FIP Snooping **839**

Commands in this Chapter **840**

feature fip-snooping **841**

fip-snooping enable **842**

fip-snooping fc-map **843**

fip-snooping port-mode **844**

show fip-snooping **845**

show fip-snooping enode **847**

show fip-snooping fcf **849**

show fip-snooping sessions **852**

show fip-snooping statistics **860**

show fip-snooping vlan **867**

clear fip-snooping statistics **869**

40 Priority Flow Control Commands 871

Commands in this Chapter **872**

priority-flow-control mode **872**

priority-flow-control priority **873**

clear priority-flow-control statistics **875**

show interfaces priority-flow-control **875**

41 Layer 3 Commands 879

42 ARP Commands 881

ARP Aging **882**

Commands in this Chapter **882**

arp **882**

arp cachesize **883**

arp dynamicrenew **884**

arp purge **885**

arp resptime **886**

arp retries **887**

arp timeout **887**

clear arp-cache **888**

clear arp-cache management **889**

ip local-proxy-arp **890**

ip proxy-arp **890**

show arp **891**

43 DHCP Server and Relay Agent Commands 893

Commands in this Chapter **894**

ip dhcp pool **894**

bootfile **897**

clear ip dhcp binding **898**

clear ip dhcp conflict **899**

client-identifier **899**

client-name. **900**

default-router. **901**

dns-server (IP DHCP Pool Config) **902**

domain-name (IP DHCP Pool Config) **903**

hardware-address 904

host 905

ip dhcp bootp automatic 906

ip dhcp conflict logging 906

ip dhcp excluded-address 907

ip dhcp ping packets 908

lease 909

netbios-name-server 910

netbios-node-type 911

network 912

next-server 913

option 914

service dhcp 918

sntp 918

show ip dhcp binding 919

show ip dhcp conflict 920

show ip dhcp global configuration 921

show ip dhcp pool 922

show ip dhcp server statistics 922

44 DHCPv6 Commands 925

clear ipv6 dhcp 925

dns-server (IPv6 DHCP Pool Config) **926**

domain-name (IPv6 DHCP Pool Config) **926**

ipv6 dhcp pool **927**

ipv6 dhcp relay **928**

ipv6 dhcp server **929**

prefix-delegation **930**

service dhcpv6 . . . . . **932**

show ipv6 dhcp **933**

show ipv6 dhcp binding **933**

show ipv6 dhcp interface (User EXEC) **934**

show ipv6 dhcp interface (Privileged EXEC) **936**

show ipv6 dhcp pool **939**

show ipv6 dhcp statistics **940**

45 DVMRP Commands 943

Commands in this Chapter **943**

ip dvmrp **943**

ip dvmrp metric **944**

show ip dvmrp **945**

show ip dvmrp interface **946**

show ip dvmrp neighbor **946**

show ip dvmrp nexthop **947**

show ip dvmrp prune **948**

show ip dvmrp route **949**

46 IGMP Commands 951

Commands in this Chapter **952**

ip igmp **952**

ip igmp last-member-query-count **953**

ip igmp last-member-query-interval **954**

ip igmp query-interval **955**

ip igmp query-max-response-time **956**

ip igmp robustness **956**

ip igmp startup-query-count **957**

ip igmp startup-query-interval **958**

ip igmp version **959**

show ip igmp **959**

show ip igmp groups **960**

show ip igmp interface **961**

show ip igmp membership **963**

show ip igmp interface stats **963**

47 IGMP Proxy Commands 965

Commands in this Chapter **965**

ip igmp-proxy **965**

ip igmp-proxy reset-status **966**

ip igmp-proxy unsolicited-report-interval **967**

show ip igmp-proxy **968**

show ip igmp-proxy interface **969**

show ip igmp-proxy groups **970**

show ip igmp-proxy groups detail **970**

48 IP Helper/DHCP Relay Commands 973

Commands in this Chapter **975**

bootpdhcprelay maxhopcount **975**

bootpdhcprelay minwaittime **976**

clear ip helper statistics **977**

ip dhcp relay information check **977**

ip dhcp relay information check-reply **978**

ip dhcp relay information option **979**

ip dhcp relay information option-insert **980**

ip helper-address (global configuration) **981**

ip helper-address (interface configuration) **983**

ip helper enable **985**

show ip helper-address **986**

show ip dhcp relay 987

show ip helper statistics 988

49 IP Routing Commands 991

Static Routes/ECMP Static Routes 991

Static Reject Routes 992

Default Routes 992

Commands in this Chapter 992

encapsulation 993

ip address 993

ip mtu 995

ip netdirbcast 996

ip route 997

ip route default 998

ip route distance 999

ip routing 1000

routing 1001

show ip brief 1001

show ip interface 1002

show ip protocols 1005

show ip route 1006

show ip route configured 1008

show ip route preferences **1009**

show ip route summary **1010**

show ip traffic **1011**

show ip vlan **1013**

50 IPv6 PIM Commands 1015

ipv6 pim **1015**

ipv6 pim sparse (Global config) **1016**

ipv6 pim dense **1016**

ipv6 pim bsr-border **1017**

ipv6 pim bsr-candidate **1018**

ipv6 pim dr-priority **1019**

ipv6 pim hello-interval **1020**

ipv6 pim join-prune-interval **1020**

ipv6 pim register-rate-limit **1021**

ipv6 pim rp-address **1022**

ipv6 pim rp-candidate **1023**

ipv6 pim spt-threshold **1024**

ipv6 pim ssm **1025**

show ipv6 pimsm **1026**

show ipv6 pim bsr-router **1027**

show ipv6 pim interface **1028**

show ipv6 pim neighbor **1030**

show ipv6 pim rp hash **1032**

show ipv6 pim rp mapping **1033**

51 IPv6 Routing Commands 1035

IPv6 Limitations & Restrictions **1035**

Commands in this Chapter **1035**

clear ipv6 neighbors **1037**

clear ipv6 statistics **1037**

ipv6 address **1038**

ipv6 enable **1039**

ipv6 hop-limit **1040**

ipv6 host **1041**

ipv6 mld last-member-query-count **1041**

ipv6 mld last-member-query-interval **1042**

ipv6 mld-proxy **1043**

ipv6 mld-proxy reset-status **1043**

ipv6 mld-proxy unsolicit-rprt-interval **1044**

ipv6 mld query-interval **1045**

ipv6 mld query-max-response-time **1046**

ipv6 mld router **1046**

ipv6 mtu **1047**

ipv6 nd dad attempts **1048**

ipv6 nd managed-config-flag **1049**

ipv6 nd ns-interval **1050**

ipv6 nd other-config-flag **1051**

ipv6 nd prefix **1051**

ipv6 nd ra-interval **1053**

ipv6 nd ra-lifetime **1054**

ipv6 nd reachable-time **1054**

ipv6 nd suppress-ra **1055**

ipv6 route **1056**

ipv6 route distance **1057**

ipv6 unicast-routing **1058**

ping ipv6 . . . . . **1059**

ping ipv6 interface **1060**

show ipv6 brief **1061**

show ipv6 interface **1062**

show ipv6 interface management statistics **1064**

show ipv6 mld groups **1066**

show ipv6 mld interface **1069**

show ipv6 mld-proxy **1071**

show ipv6 mld-proxy groups **1073**

show ipv6 mld-proxy groups detail **1074**

show ipv6 mld-proxy interface **1076**

show ipv6 mld traffic **1077**

show ipv6 neighbors **1079**

show ipv6 route **1080**

show ipv6 route preferences **1081**

show ipv6 route summary **1082**

show ipv6 traffic **1083**

show ipv6 vlan **1086**

traceroute ipv6 . . . . . **1086**

52 Loopback Interface Commands 1089

Commands in this Chapter **1089**

interface loopback **1089**

show interfaces loopback **1090**

53 Multicast Commands 1093

Commands in this Chapter **1094**

ip mcast boundary **1095**

ip mroute **1095**

ip multicast **1096**

ip multicast ttl-threshold **1097**

ip pim **1098**

ip pim bsr-border **1099**

ip pim bsr-candidate **1099**

ip pim dense **1101**

ip pim dr-priority **1101**

ip pim hello-interval **1102**

ip pim join-prune-interval **1103**

ip pim register-rate-limit **1104**

ip pim rp-address **1104**

ip pim rp-candidate **1105**

ip pim sparse **1106**

ip pim ssm **1107**

ip pim spt-threshold **1108**

show bridge multicast address-table count **1109**

show ip multicast **1110**

show ip mcast boundary **1111**

show ip multicast interface **1112**

show ip mcast mroute **1113**

show ip mcast mroute group **1113**

show ip mcast mroute source **1114**

show ip mcast mroute static **1115**

show ip pim bsr-router **1116**

show ip pim interface **1117**

show ip pim neighbor **1119**

show ip pim rp hash **1120**

show ip pim rp mapping **1121**

54 IPv6 Multicast Commands 1123

ipv6 pimsm (Global config) **1123**

ipv6 pimsm (VLAN Interface config) **1124**

ipv6 pimsm bsr-border **1124**

ipv6 pimsm bsr-candidate **1125**

ipv6 pimsm dr-priority **1126**

ipv6 pimsm hello-interval **1127**

ipv6 pimsm join-prune-interval **1127**

ipv6 pimsm register-threshold **1128**

ipv6 pimsm rp-address **1129**

ipv6 pimsm rp-candidate **1130**

ipv6 pimsm spt-threshold **1130**

ipv6 pimsm ssm **1131**

show ipv6 pimsm **1132**

show ipv6 pimsm bsr **1133**

show ipv6 pimsm interface **1134**

show ipv6 pimsm neighbor **1135**

show ipv6 pimsm rphash **1136**

show ipv6 pimsm rp mapping **1137**

55 OSPF Commands 1139

Route Preferences **1140**

OSPF Equal Cost Multipath (ECMP) **1140**

Forwarding of OSPF Opaque LSAs Enabled by Default **1141**

Passive Interfaces **1141**

Graceful Restart **1142**

Commands in this Chapter **1142**

area default-cost (Router OSPF) **1143**

area nssa (Router OSPF) **1144**

area nssa default-info-originate **1146**

area nssa no-redistribute **1147**

area nssa no-summary **1147**

area nssa translator-role **1148**

area nssa translator-stab-intv **1149**

area range (Router OSPF) **1150**

area stub **1151**

area stub no-summary **1152**

area virtual-link **1153**

area virtual-link authentication **1155**

area virtual-link dead-interval **1156**

area virtual-link hello-interval **1157**

area virtual-link retransmit-interval **1158**

area virtual-link transmit-delay **1159**

auto-cost **1160**

bandwidth **1161**

capability opaque **1162**

clear ip ospf **1162**

compatible rfc1583 . . . . . **1163**

default-information originate **1164**

default-metric **1165**

distance ospf **1166**

distribute-list out **1167**

enable **1168**

exit-overflow-interval **1169**

external-lsdb-limit **1170**

ip ospf area **1171**

ip ospf authentication **1172**

ip ospf cost **1173**

ip ospf dead-interval **1173**

ip ospf hello-interval **1174**

ip ospf mtu-ignore **1175**

ip ospf network **1176**

ip ospf priority **1177**

ip ospf retransmit-interval **1177**

ip ospf transmit-delay **1178**

maximum-paths **1179**

network area **1180**

nsf helper **1181**

nsf helper strict-lsa-checking **1182**

nsf restart-interval **1183**

passive-interface default **1184**

passive-interface **1184**

redistribute **1185**

router-id **1186**

router ospf **1187**

show ip ospf **1188**

show ip ospf abr **1193**

show ip ospf area **1194**

show ip ospf asbr **1196**

show ip ospf database 1197

show ip ospf database database-summary 1200

show ip ospf interface 1202

show ip ospf interface brief 1204

show ip ospf interface stats 1204

show ip ospf neighbor 1205

show ip ospf range 1208

show ip ospf statistics 1209

show ip ospf stub table 1210

show ip ospf virtual-link 1211

show ip ospf virtual-links brief 1212

timers spf 1213

56 OSPFv3 Commands 1215

area default-cost (Router OSPFv3) 1216

area nssa (Router OSPFv3) 1217

area nssa default-info-originate 1218

area nssa no-redistribute 1219

area nssa no-summary 1220

area nssa translator-role 1221

area nssa translator-stab-intv 1222

area range (Router OSPFv3) 1223

area stub **1224**

area stub no-summary **1225**

area virtual-link **1226**

area virtual-link dead-interval. **1228**

area virtual-link hello-interval **1228**

area virtual-link retransmit-interval. **1229**

area virtual-link transmit-delay **1230**

default-information originate **1231**

default-metric **1232**

distance ospf. **1233**

enable **1234**

exit-overflow-interval **1235**

external-lsdb-limit **1235**

ipv6 ospf **1236**

ipv6 ospf area **1237**

ipv6 ospf cost. **1238**

ipv6 ospf dead-interval. **1239**

ipv6 ospf hello-interval **1239**

ipv6 ospf mtu-ignore **1240**

ipv6 ospf network **1241**

ipv6 ospf priority **1242**

ipv6 ospf retransmit-interval **1243**

ipv6 ospf transmit-delay **1244**

ipv6 router ospf **1244**

maximum-paths **1245**

nsf **1246**

nsf helper **1247**

nsf helper strict-lsa-checking **1248**

nsf restart-interval **1248**

passive-interface **1249**

passive-interface default **1250**

redistribute **1251**

router-id **1251**

show ipv6 ospf **1252**

show ipv6 ospf abr **1256**

show ipv6 ospf area **1257**

show ipv6 ospf asbr **1258**

show ipv6 ospf border-routers **1259**

show ipv6 ospf database **1259**

show ipv6 ospf database database-summary **1262**

show ipv6 ospf interface **1263**

show ipv6 ospf interface brief **1265**

show ipv6 ospf interface stats **1266**

show ipv6 ospf interface vlan **1267**

show ipv6 ospf neighbor **1269**

show ipv6 ospf range **1270**

show ipv6 ospf stub table **1271**

show ipv6 ospf virtual-links **1272**

show ipv6 ospf virtual-link brief **1273**

57 Router Discovery Protocol Commands 1275

Commands in this Chapter **1275**

ip irdp **1275**

ip irdp address **1277**

ip irdp holdtime **1278**

ip irdp maxadvertinterval **1279**

ip irdp minadvertinterval **1280**

ip irdp multicast **1281**

ip irdp preference **1282**

show ip irdp **1282**

58 Routing Information Protocol Commands 1285

Commands in this Chapter **1285**

auto-summary 1285

default-information originate 1286

default-metric 1287

distance rip 1287

distribute-list out 1288

enable 1289

hostroutesaccept 1290

ip rip 1290

ip rip authentication 1291

ip rip receive version 1292

ip rip send version 1293

redistribute 1294

router rip 1295

show ip rip 1296

show ip rip interface 1297

show ip rip interface brief 1298

split-horizon 1299

59 Tunnel Interface Commands 1301

Commands in this Chapter 1301

interface tunnel 1302

show interfaces tunnel 1302

tunnel destination **1303**

tunnel mode ipv6ip **1304**

tunnel source **1305**

60 Virtual Router Redundancy Protocol Commands 1307

Pingable VRRP Interface **1307**

VRRP Route/Interface Tracking **1308**

Interface Tracking **1309**

Route Tracking **1309**

Commands in this Chapter **1309**

ip vrrp **1310**

vrrp accept-mode **1310**

vrrp authentication **1311**

vrrp description **1312**

vrrp ip **1313**

vrrp mode **1314**

vrrp preempt **1315**

vrrp priority **1316**

vrrp timers advertise **1317**

vrrp timers learn **1318**

vrrp track interface **1319**

vrrp track ip route **1320**

show vrrp **1322**

show vrrp interface **1325**

show vrrp interface brief **1327**

show vrrp interface stats **1328**

ip vrrp accept-mode **1329**

show ip vrrp interface **1330**

61 Utility Commands 1333

62 Auto-Install Commands 1335

Commands in this Chapter **1336**

boot auto-copy-sw **1336**

boot auto-copy-sw allow-downgrade **1337**

boot host autoreboot **1338**

boot host autosave **1339**

boot host dhcp **1339**

boot host retrycount **1340**

show auto-copy-sw **1341**

show boot **1342**

63 Captive Portal Commands 1345

Commands in this Chapter **1345**

authentication timeout **1347**

captive-portal **1347**

enable **1348**

http port **1349**

https port **1349**

show captive-portal **1350**

show captive-portal status **1351**

block **1352**

configuration **1353**

enable **1353**

group **1354**

interface **1355**

locale **1355**

name (Captive Portal) **1356**

protocol **1357**

redirect **1357**

redirect-url **1358**

session-timeout **1358**

verification **1359**

captive-portal client deauthenticate **1360**

show captive-portal client status **1360**

show captive-portal configuration client status . . . **1361**

show captive-portal interface client status **1362**

show captive-portal interface configuration status **1364**

clear captive-portal users **1365**

no user **1365**

show captive-portal user **1366**

user group **1367**

user-logout **1368**

user name **1369**

user password **1369**

user session-timeout **1370**

show captive-portal configuration **1371**

show captive-portal configuration interface **1372**

show captive-portal configuration locales **1373**

show captive-portal configuration status **1374**

user group **1375**

user group moveusers **1376**

user group name **1376**

64 CLI Macro Commands 1379

Commands in this Chapter 1380

macro name 1380

macro global apply 1381

macro global trace 1382

macro global description 1383

macro apply 1384

macro trace 1385

macro description 1386

show parser macro 1386

65 Clock Commands 1389

Real-time Clock 1389

Simple Network Time Protocol 1389

Commands in this Chapter 1390

show sntp configuration 1390

show sntp server 1391

show sntp status 1393

sntp authenticate 1394

sntp authentication-key 1395

sntp broadcast client enable 1396

sntp client poll timer 1396

sntp server 1397

sntp trusted-key 1398

sntp unicast client enable 1399

clock timezone hours-offset 1400

no clock timezone 1400

clock summer-time recurring 1401

clock summer-time date 1402

no clock summer-time 1403

show clock 1404

66 Command Line Configuration Scripting Commands 1407

Commands in this Chapter 1407

script apply 1407

script delete 1408

script list 1409

script show 1409

script validate 1410

67 Configuration and Image File Commands 1413

File System Commands 1413

Command Line Interface Scripting **1413**

Commands in this Chapter **1413**

boot system **1414**

clear config **1415**

copy **1415**

delete **1421**

delete backup-config **1422**

delete backup-image **1422**

delete startup-config **1423**

dir **1424**

erase **1425**

filedescr **1425**

rename **1426**

show backup-config **1427**

show bootvar **1428**

show running-config **1429**

show startup-config **1430**

update bootcode **1432**

write **1433**

68 Denial of Service Commands 1435

Commands in this Chapter **1436**

dos-control firstfrag 1437

dos-control icmp 1437

dos-control l4port 1438

dos-control sipdip 1439

dos-control tcpflag 1440

dos-control tcpfrag 1440

ip icmp echo-reply 1441

ip icmp error-interval 1442

ip unreachables 1443

ip redirects 1443

ipv6 icmp error-interval 1444

ipv6 unreachables 1445

show dos-control 1445

69 Line Commands 1447

exec-timeout 1447

history 1448

history size 1449

line 1449

show line 1450

speed 1452

70 Management ACL Commands 1453

Commands in this Chapter **1453**

deny (management) **1454**

management access-class **1455**

management access-list **1456**

permit (management) **1457**

show management access-class **1459**

show management access-list **1460**

71 Mode Commands 1461

configure terminal **1461**

do **1461**

72 Password Management Commands 1463

Configurable Minimum Password Length **1463**

Password History **1463**

Password Aging **1463**

User Lockout **1463**

Password Strength **1464**

Commands in this Chapter **1465**

passwords aging **1466**

passwords history **1466**

passwords lock-out **1467**

passwords min-length **1468**

passwords strength-check **1469**

passwords strength minimum uppercase-letters . . . **1470**

passwords strength minimum lowercase-letters . . . **1471**

passwords strength minimum numeric-characters **1472**

passwords strength minimum special-characters **1473**

passwords strength max-limit consecutive-characters **1473**

passwords strength max-limit repeated-characters **1474**

passwords strength minimum character-classes **1475**

passwords strength exclude-keyword **1476**

enable password encrypted **1477**

show passwords configuration **1477**

show passwords result **1479**

73 PHY Diagnostics Commands 1481

show copper-ports tdr **1481**

show fiber-ports optical-transceiver **1482**

test copper-port tdr. **1483**

74 RMON Commands 1485

Commands in this Chapter **1485**

rmon alarm **1485**

rmon collection history **1488**

rmon event **1489**

show rmon alarm. **1490**

show rmon alarms **1492**

show rmon collection history **1493**

show rmon events **1494**

show rmon history **1495**

show rmon log **1499**

show rmon statistics. **1500**

75 SDM Templates Commands 1505

Commands in this Chapter **1505**

sdm prefer **1505**

show sdm prefer **1507**

76 Serviceability Tracing Packet Commands 1511

Commands in this Chapter **1511**

debug arp **1512**

debug auto-voip **1513**

debug clear **1513**

debug console **1514**

debug dot1x **1514**

debug igmpsnooping **1515**

debug ip acl **1516**

debug ip dvmrp **1516**

debug ip igmp **1517**

debug ip mcache **1518**

debug ip pimdm packet **1519**

debug ip pimsm packet **1520**

debug ip vrrp **1520**

debug ipv6 dhcp **1521**

debug ipv6 mcache **1522**

debug ipv6 mld **1522**

debug ipv6 pimdm **1523**

debug ipv6 pimsm **1524**

debug isdp **1525**

debug lacp **1526**

debug mldsnooping **1526**

debug ospf **1527**

debug ospfv3 . . . . . **1528**

debug ping **1528**

debug rip **1529**

debug sflow **1530**

debug spanning-tree **1530**

debug vrrp **1531**

show debugging **1531**

77 Sflow Commands 1533

Commands in this Chapter **1533**

sflow destination **1533**

sflow polling **1535**

sflow polling (Interface Mode) **1536**

sflow sampling **1537**

sflow sampling (Interface Mode) **1538**

show sflow agent **1539**

show sflow destination **1540**

show sflow polling **1541**

show sflow sampling **1542**

78 SNMP Commands 1545

Commands in this Chapter **1545**

show snmp **1545**

show snmp engineID **1547**

show snmp filters **1548**

show snmp group **1549**

show snmp user **1550**

show snmp views **1552**

show trapflags **1553**

snmp-server community **1555**

snmp-server community-group **1557**

snmp-server contact **1558**

snmp-server enable traps **1558**

snmp-server engineID local **1561**

snmp-server filter **1562**

snmp-server group **1564**

snmp-server host **1565**

snmp-server location **1567**

snmp-server user **1568**

snmp-server view **1569**

snmp-server v3-host **1571**

79 SSH Commands 1573

Commands in this Chapter **1573**

crypto key generate dsa **1573**

crypto key generate rsa **1574**

crypto key pubkey-chain ssh **1575**

ip ssh port **1576**

ip ssh pubkey-auth **1577**

ip ssh server **1577**

key-string **1578**

show crypto key mypubkey **1580**

show crypto key pubkey-chain ssh **1581**

show ip ssh **1582**

user-key **1583**

80 Syslog Commands 1585

CLI Logged to Local File and Syslog Server **1585**

Commands in this Chapter **1586**

clear logging **1587**

clear logging file **1587**

description **1588**

level **1589**

logging cli-command **1589**

logging **1591**

logging audit **1593**

logging buffered **1594**

logging console **1595**

logging file **1596**

logging on **1597**

logging snmp **1598**

logging web-session **1598**

port **1599**

show logging **1600**

show logging file **1601**

show syslog-servers **1602**

81 System Management Commands 1605

asset-tag **1605**

banner exec **1606**

banner login **1607**

banner motd **1608**

banner motd acknowledge **1609**

clear checkpoint statistics **1610**

cut-through mode **1611**

exec-banner **1611**

hostname **1612**

locate **1613**

login-banner **1614**

media-type **1614**

member **1616**

motd-banner **1617**

ping **1617**

reload **1619**

set description **1620**

slot **1621**

show banner **1622**

show boot-version **1623**

show checkpoint statistics **1624**

show cut-through mode **1625**

show interfaces advanced firmware **1626**

show interfaces media-type **1627**

show memory cpu **1628**

show power-usage-history **1628**

show process cpu **1630**

show sessions **1632**

show slot 1633

show supported cardtype 1634

show supported switchtype 1636

show switch 1638

show system 1646

show system id 1647

show system power 1648

show system temperature 1649

show tech-support 1650

show users 1652

show version 1653

stack 1654

telnet 1655

traceroute 1658

82 Telnet Server Commands 1661

Commands in this Chapter 1661

ip telnet server disable 1661

ip telnet port 1662

show ip telnet 1663

83 Terminal Length Commands 1665

terminal length **1665**

84 Time Ranges Commands 1667

time-range **1667**

absolute **1668**

periodic **1669**

show time-range **1671**

85 User Interface Commands 1675

enable **1675**

end **1676**

exit **1676**

quit **1677**

86 Web Server Commands 1679

Web Sessions **1679**

Commands in this Chapter **1680**

common-name **1680**

country **1681**

crypto certificate generate **1682**

crypto certificate import **1683**

crypto certificate request **1685**

duration **1686**

ip http port **1686**

ip http server **1687**

ip http secure-certificate **1688**

ip http secure-port **1689**

ip http secure-server **1689**

key-generate **1690**

location **1691**

organization-unit **1692**

show crypto certificate mycertificate **1692**

show ip http server status **1694**

show ip http server secure status **1694**

state **1696**

A Appendix A: List of Commands 1699

1

Command Groups

Introduction

The Command Line Interface (CLI) is a network management application operated through an ASCII terminal without the use of a Graphic User Interface (GUI) driven software application. By directly entering commands, the user has greater configuration flexibility. The CLI is a basic command-line interpreter similar to the UNIX C shell.

A switch can be configured and maintained by entering commands from the CLI, which is based solely on textual input and output with commands being entered by a terminal keyboard and the output displayed as text via a terminal monitor. The CLI can be accessed from a console terminal connected to an EIA/TIA-232 port or through a Telnet/SSH session.

This guide describes how the CLI is structured, describes the command syntax, and describes the command functionality.

This guide also provides information for configuring the PowerConnect switch, details the procedures, and provides configuration examples. Basic installation configuration is described in the *User's Guide* and must be completed before using this document.

Command Groups

The system commands can be broken down into four sets of functional groups: Layer 2, Data Center Technology, Layer 3, and Utility.

Table 1-1. System Command Groups

Command Group	Description
Layer 2 Commands	
AAA	Configures connection security including authorization and passwords.
ACL	Configures and displays ACL information.
Address Table	Configures bridging address tables.
Auto-VoIP	Configures Auto VoIP for IP phones on a switch.
CDP Interoperability	Configures Cisco® Discovery Protocol (CDP).
DHCP L2 Relay	Enables the Layer 2 DHCP Relay agent for an interface.
DHCP Management Interface	Configures DHCP snooping and whether an interface is trusted for filtering.
Dynamic ARP Inspection	Configures for rejection of invalid and malicious ARP packets.
Ethernet Configuration	Configures all port configuration options for example ports, storm control, port speed and auto-negotiation.
Ethernet CFM	Configures and displays GVRP configuration and information.
IGMP Snooping	Configures IGMP snooping and displays IGMP configuration and IGMP information.
IGMP Snooping Querier	Configures IGMP Snooping Querier and displays IGMP Snooping Querier information.
IP Addressing	Configures and manages IP addresses on the switch.
IPv6 ACL	Configures and displays ACL information for IPv6.
IPv6 MLD Snooping	Configures IPv6 MLD Snooping.
IPv6 MLD Snooping Querier	Configures IPv6 Snooping Querier and displays IPv6 Snooping Querier information.
Link Dependency	Configures and displays link dependency information.

Table 1-1. System Command Groups *(continued)*

Command Group	Description
LLDP	Configures and displays LLDP information.
Port Channel	Configures and displays Port channel information.
Port Monitor	Monitors activity on specific target ports.
QoS	Configures and displays QoS information.
Radius	Configures and displays RADIUS information.
Spanning Tree	Configures and reports on Spanning Tree protocol.
TACACS+	Configures and displays TACACS+ information.
VLAN	Configures VLANs and displays VLAN information.
802.1x	Configures and displays commands related to 802.1x security protocol.
Data Center Technology Commands	
Data Center Bridging Commands	Data Center Bridging Exchange Protocol (DCBX) is used by DCB devices to exchange configuration information with directly connected peers. The protocol is also used to detect misconfiguration of the peer DCB devices and, optionally, for configuration of peer DCB devices.
FIP Snooping Commands	FCoE Initialization Protocol (FIP) is used to perform the functions of FC_BB_E device discovery, initialization and maintenance. FIP snooping is a frame inspection method used by FIP Snooping Bridges to monitor FIP frames and apply policies based upon the L2 header information in those frames, following recommendations in Annex C of FC_BB_5 Rev 2.00
Priority Flow Control Commands	Provides priority-based flow control that can pause (inhibit transmission of) individual priorities within a single physical link.
Layer 3 Commands	
ARP (IPv4)	Manages Address Resolution Protocol functions.
DHCP Server and Relay Agent (IPv4)	Manages DHCP/BOOTP operations on the system.
DHCPv6	Configures IPv6 DHCP functions.

Table 1-1. System Command Groups *(continued)*

Command Group	Description
DVMRP (Mcast)	Configures DVMRP operations.
IGMP (Mcast)	Configures IGMP operations.
IGMP Proxy (Mcast)	Manages IGMP Proxy on the system.
IP Helper/DHCP Relay	Configures relay of UDP packets.
IP Routing (IPv4)	Configures IP routing and addressing.
IPv6 Multicast	Manages IPv6 Multicasting on the system.
IPv6 Routing	Configures IPv6 routing and addressing.
Loopback Interface (IPv6)	Manages Loopback configurations.
Multicast (Mcast)	Manages Multicasting on the system.
OSPF (IPv4)	Manages shortest path operations.
OSPFv3 (IPv6)	Manages IPv6 shortest path operations.
Router Discovery Protocol (IPv4)	Manages router discovery operations.
Routing Information Protocol (IPv4)	Configures RIP activities.
Tunnel Interface (IPv6)	Managing tunneling operations.
Virtual Router Redundancy (IPv4)	Controls virtual LAN routing.
Virtual Router Redundancy (IPv4)	Manages router redundancy on the system.
Utility Commands	
Auto-Install	Automatically configures switch when a configuration file is not found.
Captive Portal	Blocks clients from accessing network until user verification is established.
Clock	Configures the system clock.
Command Line Configuration Scripting	Manages the switch configuration files.

Table 1-1. System Command Groups *(continued)*

Command Group	Description
Denial of Service	Provides several Denial of Service options.
Line	Configures the console, SSH, and remote Telnet connection.
Management ACL	Configures and displays management access-list information.
Password Management	Provides password management.
PHY Diagnostics	Diagnoses and displays the interface status.
RMON	Can be configured through the CLI and displays RMON information.
Serviceability Tracing	Controls display of debug output to serial port or telnet console.
sFlow	Configures sFlow monitoring.
SNMP	Configures SNMP communities, traps and displays SNMP information.
SSH	Configures SSH authentication.
Syslog	Manages and displays syslog messages.
System Management	Configures the switch clock, name and authorized users.
Telnet Server	Configures Telnet service on the switch and displays Telnet information.
User Interface	Describes user commands used for entering CLI commands.
Web Server	Configures web-based access to the switch.

Mode Types

The tables on the following pages use these abbreviations for Command Mode names.

- AAA — IAS User Configuration
- ARPA — ARP ACL Configuration
- CC — Crypto Configuration

- CP — Captive Portal Configuration
- CPI — Captive Portal Instance
- CMC — Class-Map Configuration
- DP — IP DHCP Pool Configuration
- GC — Global Configuration
- IC — Interface Configuration (reached via **interface vlan xxx** command)
- IP — IP Access List Configuration
- IR — Interface Range
- KC — Key Chain
- KE — Key
- L — Logging
- LC — Line Configuration
- LD — Link Dependency
- MA — Management Access-level
- MC — MST Configuration
- MDC — Maintenance Domain Configuration
- ML — MAC-List Configuration
- MSC — Mail Server Configuration
- MT — MAC-acl
- PE — Privileged EXEC
- PM — Policy Map Configuration
- PCGC — Policy Map Global Configuration
- PCMC — Policy Class Map Configuration
- R — Radius
- RIP — Router RIP Configuration
- RC — Router Configuration
- ROSPF — Router Open Shortest Path First
- ROSV3 — Router Open Shortest Path First Version 3
- SG — Stack Global Configuration

- SP — SSH Public Key
- SK — SSH Public Key-chain
- TC — TACACS Configuration
- TRC — Time Range Configuration
- UE — User EXEC
- VLAN — VLAN Configuration (reached via **vlan database** command)
- v6ACL — IPv6 Access List Configuration
- v6CMC — IPv6 Class-Map Configuration
- v6DP — IPv6 DHCP Pool Configuration

Layer 2 Commands

AAA

Command	Description	Mode[a]
aaa authentication dot1x default	Specifies an authentication method for 802.1x clients.	GC
aaa authentication enable	Defines authentication method lists for accessing higher privilege levels.	GC
aaa authentication login	Defines login authentication.	GC
aaa authorization network default radius	Enables the switch to accept VLAN assignment by the RADIUS server.	GC
aaa ias-user username	Configures IAS users and their attributes. Also changes the mode to aa user config mode.	GC
clear aaa ias-users	Deletes all IAS users.	PE
enable authentication	Specifies the authentication method list when accessing a higher privilege level from a remote telnet or console.	LC
enable password	Sets a local password to control access to the normal level.	GC
ip http authentication	Specifies authentication methods for http.	GC
ip https authentication	Specifies authentication methods for https.	GC

Command	Description	Mode[a]
login authentication	Specifies the login authentication method list for a remote telnet or console.	LC
password (IAS)	Configures a password for a user.	AAA
password	Specifies a password on a line.	LC
password	Specifies a user password	UE
show aaa ias-users	Displays configured IAS users and their attributes.	PE
show authentication methods	Shows information about authentication methods.	PE
show user accounts	Displays information about the local user database.	PE
show users login-history	Displays information about login histories of users.	PE
username	Establishes a username-based authentication system.	GC
username password encrypted username unlock	Transfers local user passwords between devices without having to know the passwords.	GC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

ACL

Command	Description	Mode[a]
access-list	Creates an Access Control List (ACL) that is identified by the parameter *accesslistnumber.*	GC
deny | permit	The deny command denies traffic if the conditions defined in the deny statement are matched. The permit command allows traffic if the conditions defined in the permit statement are matched.	ML
ip access-group	Attaches a specified access-control list to an interface.	GC or IC

Command	Description	Mode[a]
mac access-group	Attaches a specific MAC Access Control List (ACL) to an interface in the in-bound direction.	GC or IC
mac access-list extended	Creates the MAC Access Control List (ACL) identified by the *name* parameter.	GC
mac access-list extended rename	Renames the existing MAC Access Control List (ACL) name.	GC
service-acl input	Blocks Link Local Protocol Filtering (LLPF) protocol(s) on a given port.	IC
show service-acl interface	Displays the status of LLPF rules configured on a particular port or on all the ports.	PE
show ip access-lists	Displays an Access Control List (ACL) and all of the rules that are defined for the ACL.	PE
show mac access-list	Displays a MAC access list and all of the rules that are defined for the ACL.	PE

a. For the meaning of each Mode abbreviation, see Mode Typeson page 79.

Address Table

Command	Description	Mode[a]
clear mac address-table	Removes any learned entries from the forwarding database.	PE
mac address-table aging-time	Sets the address table aging time.	GC
mac address-table multicast filtering	Enables filtering of Multicast addresses.	GC
mac address-table multicast forbidden address	Forbids adding a specific Multicast address to specific ports.	IC
mac address-table multicast forbidden forward-unregistered	Forbids a port to be a forwarding-unregistered-multicast-addresses port.	IC
mac address-table multicast forward-all	Enables forwarding of all Multicast packets on a port.	IC

Command	Description	Mode[a]
mac address-table multicast forward-unregistered	Enables the forwarding of unregistered multicast addresses.	IC
mac address-table multicast static	Registers MAC-layer Multicast addresses to the bridge table, and adds static ports to the group.	IC
mac address-table static	Adds a static MAC-layer station source address to the bridge table.	IC
port security	Disables new address learning on an interface.	IC
port security max	Configures the maximum addresses that can be learned on the port while the port is in port security mode.	IC
show mac address-table	Displays dynamically created entries in the bridge-forwarding database.	PE
show mac address-table address	Displays all entries in the bridge-forwarding database for the specified MAC address.	UE or PE
show mac address-table count	Displays the number of addresses present in the Forwarding Database.	PE
show mac address-table dynamic	Displays all entries in the bridge-forwarding database.	UE or PE
show mac address-table filtering	Displays the Multicast filtering configuration.	PE
show mac address-table interface	Displays the mac forwarding table entries for a specific interface.	UE or PE
show mac address-table multicast	Displays Multicast MAC address table information.	PE
show mac address-table static	Displays statically created entries in the bridge-forwarding database.	PE
show mac address-table vlan	Displays all entries in the bridge-forwarding database for the specified VLAN.	UE or PE
show ports security	Displays the port-lock status.	PE
show ports security addresses	Displays current dynamic addresses in locked ports.	PE

a. For the meaning of each Mode abbreviation, see Mode Typeson page 79.

Auto-VoIP

Command	Description	Mode[a]
switchport voice detect auto	Enables the VoIP Profile on all the interfaces of the switch.	GC or IC
show switchport voice	Displays the status of auto-voip on an interface or all interfaces.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

CDP Interoperability

Command	Description	Mode[a]
clear isdp counters	Clears the ISDP counters.	PE
clear isdp table	Clears entries in the ISDP table.	PE
isdp advertise-v2	Enables the sending of ISDP version 2 packets from the device.	GC
isdp enable	Enables ISDP on the switch.	GC or IC
isdp holdtime	Configures the hold time for ISDP packets that the switch transmits.	GC
isdp timer	Sets period of time between sending new ISDP packets.	GC
show isdp	Displays global ISDP settings.	PE
show isdp interface	Displays ISDP settings for the specified interface.	PE
show isdp entry	Displays ISDP entries.	PE
show isdp neighbors	Displays the list of neighboring devices.	PE
show isdp traffic	Displays ISDP statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

DHCP L2 Relay

Command	Description	Mode[a]
dhcp l2relay	Enables the Layer 2 DHCP Relay agent for an interface or globally.	GC or IC
dhcp l2relay circuit-id	Enables user to set the DHCP Option 82 Circuit ID for a VLAN.	GC
dhcp l2relay remote-id	Enables user to set the DHCP Option 82 Remote ID for a VLAN.	GC
dhcp l2relay vlan	Enables the L2 DHCP Relay agent for a set of VLANs.	GC
dhcp l2relay trust	Configures an interface to trust a received DHCP Option 82.	IC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

DHCP Management Interface

Command	Description	Mode[a]
release dhcp	Forces the DHCPv4 client to release a leased address.	PE
renew dhcp	Forces the DHCP client to immediately renew an IPv4 address lane.	PE
debug dhcp packet	Displays debug information about DHCPv4 client activities and traces DHCP v4 packets to and from the local DHCPv4 client.	PE
show dhcp lease	Displays IPv4 addresses leased from a DHCP server.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

DHCP Snooping

Command	Description	Mode[a]
clear ip dhcp snooping binding	Clears all DHCP Snooping entries.	PE

Command	Description	Mode[a]
clear ip dhcp snooping statistics	Clears all DHCP Snooping statistics.	PE
ip dhcp snooping	Enables DHCP snooping globally or on a specific VLAN.	GC or IC
ip dhcp snooping binding	Configures a static DHCP Snooping binding.	GC
ip dhcp snooping database	Configures the persistent location of the DHCP snooping database.	GC
ip dhcp snooping database write-delay	Configures the interval in seconds at which the DHCP Snooping database will be stored in persistent storage.	GC
ip dhcp snooping limit	Controls the maximum rate of DHCP messages.	IC
ip dhcp snooping log-invalid	Enables logging of DHCP messages filtered by the DHCP Snooping application.	IC
ip dhcp snooping trust	Configure a port as trusted for DHCP snooping.	IC
ip dhcp snooping verify mac-address	Enables the verification of the source MAC address with the client MAC address in the received DHCP message.	GC
show ip dhcp snooping	Displays the DHCP snooping global and per port configuration.	PE
show ip dhcp snooping binding	Displays the DHCP snooping binding entries.	PE
show ip dhcp snooping database	Displays the DHCP snooping configuration related to the database persistence.	PE
show ip dhcp snooping interfaces	Displays the DHCP Snooping status of the interfaces.	PE
show ip dhcp snooping statistics	Displays the DHCP snooping filtration statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Dynamic ARP Inspection

Command	Description	Mode[a]
arp access-list	Creates an ARP ACL.	GC
clear ip arp inspection statistics	Resets the statistics for Dynamic ARP Inspection on all VLANs.	PE
ip arp inspection filter	Configures the ARP ACL to be used for a single VLAN or a range of VLANs to filter invalid ARP packets.	GC
ip arp inspection limit	Configures the rate limit and burst interval values for an interface.	IC
ip arp inspection trust	Configures an interface as trusted for Dynamic ARP Inspection.	IC
ip arp inspection validate	Enables additional validation checks like source MAC address validation, destination MAC address validation or IP address validation on the received ARP packets.	GC
ip arp inspection vlan	Enables Dynamic ARP Inspection on a single VLAN or a range of VLANs.	GC
permit ip host mac host	Configures a rule for a valid IP address and MAC address combination used in ARP packet validation.	ARPA
show arp access-list	Displays the configured ARP ACLs with the rules.	PE
show ip arp inspection interfaces	Displays the Dynamic ARP Inspection configuration.	PE
show ip arp inspection interfaces	Displays the Dynamic ARP Inspection configuration on all the DAI enabled interfaces.	PE
show ip arp inspection vlan	Displays the Dynamic ARP Inspection configuration on all the VLANs in the given VLAN range.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Email Alerting

Command	Description	Mode[a]
logging email	Enables email alerting and sets the lowest severity level for which log messages are emailed.	GC
logging email urgent	Sets the lowest severity level at which log messages are emailed in an urgent manner.	GC
logging traps	Sets the lowest severity level at which SNMP traps are logged.	GC
logging email message-type to-addr	Configures the To address field of the email.	GC
logging email from-addr	Configures the From address of the email.	GC
logging email message-type subject	Configures the subject.	GC
logging email logtime	Configures the value of how frequently the queued messages are sent.	GC
logging email test message-type	Tests whether or not an email is being sent to an SMTP server.	GC
show logging email statistics	Displays information on how many emails are sent, how many emails failed, when the last email was sent, how long it has been since the last email was sent, how long it has been since the email changed to disabled mode.	PE
clear logging email statistics	Clears the email alerting statistics.	GC
security	Sets the email alerting security protocol.	MSC
mail-server ip-address|hostname	Configures the SMTP server IP address and changes the mode to Mail Server Configuration Mode.	GC
port (Mail Server Configuration Mode)	Configures the TCP port to use for communication with the SMTP servers.	MSC
username (Mail Server Configuration Mode)	Configures the username required by the authentication.	MSC
password (Mail Server Configuration Mode)	Configures the password required to authenticate to the email server.	MSC

Command	Description	Mode[a]
show mail-server	Displays the configuration of all the mail servers or a particular mail server.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Ethernet Configuration

Command	Description	Mode[a]
clear counters	Clears statistics on an interface.	PE
description	Adds a description to an interface.	IC
duplex	Configures the full/half duplex operation of a given Ethernet interface when not using auto-negotiation.	IC
flowcontrol	Configures the flow control on a given interface.	GC
interface	Enters the interface configuration mode to configure parameters for an interface.	GC or IC
interface range	Enters the interface configuration mode to execute a command on multiple ports at the same time.	GC, IC, IR
mtu	Enables jumbo frames on an interface by adjusting the maximum size of a packet or maximum transmission unit (MTU).	IC
show interfaces advertise	Displays information about auto negotiation advertisement.	PE
show interfaces configuration	Displays the configuration for all configured interfaces.	UE
show interfaces counters	Displays traffic seen by the physical interface.	UE
show interfaces description	Displays the description for all configured interfaces.	UE
show interfaces detail	Displays the detail for all configured interfaces.	UE
show interfaces status	Displays the status for all configured interfaces.	UE
show statistics	Displays statistics for one port or for the entire switch.	PE

Command	Description	Mode[a]
show statistics switchport	Displays detailed statistics for a specific port or for the entire switch.	PE
show storm-control	Displays the storm control configuration.	PE
shutdown	Disables interfaces.	IC
speed	Configures the speed of a given Ethernet interface when not using auto-negotiation.	IC
storm-control broadcast	Enables Broadcast storm control.	IC
storm-control multicast	Enables the switch to count Multicast packets together with Broadcast packets.	IC
storm-control unicast	Enables Unicast storm control.	IC
switchport protected	Sets the port to Protected mode.	IC
switchport protected name	Configures a name for a protected group.	GC
show switchport protected	Displays protected group/port information.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Ethernet CFM

Command	Description	Mode[a]
ethernet cfm domain	Enters into maintenance domain config mode for an existing domain. Use the optional **level** parameter to create a domain and enter into maintenance domain config mode.	GC
service	Associates a VLAN with a maintenance domain.	MDC
ethernet cfm cc level	Initiates sending continuity checks (CCMs) at the specified interval and level on a VLAN monitored by an existing domain.	GC
ethernet cfm mep level	Creates a Maintenance End Point (MEP) on an interface at the specified level and direction.	IC
ethernet cfm mep enable	Enables a MEP at the specified level and direction.	IC
ethernet cfm mep active	Activates a MEP at the specified level and direction.	IC

Command	Description	Mode[a]
ethernet cfm mep archive-hold-time	Maintains internal information on a missing MEP.	IC
ethernet cfm mip level	Creates a Maintenance Intermediate Point (MIP) at the specified level.	IC
ping ethernet cfm	Generates a loopback message (LBM) from the configured MEP.	PE
traceroute ethernet cfm	Generates a link trace message (LTM) from the configured MEP.	PE
show ethernet cfm errors	Displays the cfm errors.	PE
show ethernet cfm domain	Displays the configured parameters in a maintenance domain.	PE
show ethernet cfm maintenance-points local	Displays the configured local maintenance points.	PE
show ethernet cfm maintenance-points remote	Displays the configured remote maintenance points.	PE
show ethernet cfm statistics	Displays the CFM statistics.	PE
debug cfm	Enables CFM debugging.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

GVRP

Command	Description	Mode[a]
clear gvrp statistics	Clears all the GVRP statistics information.	PE
garp timer	Adjusts the GARP application join, leave, and leaveall GARP timer values.	IC
gvrp enable (global)	Enables GVRP globally.	GC
gvrp enable (interface)	Enables GVRP on an interface.	IC
gvrp registration-forbid	De-registers all VLANs, and prevents dynamic VLAN registration on the port.	IC
gvrp vlan-creation-forbid	Enables or disables dynamic VLAN creation.	IC

Command	Description	Mode[a]
show gvrp configuration	Displays GVRP configuration information, including timer values, whether GVRP and dynamic VLAN creation is enabled, and which ports are running GVRP.	PE
show gvrp error-statistics	Displays GVRP error statistics.	UE
show gvrp statistics	Displays GVRP statistics.	UE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IGMP Snooping

Command	Description	Mode[a]
ip igmp snooping (Global)	In Global Config mode, Enables Internet Group Management Protocol (IGMP) snooping.	GC
ip igmp snooping (Interface)	Enables Internet Group Management Protocol (IGMP) snooping on a specific VLAN.	IC
ip igmp snooping host-time-out	Configures the host-time-out.	IC
ip igmp snooping leave-time-out	Configures the leave-time-out.	IC
ip igmp snooping mrouter-time-out	Configures the mrouter-time-out.	IC
show ip igmp snooping groups	Displays Multicast groups learned by IGMP snooping.	UE
show ip igmp snooping interface	Displays IGMP snooping configuration.	PE
show ip igmp snooping mrouter	Displays information on dynamically learned Multicast router interfaces.	PE
ip igmp snooping (VLAN)	In VLAN Config mode, enables IGMP snooping on a particular VLAN or on all interfaces participating in a VLAN.	VLAN
ip igmp snooping fast-leave	Enables or disables IGMP Snooping fast-leave mode on a selected VLAN.	VLAN

Command	Description	Mode[a]
ip igmp snooping groupmembership-interval	Sets the IGMP Group Membership Interval time on a VLAN.	VLAN
ip igmp snooping maxresponse	Sets the IGMP Maximum Response time on a particular VLAN.	VLAN
ip igmp snooping mcrtrexpiretime	Sets the Multicast Router Present Expiration time.	VLAN

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IGMP Snooping Querier

Command	Description	Mode[a]
ip igmp snooping querier	Enables/disables IGMP Snooping Querier on the system (Global Configuration mode) or on a VLAN.	GC, VLAN
ip igmp snooping querier election participate	Enables the Snooping Querier to participate in the Querier Election process when it discovers the presence of another Querier in the VLAN.	VLAN
ip igmp snooping querier query-interval	Sets the IGMP Querier Query Interval time.	GC
ip igmp snooping querier timer expiry	Sets the IGMP Querier timer expiration period.	GC
ip igmp snooping querier version	Sets the IGMP version of the query that the snooping switch is going to send periodically.	GC
show igmp snooping querier	Displays IGMP Snooping Querier information.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IP Addressing

Command	Description	Mode[a]
clear host	Deletes entries from the host name-to-address cache.	PE
clear ip address-conflict-detect	Clears the address conflict detection status in the switch.	PE

Command	Description	Mode[a]
ip address (Out-of-Band)	Sets an IP address for the service port.	IC
ip address-conflict-detect run	Triggers the switch to run active address conflict detection by sending gratuitous ARP packets for IPv4 addresses on the switch.	GC
ip address dhcp (Interface Config)	Acquires an IP address on an interface from the DHCP server.	IC
ip default-gateway	Defines a default gateway (router).	GC
ip domain-lookup	Enables IP DNS-based host name-to-address translation.	GC
ip domain-name	Defines a default domain name to complete unqualified host names.	GC
ip host	Configures static host name-to-address mapping in the host cache.	GC
ip name-server	Configures available name servers.	GC
ipv6 address (Interface Config)	Sets the IPv6 address of the management interface.	IC
ipv6 address (OOB Port)	Sets the IPv6 prefix on the out-of-band port.	IC
ipv6 address dhcp	Enables the DHCPv6 client on an IPv6 interface.	IC
ipv6 enable (Interface Config)	Enables IPv6 on the management interface.	GC
ipv6 enable (OOB Config)	Enables IPv6 operation on the out-of-band interface.	IC
ipv6 gateway (OOB Config)	Configures the address of the IPv6 gateway.	IC
show hosts	Displays the default domain name, a list of name server hosts, static and cached list of host names and addresses.	UE
show ip address-conflict	Displays the status information corresponding to the last detected address conflict.	UE or PE
show ip helper-address	Displays the ip helper addresses configuration.	PE

Command	Description	Mode[a]
show ipv6 dhcp interface out-of-band statistics	Displays IPv6 DHCP statistics for the out-of-band interface.	PE
show ipv6 interface out-of-band	Displays the IPv6 out-of-band port configuration.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IPv6 ACL

Command	Description	Mode[a]
{deny | permit}	Creates a new rule for the current IPv6 access list.	v6ACL
ipv6 access-list	Creates an IPv6 Access Control List (ACL) consisting of classification fields defined for the IP header of an IPv6 frame.	GC
ipv6 access-list rename	Changes the name of an IPv6 ACL.	GC
ipv6 traffic-filter	Attaches a specific IPv6 ACL to an interface or associates it with a VLAN ID in a given direction.	GC IC
show ipv6 access-lists	Displays an IPv6 access list (and the rules defined for it).	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IPv6 MLD Snooping

Command	Description	Mode[a]
ipv6 mld snooping immediate-leave	Enables or disables MLD Snooping immediate-leave admin mode on a selected interface or VLAN.	IC VLAN
ipv6 mld snooping groupmembership-interval	Sets the MLD Group Membership Interval time on a VLAN or interface.	IC VLAN
ipv6 mld snooping maxresponse	Sets the MLD Maximum Response time for an interface or VLAN.	IC or VLAN

Command	Description	Mode[a]
ipv6 mld snooping mcrtexpiretime	Sets the Multicast Router Present Expiration time.	IC
ipv6 mld snooping (Global)	Enables MLD Snooping on the system (Global Config Mode).	GC
ipv6 mld snooping (Interface)	Enables MLD Snooping on an interface.	IC
ipv6 mld snooping (VLAN)	Enables MLD Snooping on a particular VLAN and all interfaces participating in that VLAN.	VLAN
show ipv6 mld snooping	Displays MLD Snooping information.	PE
show ipv6 mld snooping groups	Displays the MLD Snooping entries in the MFDB table.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IPv6 MLD Snooping Querier

Command	Description	Mode[a]
ipv6 mld snooping querier	Enables MLD Snooping Querier on the system or on a VLAN.	GC or VLAN
ipv6 mld snooping querier address	Sets the global MLD Snooping Querier address on the system or on a VLAN.	GC or VLAN
ipv6 mld snooping querier election participate	Enables the Snooping Querier to participate in the Querier Election process when it discovers the presence of another Querier in the VLAN.	VLAN
ipv6 mld snooping querier query-interval	Sets the MLD Querier Query Interval time.	GC
ipv6 mld snooping querier timer expiry	Sets the MLD Querier timer expiration period.	GC
show ipv6 mld snooping querier	Displays MLD Snooping Querier information.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IP Source Guard

Command	Description	Mode[a]
ip verify source	Enables filtering of IP packets matching the source IP address.	IC
ip verify source port-security	Enables filtering of IP packets matching the source IP address and the source MAC address.	IC
ip verify binding	Configures static bindings.	GC
show ip verify interface	Displays the IPSG interface configuration.	PE
show ip verify source interface	Displays the bindings configured on a particular interface.	PE
show ip source binding	Displays all bindings (static and dynamic).	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

iSCSI Optimization

Link Dependency

Command	Description	Mode[a]
iscsi aging time	Sets aging time for iSCSI sessions.	GC
iscsi cos	Sets the quality of service profile that will be applied to iSCSI flows.	GC
iscsi enable	Enables Global Configuration mode command globally enables iSCSI awareness.	GC
iscsi target port	Configures an iSCSI target port (optionally configures target port address and name).	GC
show iscsi	Displays the iSCSI settings.	PE
show iscsi sessions	Displays the iSCSI sessions.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Command	Description	Mode[a]
action	Indicates if the link-dependency group should mirror or invert the status of the depended on interfaces.	LD
link-dependency group	Enters the link-dependency mode to configure a link-dependency group.	GC
add gigabitethernet	Adds member gigabit Ethernet port(s) to the dependency list.	LD
add tengigabitethernet	Adds member ten gigabit Ethernet port(s) to the dependency list.	LD
add port-channel	Adds member port-channels to the dependency list.	LD
depends-on	Adds the dependent Ethernet ports or port channels list.	LD
show link-dependency	Shows the link dependencies configured on a particular group.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

LLDP

Command	Description	Mode[a]
clear lldp remote-data	Deletes all data from the remote data table.	PE
clear lldp statistics	Resets all LLDP statistics.	PE
lldp notification	Enables remote data change notifications.	IC
lldp notification-interval	Limits how frequently remote data change notifications are sent.	GC
lldp receive	Enables the LLDP receive capability.	IC
lldp timers	Sets the timing parameters for local data transmission on ports enabled for LLDP.	GC
lldp transmit	Enables the LLDP advertise capability.	IC
lldp transmit-mgmt	Specifies that transmission of the local system management address information in the LLDPDUs is included.	IC
lldp transmit-tlv	Specifies which optional TLVs in the 802.1AB basic management set will be transmitted in the LLDPDUs.	IC
show lldp	Displays the current LLDP configuration summary.	PE
show lldp interface	Displays the current LLDP interface state.	PE
show lldp local-device	Displays the LLDP local data.	PE
show lldp remote-device	Displays the current LLDP remote data.	PE
show lldp statistics	Displays the current LLDP traffic statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Multicast VLAN Registration

Command	Description	Mode[a]
mvr	Enables MVR.	GC or IC
mvr group	Adds an MVR membership group.	GC
mvr mode	Changes the MVR mode type.	GC

Command	Description	Mode[a]
mvr querytime	Sets the MVR query response time.	GC
mvr vlan	Sets the MVR multicast VLAN.	GC
mvr immediate	Enables MVR Immediate Leave mode.	IC
mvr type	Sets the MVR port type.	IC
mvr vlan group	Use to participate in the specific MVR group.	IC
show mvr	Displays global MVR settings.	PE
show mvr members	Displays the MVR membership groups allocated.	PE
show mvr interface	Displays the MVR enabled interface configuration.	PE
show mvr traffic	Displays global MVR statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Port Channel

Command	Description	Mode[a]
channel-group	Associates a port with a port-channel.	IC
interface port-channel	Enters the interface configuration mode of a specific port-channel.	GC
interface range port-channel	Enters the interface configuration mode to configure multiple port-channels.	GC
hashing-mode	Sets the hashing algorithm on trunk ports.	IC (port-channel)
lacp port-priority	Configures the priority value for physical ports.	IC
lacp system-priority	Configures the system LACP priority.	GC
lacp timeout	Assigns an administrative LACP timeout.	IC
port-channel min-links	Sets the minimum number of links that must be up in order for the port channel interface to be declared up.	IC
show interfaces port-channel	Displays port-channel information.	PE

Command	Description	Mode[a]
show lacp	Displays LACP information for ports.	PE
show statistics port-channel	Displays port-channel statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Port Monitor

Command	Description	Mode[a]
monitor session	Configures a port monitoring session.	GC
show monitor session	Displays the port monitoring status.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

QoS

Command	Description	Mode[a]
assign-queue	Modifies the queue ID to which the associated traffic stream is assigned.	PCMC
class	Creates an instance of a class definition within the specified policy for the purpose of defining treatment of the traffic class through subsequent policy attribute statements.	PMC
class-map	Defines a new DiffServ class of type *match-all*, *match-any,* or *match-access-group*. For now, only *match-all* is available in the CLI.	GC
class-map rename	Changes the name of a DiffServ class.	GC
classofservice dotlp-mapping	Maps an 802.1p priority to an internal traffic class for a switch.	GC or IC
classofservice ip-dscp-mapping	Maps an IP DSCP value to an internal traffic class.	GC
classofservice trust	Sets the class of service trust mode of an interface.	GC or IC

Command	Description	Mode[a]
conform-color	Specifies for each outcome, the only possible actions are drop, setdscp-transmit, set-prec-transmit, or transmit.	PCMC
cos-queue min-bandwidth	Specifies the minimum transmission bandwidth for each interface queue.	GC or IC
cos-queue random-detect	Configures WRED queue management policy on an interface CoS queue.	IC
cos-queue strict	Activates the strict priority scheduler mode for each specified queue.	GC or IC
diffserv	Sets the DiffServ operational mode to active.	GC
drop	Use the **drop policy-class-map configuration** command to specify that all packets for the associated traffic stream are to be dropped at ingress.	PCMC
mark cos	Marks all packets for the associated traffic stream with the specified class of service value in the priority field of the 802.1p header.	PCMC
mark ip-dscp	Marks all packets for the associated traffic stream with the specified IP DSCP value.	PCMC
mark ip-precedence	Marks all packets for the associated traffic stream with the specified IP precedence value.	PCMC
match class-map	Adds add to the specified class definition the set of match conditions defined for another class.	CMC
match cos	Adds to the specified class definition a match condition for the Class of Service value.	CMC
match destination-address mac	Adds to the specified class definition a match condition based on the destination MAC address of a packet.	CMC
match dstip	Adds to the specified class definition a match condition based on the destination IP address of a packet.	CMC

Command	Description	Mode[a]
match dstip6	Adds to the specified class definition a match condition based on the destination IPv6 address of a packet.	v6CMC
match dstl4port	Adds to the specified class definition a match condition based on the destination layer 4 port of a packet using a single keyword, or a numeric notation.	CMC
match ethertype	Adds to the specified class definition a match condition based on the value of the ethertype.	CMC
match ip6flowlbl	Adds to the specified class definition a match condition based on the IPv6 flow label of a packet.	v6CMC
match ip dscp	Adds to the specified class definition a match condition based on the value of the IP DiffServ Code Point (DSCP) field in a packet.	CMC
match ip precedence	Adds to the specified class definition a match condition based on the value of the IP.	CMC
match ip tos	Adds to the specified class definition a match condition based on the value of the IP TOS field in a packet.	CMC
match protocol	Adds to the specified class definition a match condition based on the value of the IP Protocol field in a packet using a single keyword notation or a numeric value notation.	CMC
match source-address mac	Adds to the specified class definition a match condition based on the source MAC address of the packet.	CMC
match srcip	Adds to the specified class definition a match condition based on the source IP address of a packet.	CMC
match srcip6	Adds to the specified class definition a match condition based on the source IPv6 address of a packet.	v6CMC

Command	Description	Mode[a]
match srcl4port	Adds to the specified class definition a match condition based on the source layer 4 port of a packet using a single keyword, a numeric notation, or a numeric range notation.	CMC
match vlan	Adds to the specified class definition a match condition based on the value of the layer 2 VLAN Identifier field.	CMC
mirror	Mirrors all the data that matches the class defined to the destination port specified.	PCMC
police-simple	Establishes the traffic policing style for the specified class.	PCMC
policy-map	Establishes a new DiffServ policy or enters policy map configuration mode.	GC
redirect	Specifies that all incoming packets for the associated traffic stream are redirected to a specific egress interface (physical port or port-channel).	PCMC
service-policy	Attaches a policy to an interface in a particular direction.	GC or IC
show class-map	Displays all configuration information for the specified class.	PE
show classofservice dotlp-mapping	Displays the current Dot1p (802.1p) priority mapping to internal traffic classes for a specific interface.	PE
show classofservice ip-dscp-mapping	Displays the current IP DSCP mapping to internal traffic classes for a specific interface.	PE
show classofservice trust	Displays the current trust mode setting for a specific interface.	PE
show diffserv	Displays the DiffServ General Status information.	PE
show diffserv service interface	Displays policy service information for the specified interface and direction.	PE
show diffserv service interface port-channel	Displays policy service information for the specified interface and direction.	PE

Command	Description	Mode[a]
show diffserv service brief	Displays all interfaces in the system to which a DiffServ policy has been attached.	PE
show interfaces cos-queue	Displays the class-of-service queue configuration for the specified interface.	PE
show interfaces random-detect	Displays the WRED policy on an interface.	PE
show policy-map	Displays all configuration information for the specified policy.	PE
show policy-map interface	Displays policy-oriented statistics information for the specified interface and direction.	PE
show service-policy	Displays a summary of policy-oriented statistics information for all interfaces.	PE
traffic-shape	Specifies the maximum transmission bandwidth limit for the interface as a whole.	GC or IC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Radius

Command	Description	Mode[a]
aaa accounting network default start-stop group radius	Enables RADIUS accounting on the switch.	GC
acct-port	Sets the port that connects to the RADIUS accounting server.	
auth-port	Sets the port number for authentication requests of the designated radius server.	R
deadtime	Improves Radius response times when a server is unavailable by causing the unavailable server to be skipped.	R
key	Sets the authentication and encryption key for all RADIUS communications between the switch and the RADIUS daemon.	R

Command	Description	Mode[a]
msgauth	Enables the message authenticator attribute to be used for the RADIUS Authenticating server being configured.	R
name	Assigns a name to a RADIUS server.	R
primary	Specifies that a configured server should be the primary server in the group of authentication servers which have the same server name.	R
priority	Specifies the order in which the servers are to be used, with 0 being the highest priority.	R
radius-server deadtime	Improves RADIUS response times when servers are unavailable. Causes the unavailable servers to be skipped.	GC
radius-server host	Specifies a RADIUS server host.	GC
radius-server key	Sets the authentication and encryption key for all RADIUS communications between the switch and the RADIUS daemon.	GC
radius-server retransmit	Specifies the number of times the software searches the list of RADIUS server hosts.	GC
radius-server source-ip	Specifies the source IP address used for communication with RADIUS servers.	GC
radius-server timeout	Sets the interval for which a switch waits for a server host to reply.	GC
retransmit	Specifies the number of times the software searches the list of RADIUS server hosts before stopping the search.	R
show aaa servers	Displays the list of configured RADIUS servers and the values configured for the global parameters of the RADIUS client.	UE or PE
show radius-servers	Displays the RADIUS server settings.	PE
show radius-servers statistics	Shows the statistics for an authentication or accounting server.	PE
source-ip	Specifies the source IP address to be used for communication with RADIUS servers.	R

Command	Description	Mode[a]
timeout	Sets the timeout value in seconds for the designated radius server.	R
usage	Specifies the usage type of the server.	R

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Spanning Tree

Command	Description	Mode[a]
clear spanning-tree detected-protocols	Restarts the protocol migration process on all interfaces or on the specified interface.	PE
exit (mst)	Exits the MST configuration mode and applies configuration changes.	MC
instance (mst)	Maps VLANs to an MST instance.	MC
name (mst)	Defines the MST configuration name.	MC
revision (mst)	Defines the configuration revision number.	MC
show spanning-tree	Displays spanning tree configuration.	PE
show spanning-tree summary	Displays spanning tree settings and parameters for the switch.	PE
spanning tree	Enables spanning-tree functionality.	GC
spanning-tree auto-portfast	Sets the port to auto portfast mode.	IC
spanning-tree bpdu flooding	Allows flooding of BPDUs received on nonspanning-tree ports to all other non-spanning-tree ports.	GC
spanning-tree bpdu-protection	Enables BPDU protection on a switch.	GC
spanning-tree cost	Configures the spanning tree path cost for a port.	IC
spanning-tree disable	Disables spanning tree on a specific port.	IC
spanning-tree forward-time	Configures the spanning tree bridge forward time.	GC
spanning-tree guard	Selects whether loop guard or root guard is enabled on an interface.	IC

Command	Description	Mode[a]
spanning-tree loopguard	Enables loop guard on all ports.	GC
spanning-tree max-age	Configures the spanning tree bridge maximum age.	GC
spanning-tree max-hops	Sets the MSTP Max Hops parameter to a new value for the common and internal spanning tree.	GC
spanning-tree mode	Configures the spanning tree protocol.	GC
spanning-tree mst configuration	Enables configuring an MST region by entering the multiple spanning-tree (MST) mode.	GC
spanning-tree mst cost	Configures the path cost for multiple spanning tree (MST) calculations.	IC
spanning-tree mst port-priority	Configures port priority.	IC
spanning-tree mst priority	Configures the switch priority for the specified spanning tree instance.	GC
spanning-tree portfast	Enables PortFast mode.	IC
spanning-tree portfast bpdufilter default	Discards BPDUs received on spanningtree ports in portfast mode.	GC
spanning-tree portfast default	Enables Portfast mode on all ports.	GC
spanning-tree port-priority	Configures port priority.	IC
spanning-tree priority	Configures the spanning tree priority.	GC
spanning-tree tcnguard	Prevents a port from propagating topology change notifications.	IC
spanning-tree transmit hold-count	Set the maximum number of BPDUs that a bridge is allowed to send within a hello time window (2 seconds).	GC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

TACACS+

Command	Description	Mode[a]
key	Specifies the authentication and encryption key for all TACACS communications between the device and the TACACS server.	TC
port	Specifies a server port number.	TC
priority	Specifies the order in which servers are used.	TC
show tacacs	Displays TACACS+ server settings and statistics.	PE
tacacs-server host	Specifies a TACACS+ server host.	GC
tacacs-server key	Sets the authentication and encryption key for all TACACS+ communications between the switch and the TACACS+ daemon.	GC
tacacs-server timeout	Sets the interval for which the switch waits for a server host to reply.	GC
timeout	Specifies the timeout value in seconds.	TC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

VLAN

Command	Description	Mode[a]
dvlan-tunnel ethertype	Configures the EtherType for the interface.	GC
interface vlan	Enters the interface configuration (VLAN) mode.	GC
interface range vlan	Enters the interface configuration mode to configure multiple VLANs.	GC
mode dvlan-tunnel	Enables Double VLAN tunneling on the specified interface.	IC
name	Configures a name to a VLAN.	IC
protocol group	Attaches a *vlanid* to the protocol-based VLAN identified by *groupid*.	VLAN
protocol vlan group	Adds the physical unit/slot/port interface to the protocol-based VLAN identified by *groupid*.	IC

Command	Description	Mode[a]
protocol vlan group all	Adds all physical unit/slot/port interfaces to the protocol-based VLAN identified by *groupid*.	GC
show dvlan-tunnel	Displays all interfaces enabled for Double VLAN Tunneling.	PE
show dvlan-tunnel interface	Displays detailed information about Double VLAN Tunneling for the specified interface.	PE
show interfaces switchport	Displays switchport configuration.	PE
show port protocol	Displays the Protocol-Based VLAN information for either the entire system or for the indicated group.	PE
show vlan	Displays detailed information, including interface information and dynamic vlan type, for a specific VLAN.	PE
show vlan association mac	Displays the VLAN associated with a specific configured MAC address.	PE
show vlan association subnet	Displays the VLAN associated with a specific configured IP subnet.	PE
switchport access vlan	Configures the VLAN ID when the interface is in access mode.	IC
switchport forbidden vlan	Forbids adding specific VLANs to a port.	IC
switchport general acceptable-frame-type tagged-only	Discards untagged frames at ingress.	IC
switchport general allowed vlan	Adds or removes VLANs from a port in General mode.	IC
switchport general ingress-filtering disable	Disables port ingress filtering.	IC
switchport general pvid	Configures the PVID when the interface is in general mode.	IC
switchport mode	Configures the VLAN membership mode of a port.	IC
switchport trunk	Adds or removes VLANs from a trunk port.	IC

Command	Description	Mode[a]
vlan	Creates a VLAN.	VLAN
vlan (Global Config)	Configures a VLAN.	GC
vlan association mac	Associates a MAC address to a VLAN.	VLAN
vlan association subnet	Associates an IP subnet to a VLAN.	VLAN
vlan database	Enters the VLAN database configuration mode.	GC
vlan makestatic	Changes a dynamically created VLAN to a static VLAN.	VLAN
vlan protocol group	Adds protocol-based VLAN groups to the system.	GC
vlan protocol group add protocol	Adds a protocol to the protocol-based VLAN identified by *groupid*.	GC
vlan protocol group name	Adds a group name to the protocol-based VLAN identified by *groupid*.	GC
vlan protocol group remove	Removes the protocol-base VLAN group identified by *groupid*.	GC
vlan routing	Enable routing on a VLAN.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

802.1x

Command	Description	Mode[a]
dot1x dynamic-vlan enable	Enables the capability of creating VLANs dynamically when a RADIUS-assigned VLAN does not exist in the switch.	GC
dot1x initialize	Begins the initialization sequence on the specified port.	PE
dot1x mac-auth-bypass	Enables MAB on an interface.	IC
dot1x max-req	Sets the maximum number of times the switch sends an EAP-request frame to the client before restarting the authentication process.	IC

Command	Description	Mode[a]
dot1x max-users	Sets the maximum number of clients supported on the port when MAC-based 802.1X authentication is enabled on the port.	IC
dot1x port-control	Enables manual control of the authorization state of the port.	IC
dot1x re-authenticate	Manually initiates a re-authentication of all 802.1x-enabled ports or a specified 802.1X enabled port.	PE
dot1x reauthentication	Enables periodic re-authentication of the client.	IC
dot1x system-auth-control monitor	Enables 802.1X globally.	GC
dot1x timeout guest-vlan-period	Sets the number of seconds that the switch waits before authorizing the client if the client is a dot1x unaware client.	IC
dot1x timeout quiet-period	Sets the number of seconds the switch remains in the quiet state following a failed authentication attempt.	IC
dot1x timeout re-authperiod	Sets the number of seconds between re-authentication attempts.	IC
dot1x timeout server-timeout	Sets the number of seconds the switch waits for a response from the authentication server before resending the request.	IC
dot1x timeout supp-timeout	Sets the number of seconds the switch waits for a response to an EAP-request frame from the client before retransmitting the request.	IC
dot1x timeout tx-period	Sets the number of seconds the switch waits for a response to an EAP-request/identify frame from the client before resending the request.	IC
show dot1x	Displays 802.1X status for the switch or the specified interface.	PE
show dot1x authentication-history	Displays the dot1x authentication events and information during successful and unsuccessful dot1x authentication processes.	PE

Command	Description	Mode[a]
show dot1x clients	Displays detailed information about the users who have successfully authenticated on the system or on a specified port.	PE
show dot1x interface	Shows the status of MAC Authentication Bypass.	PE
show dot1x statistics	Displays 802.1X statistics for the specified interface.	PE
show dot1x users	Displays active 802.1X authenticated users for the switch.	PE
clear dot1x authentication-history	Clears the authentication history table captured during successful and unsuccessful authentication.	PE
dot1x guest-vlan	Sets the guest VLAN on a port.	IC
dot1x unauth-vlan	Specifies the unauthenticated VLAN on a port.	IC
dot1x guest-vlan	Defines a guest VLAN.	IC
show dot1x advanced	Displays 802.1X advanced features for the switch or specified interface.	PE
radius-server attribute 4	Sets the network access server (NAS) IP address for the RADIUS server.	GC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Data Center Technology Commands

Data Center Bridging Commands

Command	Description	Mode[a]
datacenter-bridging	Enters the Data Center Bridging mode.	IC
lldp dcbx version	Enables the switch to support a specific version of the Data Center Bridging Capability Exchange (DCBX) protocol or to detect the peer version and match it.	GC
lldp tlv-select dcbxp	Sends specific DCBX TLVs if LLDP is enabled to transmit on the given interface. If no parameter is given, all DCBX TLVs are enabled for transmission.	IC, GC
lldp dcbx port-role	Configures the port role to manual, auto-upstream, auto-downstream and configuration source.	IC
show lldp tlv-select	Displays the per interface TLV configuration.	PE
show lldp dcbx	Displays the per interface DCBX configuration and status.	PE

a. For the meaning of each Mode abbreviation, see Mode Types.

FIP Snooping Commands

Command	Description	Mode[a]
feature fip-snooping	Globally enables Fibre Channel over Ethernet Initialization Protocol (FIP) snooping on the switch.	GC
fip-snooping enable	Enables snooping of FIP packets on the configured VLANs.	VLAN
fip-snooping fc-map	Configures the FP-MAP value on a VLAN.	VLAN
fip-snooping port-mode	Configure the interface that is connected toward FCF.	IC
show fip-snooping	Displays information about the global FIP snooping configuration and status.	UE, PE

Command	Description	Mode[a]
show fip-snooping enode	Displays information about the interfaces connected to ENodes	UE, PE
show fip-snooping fcf	Displays information about the interfaces connected to FCFs.	UE, PE
show fip-snooping sessions	Displays information about the active FIP snooping sessions.	UE, PE
show fip-snooping statistics	Displays the statistics of the FIP packets snooped in the VLAN or on an interface.	UE, PE
show fip-snooping vlan	Displays the FCoE VLANs information and, additionally, the FIP snooping port status when optional argument is specified.	UE, PE
clear fip-snooping statistics	Clears the FIP Snooping statistics in the supplied VLAN or on a supplied interface.	UE, PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Priority Flow Control Commands

Command	Description	Mode[a]
priority-flow-control mode	Enables Priority-Flow-Control (PFC) on an interface.	DCB
priority-flow-control priority	Enables the priority group for lossless behavior (PFC enabled).	DCB
clear priority-flow-control statistics	Clears all or interface Priority-Flow-Control statistics.	PE
show interfaces priority-flow-control	Displays the global or interface priority flow control status and statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Layer 3 Commands

ARP (IPv4)

Command	Description	Mode[a]
arp	Creates an Address Resolution Protocol (ARP) entry.	GC
arp cachesize	Configures the maximum number of entries in the ARP cache.	GC
arp dynamicrenew	Enables the ARP component to automatically renew dynamic ARP entries when they age out.	GC
arp purge	Causes the specified IP address to be removed from the ARP cache.	PE
arp resptime	Configures the ARP request response timeout.	GC
arp retries	Configures the ARP count of maximum request for retries.	GC
arp timeout	Configures the ARP entry age-out time.	GC
clear arp-cache	Removes all ARP entries of type dynamic from the ARP cache.	PE
clear arp-cache management	Removes all entries from the ARP cache learned from the management port.	PE
ip local-proxy-arp	Enables proxying of ARP requests.	IC
ip proxy-arp	Enables proxy ARP on a router interface.	IC
show arp	Displays the Address Resolution Protocol (ARP) cache.	PE
show arp brief	Displays the brief Address Resolution Protocol (ARP) table information.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

DHCP Server and Relay Agent (IPv4)

Command	Description	Mode[a]
ip dhcp pool	Defines a DHCP address pool that can be used to supply addressing information to DHCP client. This command puts the user into DHCP Pool Configuration mode.	GC
bootfile	Sets the name of the image for the DHCP client to load.	DP
clear ip dhcp binding	Removes automatic DHCP server bindings.	PE
clear ip dhcp conflict	Removes DHCP server address conflicts.	PE
client-identifier	Identifies a a Microsoft® DHCP client to be manually assigned an address.	DP
client-name	Specifies the host name of a DHCP client.	DP
default-router	Sets the IPv4 address of one or more routers for the DHCP client to use.	DP
dns-server (IP DHCP Pool Config)	Sets the IPv4 DNS server address which is provided to a DHCP client by the DHCP server.	DP
domain-name (IP DHCP Pool Config)	Sets the DNS domain name which is provided to a DHCP client by the DHCP server.	DP
hardware-address	Specifies the MAC address of a client to be manually assigned an address.	DP
host	Specifies a manual binding for a DHCP client host.	DP
ip dhcp bootp automatic	Enables automatic BOOTP address assignments.	GC
ip dhcp conflict logging	Enables DHCP address conflict detection.	GC
ip dhcp excluded-address	Excludes one or more DHCP addresses from automatic assignment.	GC
ip dhcp ping packets	Configures the number of pings sent to detect if an address is in use prior to assigning an address from the DHCP pool.	GC
lease	Sets the period for which a dynamically assigned DHCP address is valid.	DP

Command	Description	Mode[a]
netbios-name-server	Configures the IPv4 address of the Windows® Internet Naming Service (WINS) for a Microsoft DHCP client.	DP
netbios-node-type	Sets the NetBIOS node type for a Microsoft DHCP client.	DP
network	Defines a pool of IPv4 addresses for distributing to clients.	DP
next-server	Sets the IPv4 address of the TFTP server to be used during auto-install.	DP
option	Supplies arbitrary configuration information to a DHCP client.	DP
service dhcp	Enables local IPv4 DHCP server on the switch.	GC
sntp	Sets the IPv4 address of the NTP server to be used for time synchronization of the client.	DP
show ip dhcp binding	Displays the configured DHCP bindings.	PE
show ip dhcp conflict	Displays DHCP address conflicts for all relevant interfaces or a specified interface.	PE
show ip dhcp global configuration	Displays the DHCP global configuration.	PE
show ip dhcp pool	Displays the configured DHCP pool or pools.	UE or PE
show ip dhcp server statistics	Displays the DHCP server binding and message counters.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

DHCPv6

Command	Description	Mode[a]
clear ipv6 dhcp	Clears DHCPv6 statistics for all interfaces or for a specific interface.	PE
dns-server	Sets the IPv6 DNS server address which is provided to a DHCPv6 client by the DHCPv6 server.	v6DP

Command	Description	Mode[a]
domain-name	Sets the DNS domain name which is provided to a DHCPv6 client by the DHCPv6 server.	v6DP
ipv6 dhcp pool	Enters IPv6 DHCP Pool Configuration mode.	GC
ipv6 dhcp relay	Configures an interface for DHCPv6 Relay functionality.	IC
ipv6 dhcp server	Configures DHCPv6 server functionality on an interface.	IC
prefix-delegation	Defines Multiple IPv6 prefixes within a pool for distributing to specific DHCPv6 Prefix delegation clients.	v6DP
service dhcpv6	Enables DHCPv6 configuration on the router.	GC
show ipv6 dhcp	Displays the DHCPv6 server name and status.	PE
show ipv6 dhcp binding	Displays the configured DHCP pool.	PE
show ipv6 dhcp interface	Displays DHCPv6 information for all relevant interfaces or a specified interface.	UE
show ipv6 dhcp pool	Displays the configured DHCP pool.	PE
show ipv6 dhcp statistics	Displays the DHCPv6 server name and status.	UE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

DVMRP

Command	Description	Mode[a]
ip dvmrp	Sets the administrative mode of DVMRP in the router to active.	GC IC
ip dvmrp metric	Configures the metric for an interface.	IC
show ip dvmrp	Displays the system-wide information for DVMRP.	PE
show ip dvmrp interface	Displays the interface information for DVMRP on the specified interface.	PE
show ip dvmrp neighbor	Displays the neighbor information for DVMRP.	PE

Command	Description	Mode[a]
show ip dvmrp nexthop	Displays the next hop information on outgoing interfaces for routing multicast datagrams.	PE
show ip dvmrp prune	Displays the table that lists the router's upstream prune information.	PE
show ip dvmrp route	Displays the multicast routing information for DVMRP.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

GMRP

Command	Description	Mode[a]
gmrp enable	Enables GMRP globally or on a port.	GC or IC
show gmrp configuration	Displays GMRP configuration.	GC or IC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IGMP

Command	Description	Mode[a]
ip igmp	Sets the administrative mode of IGMP in the system to active.	GC
ip igmp last-member-query-count	Sets the number of Group-Specific Queries sent before the router assumes that there are no local members on the interface.	IC
ip igmp last-member-query-interval	Configures the Maximum Response Time inserted in Group-Specific Queries which are sent in response to Leave Group messages.	IC
ip igmp query-interval	Configures the query interval for the specified interface. The query interval determines how fast IGMP Host-Query packets are transmitted on this interface.	IC

Command	Description	Mode[a]
ip igmp query-max-response-time	Configures the maximum response time interval for the specified interface.	IC
ip igmp robustness	Configures the robustness that allows tuning of the interface.	IC
ip igmp startup-query-count	Sets the number of queries sent out on startup—at intervals equal to the startup query interval for the interface.	IC
ip igmp startup-query-interval	Sets the interval between general queries sent at startup on the interface.	IC
ip igmp version	Configures the version of IGMP for an interface.	IC
show ip igmp	Displays system-wide IGMP information.	PE
show ip igmp groups	Displays the registered multicast groups on the interface.	PE
show ip igmp interface	Displays the IGMP information for the specified interface.	PE
show ip igmp interface membership	Displays the list of interfaces that have registered in the multicast group.	PE
show ip igmp interface stats	Displays the IGMP statistical information for the interface.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IGMP Proxy

Command	Description	Mode[a]
ip igmp-proxy	Enables the IGMP Proxy on the router.	IC
ip igmp-proxy reset-status	Resets the host interface status parameters of the IGMP Proxy router.	IC
ip igmp-proxy unsolicited-report-interval	Sets the unsolicited report interval for the IGMP Proxy router.	IC
show ip igmp-proxy	Displays a summary of the host interface status parameters.	PE

Command	Description	Mode[a]
show ip igmp-proxy interface	Displays a detailed list of the host interface status parameters.	PE
show ip igmp-proxy groups	Displays a table of information about multicast groups that IGMP Proxy reported.	PE
show ip igmp-proxy groups detail	Displays complete information about multicast groups that IGMP Proxy has reported.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IP Helper/DHCP Relay

Command	Description	Mode[a]
bootpdhcprelay maxhopcount	Configures the maximum allowable relay agent hops for BootP/DHCP Relay on the system.	GC
bootpdhcprelay minwaittime	Configures the minimum wait time in seconds for BootP/DHCP Relay on the system.	GC
clear ip helper statistics	Resets (to 0) the statistics displayed in show ip helper statistics.	PE
ip dhcp relay information check	Enables DHCP Relay to check that the relay agent information option in forwarded BOOTREPLY messages is valid.	GC
ip dhcp relay information check-reply	Enables DHCP Relay to check that the relay agent information option in forwarded BOOTREPLY messages is valid.	IC
ip dhcp relay information option	Enables the circuit ID option and remote agent ID mode for BootP/DHCP Relay on the system (also called option 82).	GC
ip dhcp relay information option-insert	Enables the circuit ID option and remote agent ID mode for BootP/DHCP Relay on the circuit ID option and remote agent ID mode for BootP/DHCP Relay on the interface (also called option 82).	GC
ip helper-address (global configuration)	Configures the relay of certain UDP broadcast packets received on any interface.	GC

Command	Description	Mode[a]
ip helper-address (interface configuration)	Configures the relay of certain UDP broadcast packets received on a specific interface.	IC
ip helper enable	Enables relay of UDP packets.	GC
show ip helper-address	Displays the IP helper address configuration.	PE
show ip dhcp relay	Displays the BootP/DHCP Relay information.	UE or PE
show ip helper statistics	Displays the number of DHCP and other UDP packets processed and relayed by the UDP relay agent.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IP Routing

Command	Description	Mode[a]
encapsulation	Configures the link layer encapsulation type for the packet.	IC
ip address	Configures an IP address on an interface.	IC
ip mtu	Sets the IP Maximum Transmission Unit (MTU) on a routing interface.	IC
ip netdirbcast	Enables the forwarding of network-directed broadcasts.	IC
ip route	Configures a static route. Use the no form of the command to delete the static route.	GC
ip route default	Configures the default route. Use the no form of the command to delete the default route.	GC
ip route distance	Sets the default distance (preference) for static routes.	GC
ip routing	Globally enables IPv4 routing on the router.	GC
routing	Enables IPv4 and IPv6 routing for an interface.	IC
show ip brief	Displays all the summary information of the IP.	PE
show ip interface	Displays all pertinent information about the IP interface.	PE

Command	Description	Mode[a]
show ip protocols	Displays the parameters and current state of the active routing protocols.	PE
show ip route	Displays the routing table.	PE
show ip route preferences	Displays detailed information about the route preferences.	PE
show ip route summary	Shows the number of all routes, including best and non-best routes.	PE
show ip traffic	Displays IP statistical information.	UE or PE
show ip vlan	Displays the VLAN routing information for all VLANs with routing enabled.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IPv6 Multicast

Command	Description	Mode[a]
ipv6 pimsm (Global Config)	Administratively enables PIMSM for IPv6 multicast routing.	GC
ipv6 pimsm (VLAN Interface Config)	Administratively enables PIM-SM multicast routing mode on a particular IPv6 router interface.	IC
ipv6 pimsm bsr-border	Prevents bootstrap router (BSR) messages from being sent or received through an interface.	IC
ipv6 pimsm bsr-candidate	Configures the router to announce its candidacy as a bootstrap router (BSR).	GC
ipv6 pimsm dr-priority	Sets the priority value for which a router is elected as the designated router (DR).	IC
ipv6 pimsm hello-interval	Administratively configures the PIM-SM Hello Interval for the specified interface.	IC
ipv6 pimsm join-prune-interval	Administratively configures the interface join/prune interval for the PIM-SM router,	IC
ipv6 pimsm register-threshold	Configures the Register Threshold rate for the RP router to switch to the shortest path.	GC

Command	Description	Mode[a]
ipv6 pimsm rp-address	Statically configures the Rendezvous Point (RP) address of a PIM for one or more multicast groups.	GC
ipv6 pimsm rp-candidate	Configures the router to advertise itself to the bootstrap router (BSR) as a PIM candidate rendezvous point (RP).	GC
ipv6 pimsm spt-threshold	Configures the Data Threshold rate for the last-hop router to switch to the shortest path on the router.	GC
ipv6 pimsm ssm	Defines the Source Specific Multicast (SSM) range of multicast addresses.	GC
show ipv6 pimsm	Displays global status of IPv6 PIMSM and its IPv6 routing interfaces.	PE
show ipv6 pimsm bsr	Displays the bootstrap router (BSR) information.	PE
show ipv6 pimsm interface	Displays interface config parameters.	PE
show ipv6 pimsm neighbor	Displays IPv6 PIM neighbors learned on the routing interfaces.	PE
show ipv6 pimsm rphash	Displays which rendezvous point (RP) is being selected for a specified group.	PE
show ipv6 pimsm rp mapping	Displays all group-to-RP mappings of which the router is aware (either configured or learned from the bootstrap router (BSR).	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

IPv6 Routing

Command	Description	Mode[a]
clear ipv6 neighbors	Clears all entries in the IPv6 neighbor table or an entry on a specific interface.	PE
clear ipv6 statistics	Clears IPv6 statistics for all interfaces or for a specific interface, including loopback and tunnel interfaces.	PE

Command	Description	Mode[a]
ipv6 address	Configures an IPv6 address on an interface (including tunnel and loopback interfaces).	IC
ipv6 enable	Enables IPv6 routing on an interface (including tunnel and loopback interfaces) that has not been configured with an explicit IPv6 address.	IC
ipv6 hop-limit	Configures the hop limit used in IPv6 PDUs originated by the router.	GC
ipv6 host	Defines static host name-to- ipv6 address mapping in the host cache.	GC
ipv6 mld last-member-query-count	Sets the number of listener-specific queries sent before the router assumes that there are no local members on the interface.	IC (VLAN)
ipv6 mld last-member-query-interval	Sets the last member query interval for the MLD interface, which is the value of the maximum response time parameter in the groupspecific queries sent out of this interface.	IC (VLAN)
ipv6 mld-proxy	Enables MLD Proxy on the router.	IC
ipv6 mld-proxy reset-status	Resets the host interface status parameters of the MLD Proxy router.	IC
ipv6 mld-proxy unsolicit-rprt-interval	Sets the unsolicited report interval for the MLD Proxy router.	IC
ipv6 mld query-interval	Sets the MLD router's query interval for the interface.	IC
ipv6 mld query-max-response-time	Sets MLD querier's maximum response time for the interface.	IC
ipv6 mld router	Enables MLD in the router in global configuration mode and for a specific interface in interface configuration mode.	GC or IC
ipv6 mtu	Sets the maximum transmission unit (MTU) size, in bytes, of IPv6 packets on an interface.	IC

Command	Description	Mode[a]
ipv6 nd dad attempts	Sets the number of duplicate address detection probes transmitted while doing neighbor discovery.	IC
ipv6 nt managed-config-flag	Sets the managed address configuration flag in router advertisements.	IC
ipv6 nd ns-interval	Sets the interval between router advertisements for advertised neighbor solicitations.	IC
ipv6 nd other-config-flag	Sets the other stateful configuration flag in router advertisements sent from the interface.	IC
ipv6 nd prefix	Sets the IPv6 prefixes to include in the router advertisement.	IC
ipv6 nd ra-interval	Sets the transmission interval between router advertisements.	IC
ipv6 nd ra-lifetime	Sets the value that is placed in the Router Lifetime field of the router advertisements sent from the interface.	IC
ipv6 nd reachable-time	Sets the router advertisement time to consider a neighbor reachable after neighbor discovery confirmation.	IC
ipv6 nd suppress-ra	Suppresses router advertisement transmission on an interface.	IC
ipv6 route	Configures an IPv6 static route	GC
ipv6 route distance	Sets the default distance (preference) for static routes.	GC
ipv6 unicast-routing	Enables forwarding of IPv6 unicast datagrams.	GC
ping ipv6	Determines whether another computer is on the network.	PE
ping ipv6 interface	Determines whether another computer is on the network using **Interface** keyword.	PE
show ipv6 brief	Displays the IPv6 status of forwarding mode and IPv6 unicast routing mode.	PE

Command	Description	Mode[a]
show ipv6 interface	Shows the usability status of IPv6 interfaces.	PE
show ipv6 mld groups	Displays information about multicast groups that MLD reported.	PE
show ipv6 mld interface	Displays MLD related information for an interface.	PE
show ipv6 mld-proxy	Displays a summary of the host interface status parameters.	PE
show ipv6 mld-proxy groups	Displays information about multicast groups that the MLD Proxy reported.	PE
show ipv6 mld-proxy groups detail	Displays information about multicast groups that MLD Proxy reported.	PE
show ipv6 mld-proxy interface	Displays a detailed list of the host interface status parameters.	PE
show ipv6 mld traffic	Displays MLD statistical information for the router.	PE
show ipv6 neighbors	Displays information about IPv6 neighbors.	PE
show ipv6 route	Displays the IPv6 routing table.	PE
show ipv6 route preference	Shows the preference value associated with the type of route.	PE
show ipv6 route summary	Displays a summary of the routing table.	PE
show ipv6 traffic	Shows traffic and statistics for IPv6 and ICMPv6.	UE
show ipv6 vlan	Displays IPv6 VLAN routing interface addresses.	PE
traceroute ipv6	Discovers the routes that packets actually take when traveling to their destination through the network on a hop-by-hop basis.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Loopback Interface

Command	Description	Mode[a]
interface loopback	Enters the Interface Loopback configuration mode.	GC
show interface loopback	Displays information about configured loopback interfaces.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Multicast

Command	Description	Mode[a]
ip mcast boundary	Adds an administrative scope multicast boundary.	IC
ip mroute	Creates a static multicast route for a source range.	GC
ip multicast	Sets the administrative mode of the IP multicast forwarder in the router to active.	GC
ip multicast ttl-threshold	Applies a *ttlvalue* to a routing interface.	IC
ip pim	Administratively configures PIM mode for IP multicast routing on a VLAN interface.	IC
ip pim bsr-border	Administratively disables bootstrap router (BSR) messages from being sent or received through an interface.	IC
ip pim bsr-candidate	Configures the router to advertise itself as a bootstrap router (BSR).	GC
ip pim dense	Administratively configures PIM dense mode for IP multicast routing.	GC
ip pim dr-priority	Administratively configures the advertised designated router (DR) priority value.	IC
ip pim hello-interval	Administratively configures the PIM Hello messages on the specified interface.	IC
ip pim join-prune-interval	Administratively configures the frequency of join/prune messages on the specified interface.	IC

Command	Description	Mode[a]
ip pim register-rate-limit	Sets a limit on the maximum number of PIM register messages sent per second for each (S,G) entry.	GC
ip pim rp-address	Defines the address of a PIM RP for a specific multicast group range.	GC
ip pim rp-candidate	Configures the router to advertise itself to the bootstrap router (BSR) as a PIM candidate rendezvous point (RP) for a specific multicast group range.	IC
ip pim sparse	Administratively configures PIM sparse mode for IP multicast routing.	GC
ip pim ssm	Administratively configures PIM Source Specific Multicast (SSM) range of addresses for IP multicast routing.	GC
ip pim spt-threshold	Sets the multicast traffic threshold rate for the last-hop router to switch to the shortest path on the router.	GC
show bridge multicast address-table count	Displays statistical information about the entries in the multicast address table.	PE
show ip mcast	Displays the system-wide multicast information.	PE
show ip mcast boundary	Displays the system-wide multicast information.	PE
show ip mcast interface	Displays the multicast information for the specified interface.	PE
show ip mcast mroute	Displays a summary or all the details of the multicast table.	PE
show ip mcast mroute group	Displays the multicast configuration settings of entries in the multicast mroute table.	PE
show ip mcast mroute source	Displays the multicast configuration settings of entries in the multicast mroute table.	PE
show ip mcast mroute static	Displays all the static routes configured in the static mcast table.	PE

Command	Description	Mode[a]
show ip pim bsr-router	Displays the bootstrap router (BSR) information.	PE
show ip pim interface	Displays PIM interface status parameters. If no interface is specified, the command displays the status parameters of all PIM-enabled interfaces.	UE or PE
show ip pim neighbor	Displays PIM neighbors discovered by PIMv2 Hello messages. If no interface is specified, the command displays the neighbors discovered on all PIM-enabled interfaces.	UE or PE
show ip pimrphash	Displays the rendezvous point (RP) selected for the specified group address.	UE or PE
show ip pim rp mapping	Displays the mappings for the PIM group to the active rendezvous points (RPs).	UE or PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

OSPF

Command	Description	Mode[a]
area default-cost	Configures the advertised default cost for the stub area.	ROSPF
area nssa	Configures the specified area ID to function as an NSSA.	ROSPF
area nssa default-info-originate	Configures the metric value and type for the default route advertised into the NSSA.	ROSPF
area nssa no-redistribute	Configures the NSSA Area Border router (ABR) so that learned external routes are not redistributed to the NSSA.	ROSPF
area nssa no-summary	Configures the NSSA so that summary LSAs are not advertised into the NSSA.	ROSPF
area nssa translator-role	Configures the translator role of the NSSA.	ROSPF
area nssa translator-stab-intv	Configures the translator stability interval of the NSSA.	ROSPF
area range	Creates a specified area range for a specified NSSA.	ROSPF

Command	Description	Mode[a]
area stub	Creates a stub area for the specified area ID.	ROSPF
area stub no-summary	Prevents Summary LSAs from being advertised into the NSSA.	ROSPF
area virtual-link	Creates the OSPF virtual interface for the specified area-id and neighbor router.	ROSPF
area virtual-link authentication	Configures the authentication type and key for the OSPF virtual interface identified by the area ID and neighbor ID.	ROSPF
area virtual-link dead-interval	Configures the dead interval for the OSPF virtual interface on the virtual interface identified by area-id and neighbor router.	ROSPF
area virtual-link hello-interval	Configures the hello interval for the OSPF virtual interface on the virtual interface identified by the area ID and neighbor ID.	ROSPF
area virtual-link retransmit-interval	Configures the retransmit interval for the OSPF virtual interface on the virtual interface identified by the area ID and neighbor ID.	ROSPF
area virtual-link transmit-delay	Configures the transmit delay for the OSPF virtual interface on the virtual interface identified by the area ID and neighbor ID.	ROSPF
auto-cost	Allows user to change the reference bandwidth used in computing link cost.	ROSPF
bandwidth	Allows user to change the bandwidth used in computing link cost.	IC
capability opaque	Enables Opaque Capability on the router.	RC
clear ip ospf	Resets specific OSPF states.	PE
compatible rfc1583	Enables OSPF 1583 compatibility.	ROSPF
default-information originate	Controls the advertisement of default routes.	ROSPF
default-metric	Sets a default for the metric of distributed routes.	ROSPF
distance ospf	Sets the route preference value of OSPF in the router.	ROSPF

Command	Description	Mode[a]
distribute-list out	Specifies the access list to filter routes received from the source protocol.	ROSPF
enable	Resets the default administrative mode of OSPF in the router (active).	ROSPF
exit-overflow-interval	Configures the exit overflow interval for OSPF.	ROSPF
external-lsdb-limit	Configures the external LSDB limit for OSPF.	ROSPF
ip ospf area	Enables OSPFv2 and sets the area ID of an interface.	IC
ip ospf authentication	Sets the OSPF Authentication Type and Key for the specified interface.	IC
ip ospf cost	Configures the cost on an OSPF interface.	IC
ip ospf dead-interval	Sets the OSPF dead interval for the specified interface.	IC
ip ospf hello-interval	Sets the OSPF hello interval for the specified interface.	IC
ip ospf mtu-ignore	Disables OSPF maximum transmission unit (MTU) mismatch detection.	IC
ip ospf network	Configure OSPF to treat an interface as a point-to-point, rather than broadcast interface.	IC
ip ospf priority	Sets the OSPF priority for the specified router interface.	IC
ip ospf retransmit-interval	Sets the OSPF retransmit Interval for the specified interface.	IC
ip ospf transmit-delay	Sets the OSPF Transit Delay for the specified interface.	IC
maximum-paths	Sets the number of paths that OSPF can report for a given destination.	ROSPF
nsf helper	Allow OSPF to act as a helpful neighbor for a restarting router.	ROSPF
nsf helper strict-lsa-checking	Set an OSPF helpful neighbor exit helper mode whenever a topology change occurs.	ROSPF

Command	Description	Mode[a]
nsf restart-interval	Configures the length of the grace period on the restarting router.	ROSPF
network area	Enables OSPFv2 on an interface and sets its area ID if the IP address of an interface is covered by this network command.	ROSPF
passive-interface	Sets the interface or tunnel as passive.	IC
passive-interface default	Enables the global passive mode by default for all interfaces.	ROSPF
passive-interface (router mode)	Sets the interface or tunnel as passive.	ROSPF
redistribute	Configures OSPF protocol to allow redistribution of routes from the specified source protocol/routers.	ROSPF
router-id	Sets a 4-digit dotted-decimal number uniquely identifying the router OSPF ID.	ROSPF
router ospf	Enters Router OSPF mode.	GC
show ip ospf	Displays information relevant to the OSPF router.	PE
show ip ospf abr	Displays the internal OSPF routing table entries to Area Border Routers (ABR).	PE
show ip ospf area	Displays information about the identified OSPF area.	PE
show ip ospf asbr	Displays the internal OSPF routing table entries to Autonomous System Boundary Routes (ASBR).	PE
show ip ospf database	Displays information about the link state database when OSPF is enabled.	PE
show ip ospf database database-summary	Displays the number of each type of LSA in the database for each area and for the router.	PE
show ip ospf interface	Displays the information for the IFO object or virtual interface tables.	PE
show ip ospf interface brief	Displays brief information for the IFO object or virtual interface tables.	PE

Command	Description	Mode[a]
show ip ospf interface stats	Displays the statistics for a specific interface.	PE
show ip ospf neighbor	Displays information about OSPF neighbors.	PE
show ip ospf range	Displays information about the area ranges for the specified area-id.	PE
show ip ospf statistics	Displays information about recent Shortest Path First (SPF) calculations.	PE
show ip ospf stub table	Displays the OSPF stub table.	PE
show ip ospf virtual-link	Displays the OSPF Virtual Interface information for a specific area and neighbor.	PE
show ip ospf virtual-link brief	Displays the OSPF Virtual Interface information for all areas in the system.	PE
timers spf	Configures the SPF delay and hold time.	ROSPF

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

OSPFv3

Command	Description	Mode[a]
area default-cost	Configures the monetary default cost for the stub area.	ROSV3
area nssa	Configures the specified areaid to function as an NSSA.	ROSV3
area nssa default-info-originate	Configures the metric value and type for the default route advertised into the NSSA.	ROSV3
area nssa no-redistribute	Configures the NSSA ABR so that learned external routes will not be redistributed to the NSSA.	ROSV3
area nssa no-summary	Configures the NSSA so that summary LSAs are not advertised into the NSSA.	ROSV3
area nssa translator-role	Configures the translator role of the NSSA.	ROSV3
area nssa translator-stab-intv	Configures the translator stability interval of the NSSA.	ROSV3

Command	Description	Mode[a]
area range	Creates an area range for a specified NSSA.	ROSV3
area stub	Creates a stub area for the specified area ID.	ROSV3
area stub no-summary	Disables the import of Summary LSAs for the stub area identified by *areaid*.	ROSV3
area virtual-link	Creates the OSPF virtual interface for the specified *areaid* and *neighbor*.	ROSV3
area virtual-link dead-interval	Configures the dead interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.	ROSV3
area virtual-link hello-interval	Configures the hello interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.	ROSV3
area virtual-link retransmit-interval	Configures the retransmit interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.	ROSV3
area virtual-link transmit-delay	Configures the transmit delay for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.	ROSV3
default-information originate	Controls the advertisement of default routes.	ROSV3
default-metric	Sets a default for the metric of distributed routes.	ROSV3
distance ospf	Sets the route preference value of OSPF in the router.	ROSV3
enable	Resets the default administrative mode of OSPF in the router (active).	ROSV3
exit-overflow-interval	Configures the exit overflow interval for OSPF.	ROSV3
external-lsdb-limit	Configures the external LSDB limit for OSPF.	ROSV3
ipv6 ospf	Enables OSPF on a router interface or loopback interface.	IC
ipv6 ospf area	Sets the OSPF area to which the specified router interface belongs.	IC
ipv6 ospf cost	Configures the cost on an OSPF interface.	IC

Command	Description	Mode[a]
ipv6 ospf dead-interval	Sets the OSPF dead interval for the specified interface.	IC
ipv6 ospf hello-interval	Sets the OSPF hello interval for the specified interface.	IC
ipv6 ospf mtu-ignore	Disables OSPF maximum transmission unit (MTU) mismatch detection.	IC
ipv6 ospf network	Changes the default OSPF network type for the interface.	IC
ipv6 ospf priority	Sets the OSPF priority for the specified router interface.	IC
ipv6 ospf retransmit-interval	Sets the OSPF retransmit interval for the specified interface.	IC
ipv6 ospf transmit-delay	Sets the OSPF Transmit Delay for the specified interface.	IC
ipv6 router ospf	Enters Router OSPFv3 Configuration mode.	GC
maximum-paths	Sets the number of paths that OSPF can report for a given destination.	ROSV3
nsf	Enables OSPF graceful restart.	ROSV3
nsf helper	Allows OSPF to act as a helpful neighbor for a restarting router.	ROSV3
nsf helper strict-lsa-checking	Requires that an OSPF helpful neighbor exit helper mode whenever a topology change occurs.	ROSV3
nsf restart-interval	Configures the length of the grace period on the restarting router.	ROSV3
passive-interface	Sets the interface or tunnel as passive.	IC
passive-interface default	Enables the global passive mode by default for all interfaces.	ROSV3
redistribute	Configures the OSPFv3 protocol to allow redistribution of routes from the specified source protocol/routers.	ROSV3
router-id	Sets a 4-digit dotted-decimal number uniquely identifying the Router OSPF ID.	ROSV3

Command	Description	Mode[a]
show ipv6 ospf	Displays information relevant to the OSPF router.	PE
show ipv6 ospf abr	Displays the internal OSPFv3 routes to reach Area Border Routers (ABR).	PE
show ipv6 ospf area	Displays information about the area.	PE
show ipv6 ospf asbr	Displays the internal OSPFv3 routes to reach Autonomous System Boundary Routes (ASBR).	PE
show ipv6 ospf border-routers	Displays internal OSPFv3 routers to reach Area Border Routers (ABR) and Autonomous System Boundary Routers (ASBR).	UE or PE
show ipv6 ospf database	Displays information about the link state database when OSPFv3 is enabled.	PE
show ipv6 ospf database database-summary	Displays the number of each type of LSA in the database and the total number of LSAs in the database.	PE
show ipv6 ospf interface	Displays the information for the IFO object or virtual interface tables.	PE
show ipv6 ospf interface brief	Displays brief information for the IFO object or virtual interface tables.	PE
show ipv6 ospf interface stats	Displays the statistics for a specific interface.	UE
show ipv6 ospf interface vlan	Displays OSPFv3 configuration and status information for a specific VLAN.	PE
show ipv6 ospf neighbor	Displays information about OSPF neighbors.	PE
show ipv6 ospf range	Displays information about the area ranges for the specified area identifier.	PE
show ipv6 ospf stub table	Displays the OSPF stub table.	PE
show ipv6 ospf virtual-links	Displays the OSPF Virtual Interface information for a specific area and neighbor.	PE
show ipv6 ospf virtual-link brief	Displays the OSPFV3 Virtual Interface information for all areas in the system.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Router Discovery Protocol

Command	Description	Mode[a]
ip irdp	Enables Router Discovery on an interface.	IC
ip irdp address	Configures the address that the interface uses to send the router discovery advertisements.	IC
ip irdp holdtime	Configures the value, in seconds, of the holdtime field of the router advertisement sent from this interface.	IC
ip irdp maxadvertinterval	Configures the maximum time, in seconds, allowed between sending router advertisements from the interface.	IC
ip irdp minadvertinterval	Configures the minimum time, in seconds, allowed between sending router advertisements from the interface.	IC
ip irdp multicast	Sends router advertisements as IP multicast packets.	IC
ip irdp preference	Configures the preference of the address as a default router address relative to other router addresses on the same subnet.	IC
show ip irdp	Displays the router discovery information for all interfaces, or for a specified interface.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Routing Information Protocol

Command	Description	Mode[a]
auto-summary	Enables the RIP auto-summarization mode.	RIP
default-information originate	Controls the advertisement of default routes.	RIP
default-metric	Sets a default for the metric of distributed routes.	RIP
distance rip	Sets the route preference value of RIP in the router.	RIP

Command	Description	Mode[a]
distribute-list out	Specifies the access list to filter routes received from the source protocol.	RIP
enable	Resets the default administrative mode of RIP in the router (active).	RIP
hostroutesaccept	Enables the RIP hostroutesaccept mode.	RIP
ip rip	Enables RIP on a router interface.	IC
ip rip authentication	Sets the RIP Version 2 Authentication Type and Key for the specified interface.	IC
ip rip receive version	Configures the interface to allow RIP control packets of the specified version(s) to be received.	IC
ip rip send version	Configures the interface to allow RIP control packets of the specified version to be sent.	IC
redistribute	Configures OSPF protocol to allow redistribution of routes from the specified source protocol/routers.	PIP
router rip	Enters Router RIP mode.	GC
show ip rip	Displays information relevant to the RIP router.	PE
show ip rip interface	Displays information related to a particular RIP interface.	PE
show ip rip interface brief	Displays general information for each RIP interface.	PE
split-horizon	Sets the RIP split horizon mode.	RIP

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Tunnel Interface

Command	Description	Mode[a]
interface tunnel	Enables the interface configuration mode for a tunnel.	GC
show interfaces tunnel	Displays the parameters related to tunnel such as tunnel mode, tunnel source address and tunnel destination address.	PE

Command	Description	Mode[a]
tunnel destination	Specifies the destination transport address of the tunnel.	IC
tunnel mode ipv6ip	Specifies the mode of the tunnel.	IC
tunnel source	Specifies the source transport address of the tunnel, either explicitly or by reference to an interface.	IC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Virtual Router Redundancy

Command	Description	Mode[a]
ip vrrp	Enables the administrative mode of Virtual Router Redundancy Protocol (VRRP) for the router.	GC
vrrp accept-mode	Enables the VRRP Master to accept ping packets sent to one of the virtual router's IP addresses.	IC
vrrp authentication	Sets the authentication details value for the virtual router configured on a specified interface.	IC
vrrp description	Assigns a description to the VRRP group.	IC
vrrp ip	Sets the virtual router IP address value for an interface.	IC
vrrp mode	Enables the virtual router configured on an interface. Enabling the status field starts a virtual router.	IC
vrrp preempt	Sets the preemption mode value for the virtual router configured on a specified interface.	IC
vrrp priority	Sets the priority value for the virtual router configured on a specified interface.	IC
vrrp timers advertise	Sets the frequency, in seconds, that an interface on the specified virtual router sends a virtual router advertisement.	IC

Command	Description	Mode[a]
vrrp timers learn	Configures the router, when it is acting as backup virtual router for a VRRR group, to learn the advertisement interval used by the master virtual router.	IC
vrrp track interface	Alters the priority of the VRRP router based on the availability of its interfaces.	IC
vrrp track ip route	Tracks route reachability.	IC
show vrrp	Displays the global VRRP configuration and status as well as the brief or detailed status of one or all VRRP groups.	UE or PE
show vrrp interface	Displays all configuration information and VRRP router statistics of a virtual router configured on a specific interface.	UE or PE
show vrrp interface brief	Displays information about each virtual router configured on the switch.	PE
show vrrp interface stats	Displays the statistical information about each virtual router configured on the switch.	PE
Pingable VRRP Commands		
ip vrrp accept-mode	Enables the VRRP Master to accept ping packets sent to one of the virtual router's IP addresses.	IC
show ip vrrp interface	Displays the configured value for Accept Mode.	UE or PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Utility Commands

Auto-Install

Command	Description	Mode[a]
boot auto-copy-sw	Enables or disables Stack Firmware Synchronization.	GC

Command	Description	Mode[a]
boot auto-copy-sw allow-downgrade	Enables downgrading the firmware version on the stack member if the firmware version on the manager is older than the firmware version on the member.	GC
boot host autoreboot	Enables rebooting the device (no administrative intervention) when the auto-image is successfully downloaded.	GC
boot host autosave	Enables/disables automatically saving the downloaded configuration on the switch.	GC
boot host dhcp	Enables/disables Auto Config on the switch.	GC
boot host retrycount	Set the number of attempts to download a configuration.	GC
show auto-copy-sw	Displays Stack Firmware Synchronization configuration status.	PE
show boot	Displays the current status of the Auto Config process.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Captive Portal

Command	Description	Mode[a]
authentication timeout	Configures the authentication timeout.	CP
captive-portal	Enables the captive portal configuration mode.	GC
enable	Globally enables captive portal.	CPI
http port	Configures an additional HTTP port for captive portal to monitor.	CP
https port	Configures an additional HTTPS port for captive portal to monitor.	CP
show captive-portal	Displays the status of captive portal.	PE
show captive-portal status	Reports the status of all captive portal instances in the system.	PE
block	Blocks all traffic for a captive portal configuration.	CPI

Command	Description	Mode[a]
configuration	Enables the captive portal instance mode.	CP
enable	Enables a captive portal configuration.	CPI
group	Configures the group number for a captive portal configuration.	CPI
interface	Associates an interface with a captive portal configuration.	CPI
locale	Associates an interface with a captive portal configuration.	CPI
name	Configures the name for a captive portal configuration.	CPI
protocol	Configures the protocol mode for a captive portal configuration.	CPI
redirect	Enables the redirect mode for a captive portal configuration.	CPI
redirect-url	Configures the redirect URL for a captive portal configuration.	CPI
session-timeout	Configures the session timeout for a captive portal configuration.	CPI
verification	Configures the verification mode for a captive portal configuration.	CPI
captive-portal client deauthenticate	Deauthenticates a specific captive portal client.	PE
show captive-portal client status	Displays client connection details or a connection summary for connected captive portal users.	PE
show captive-portal configuration client status	Displays the clients authenticated to all captive portal configurations or a to specific configuration.	PE
show captive-portal interface client status	Displays information about clients authenticated on all interfaces or a specific interface.	PE

Command	Description	Mode[a]
show captive-portal interface configuration status	Displays the clients authenticated to all captive portal configurations or a to specific configuration.	PE
clear captive-portal users	Deletes all captive portal user entries.	PE
no user	Deletes a user from the local user database.	CP
show captive-portal user	Displays all configured users or a specific user in the captive portal local user database.	PE
user group	Associates a group with a captive portal user.	
user-logout	Enables captive portal users to log out of the portal.	CPI
user name	Modifies the user name for a local captive portal user.	CP
user password	Creates a local user or changes the password for an existing user.	CP
user session-timeout	Sets the session timeout value for a captive portal user.	CP
show captive-portal configuration	Displays the operational status of each captive portal configuration.	PE
show captive-portal configuration interface	Displays information about all interfaces assigned to a captive portal configuration or about a specific interface assigned to a captive portal configuration.	PE
show captive-portal configuration locales	Displays locales associated with a specific captive portal configuration.	PE
show captive-portal configuration status	Displays information about all configured captive portal configurations or a specific captive portal configuration.	PE
user group	Creates a user group.	CP
user group moveusers	Moves a group's users to a different group.	CP
user group name	Configures a group name.	CP

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

CLI Macro

Command	Description	Mode[a]
macro name	Creates a user-defined macro.	GC
macro global apply	Use to apply a macro.	GC
macro global trace	Applies and traces a macro.	GC
macro global description	Appends a line to the global macro description.	GC
macro apply	Use to apply a macro.	IC
macro trace	Applies and traces a macro.	IC
macro description	Appends a line to the macro description.	IC
show parser macro	Displays information about defined macros.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Clock

Command	Description	Mode[a]
show clock	Displays the time and date of the system clock.	PE
show sntp configuration	Displays the SNTP configuration.	PE
show sntp server	Displays the pre-configured SNTP servers.	PE
show sntp status	Displays the SNTP status.	PE
sntp authenticate	Set to require authentication for received NTP traffic from servers.	GC
sntp authentication-key	Defines an authentication key for SNTP.	GC
sntp broadcast client enable	Enables SNTP Broadcast clients.	GC
sntp client poll timer	Defines polling time for the SNTP client.	GC
sntp server	Configures the SNTP server to use SNTP to request and accept NTP traffic from it.	GC
sntp trusted-key	Authenticates the identity of a system to which Simple Network Time Protocol (SNTP) will synchronize.	GC

Command	Description	Mode[a]
sntp unicast client enable	Enables clients to use Simple Network Time Protocol (SNTP) predefined Unicast clients.	GC
clock timezone hours-offset	Sets the offset to Coordinated Universal Time.	GC
clock summer-time recurring	Sets the summertime offset to UTC recursively every year.	GC
clock summer-time date	Sets the summertime offset to UTC.	GC
show clock	Displays the time and date from the system clock.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Command Line Configuration Scripting

Command	Description	Mode[a]
script apply	Applies commands in the script to the switch.	PE
script delete	Deletes a specific script.	PE
script list	Lists all scripts present in the switch.	PE
script show	Displays the contents of a script file.	PE
script validate	Validates a script file.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Configuration and Image Files

Command	Description	Mode[a]
boot system	Specifies the system image that the switch loads at startup.	PE
clear config	Restores switch to default configuration.	PE
copy	Copies files from a source to a destination.	PE
delete backup-image	Deletes a file from a flash memory.	PE
delete backup-config	Deletes the backup configuration file.	PE
delete startup-config	Deletes the startup configuration file.	PE
dir	Prints the contents of the flash file system.	PE

Command	Description	Mode[a]
erase	Erases the startup configuration, the backup configuration, or the backup image.	PE
filedescr	Adds a description to a file.	PE
rename	Renames the file present in flash.	PE
show backup-config	Displays contents of a backup configuration file.	PE
show bootvar	Displays the active system image file that the switch loads at startup.	UE
show running-config	Displays the contents of the currently running configuration file.	PE
show startup-config	Displays the startup configuration file contents.	PE
update bootcode	Updates the bootcode on one or more switches.	PE
write	Copies the running configuration image to the startup configuration.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Denial of Service

Command	Description	Mode[a]
dos-control firstfrag	Enables Minimum TCP Header Size Denial of Service protection.	GC
dos-control icmp	Enables Maximum ICMP Packet Size Denial of Service protections.	GC
dos-control l4port	Enables L4 Port Denial of Service protection.	GC
dos-control sipdip	Enables Source IP Address = Destination IP Address (SIP=DIP) Denial of Service protection.	GC
dos-control tcpflag	Enables TCP Flag Denial of Service protections.	GC
dos-control tcpfrag	Enables TCP Fragment Denial of Service protection.	GC

Command	Description	Mode[a]
ip icmp echo-reply	Enables or disables the generation of ICMP Echo Reply messages.	GC
ip icmp error-interval	Limits the rate at which IPv4 ICMP error messages are sent.	GC
ip unreachables	Enables the generation of ICMP Destination Unreachable messages.	IC
ip redirects	Enables the generation of ICMP Redirect messages.	IC
ipv6 icmp error-internal	Limits the rate at which ICMPv6 error messages are sent.	GC
ipv6 unreachables	Enables the generation of ICMPv6 Destination Unreachable messages.	IC
show dos-control	Displays Denial of Service configuration information.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Line

Command	Description	Mode[a]
exec-timeout	Configures the interval that the system waits for user input.	LC
history	Enables the command history function.	LC
history size	Changes the command history buffer size for a particular line.	LC
line	Identifies a specific line for configuration and enters the line configuration command mode.	GC
show line	Displays line parameters.	UE
speed	Sets the line baud rate.	LC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Management ACL

Command	Description	Mode[a]
deny (management)	Defines a deny rule.	MA
management access-class	Defines which management access-list is used.	GC
management access-list	Defines a management access-list, and enters the access-list for configuration.	GC
permit (management)	Defines a permit rule.	MA
show management access-class	Displays the active management access-list.	PE
show management access-list	Displays management access-lists.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Mode

Command	Description	Mode[a]
configure terminal	Gets to the configure line. This command is equivalent to the configure command.	PE
do	Executes commands available in Privileged EXEC mode from Global Configuration and other modes.	All except PE and UE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Password Management

Command	Description	Mode[a]
passwords aging	Implements aging on the passwords such that users are required to change passwords when they expire.	GC
passwords history	Enables the administrator to set the number of previous passwords that are stored to ensure that users do not reuse their passwords too frequently.	GC

Command	Description	Mode[a]
passwords lock-out	Enables the administrator to strengthen the security of the switch by enabling the user lockout feature. When a lockout count is configured, a user who is logging in must enter the correct password within that count.	GC
passwords min-length	Enables the administrator to enforce a minimum length required for a password.	GC
passwords strength-check	Enables the Password Strength feature.	GC
passwords strength minimum uppercase-letters	Enforces a minimum number of uppercase letters that a password should contain.	GC
passwords strength minimum lowercase-letters	Enforces a minimum number of lowercase letters that a password must contain.	GC
passwords strength minimum numeric-characters	Enforces a minimum number of numeric numbers that a password should contain.	GC
passwords strength minimum special-characters	Enforces a minimum number of special characters that a password may contain.	GC
passwords strength maximum consecutive-characters	Enforces a maximum number of consecutive characters that a password can contain.	GC
passwords strength maximum repeated-characters	Enforces a maximum repeated characters that a password should contain.	GC
passwords strength minimum character-classes	Excludes the keyword while configuring the password.	GC
passwords strength exclude-keyword	Enforces a maximum number of consecutive characters that a password can contain.	GC
enable password encrypted	Used by an Administrator to transfer the enable password between devices without having to know the password.	PE
show passwords configuration	Displays the configuration parameters for password configuration.	PE

Command	Description	Mode[a]
show passwords result	Displays the last password set result information.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

PHY Diagnostics

Command	Description	Mode[a]
show copper-ports tdr	Displays the last TDR (Time Domain Reflectometry) tests on specified ports.	PE
show fiber-ports optical-transceiver	Displays the optical transceiver diagnostics.	PE
test copper-port tdr	Diagnoses with TDR (Time Domain Reflectometry) technology the quality and characteristics of a copper cable attached to a port.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

RMON

Command	Description	Mode[a]
rmon alarm	Configures alarm conditions.	GC
rmon collection history	Enables a Remote Monitoring (RMON) MIB history statistics group on an interface.	IC
rmon event	Configures an RMON event.	GC
show rmon alarm	Displays alarm configurations.	UE
show rmon alarms	Displays the alarms summary table.	UE and PE
show rmon collection history	Displays the requested group of statistics.	UE
show rmon events	Displays the RMON event table.	UE
show rmon history	Displays RMON Ethernet Statistics history.	UE
show rmon log	Displays the RMON logging table.	UE

Command	Description	Mode[a]
show rmon statistics	Displays RMON Ethernet Statistics.	UE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

SDM Templates

Command	Description	Mode[a]
sdm prefer	Changes the template that will be active after the next reboot.	GC
show sdm prefer	Views the currently active SDM template and its scaling parameters, or views the scaling parameters for an inactive template.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Serviceability Tracing

Command	Description	Mode[a]
debug arp	Enables tracing of ARP packets.	PE
debug auto-voip	Enables Auto VOIP debug messages.	PE
debug clear	Disables all debug traces.	PE
debug console	Enables the display of debug trace output on the login session in which it is executed.	PE
debug dot1x	Enables dot1x packet tracing.	PE
debug igmpsnooping	Enables tracing of IGMP Snooping packets transmitted and/or received by the switch.	PE
debug ip acl	Enables debug of IP Protocol packets matching the ACL criteria.	PE
debug ip dvmrp	Traces DVMRP packet reception and transmission.	PE
debug ip igmp	Traces IGMP packet reception and transmission.	PE
debug ip mcache	Traces MDATA packet reception and transmission.	PE

Command	Description	Mode[a]
debug ip pimdm	Traces PIMDM packet reception and transmission.	PE
debug ip pimsm	Traces PIMSM packet reception and transmission.	PE
debug ip vrrp	Enables VRRP debug protocol messages.	PE
debug ipv6 dhcp	Displays debug information about DHCPv6 client activities and to trace DHCPv6 packets to and from the local DHCPv6 client.	PE
debug ipv6 mcache	Traces MDATAv6 packet reception and transmission.	PE
debug ipv6 mld	Traces MLD packet reception and transmission.	PE
debug ipv6 pimdm	Traces PIMDMv6 packet reception and transmission.	PE
debug ipv6 pimsm	Traces PIMSMv6 packet reception and transmission.	PE
debug isdp	Traces ISDP packet reception and transmission.	PE
debug lacp	Traces of LACP packets received and transmitted by the switch.	PE
debug mldsnooping	Traces MLD snooping packet reception and transmission.	PE
debug ospf	Enables tracing of OSPF packets received and transmitted by the switch.	PE
debug ospfv3	Enables tracing of OSPFv3 packets received and transmitted by the switch.	PE
debug ping	Enables tracing of ICMP echo requests and responses.	PE
debug rip	Enables tracing of RIP requests and responses.	PE
debug sflow	Enables sFlow debug packet trace.	PE
debug spanning-tree	Traces spanning tree BPDU packet reception and transmission.	PE
debug vrrp	Enables VRRP debug protocol messages.	PE
show debugging	Displays packet tracing configurations.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

sFlow

Command	Description	Mode[a]
sflow destination	Configures sFlow collector parameters (owner string, receiver timeout, ip address, and port).	GC
sflow polling	Enables a new sflow poller instance for the data source if rcvr_idx is valid.	GC
sflow polling (Interface Mode)	Enable a new sflow poller instance for this data source if rcvr_idx is valid.	IC
sflow sampling	Enables a new sflow sampler instance for this data source if rcvr_idx is valid.	GC
sflow sampling (Interface Mode)	Enables a new sflow sampler instance for this data source if rcvr_idx is valid.	IC
show sflow agent	Displays the sflow agent information.	PE
show sflow destination	Displays all the configuration information related to the sFlow receivers.	PE
show sflow polling	Displays the sFlow polling instances created on the switch.	PE
show sflow sampling	Displays the sFlow sampling instances created on the switch.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

SNMP

Command	Description	Mode[a]
show snmp	Displays the SNMP status.	PE
show snmp engineID	Displays the SNMP engine ID.	PE
show snmp filters	Displays the configuration of filters.	PE
show snmp group	Displays the configuration of groups.	PE
show snmp user	Displays the configuration of users.	PE
show snmp views	Displays the configuration of views.	PE

Command	Description	Mode[a]
show trapflags	Displays SNMP traps globally or displays specific SNMP traps.	PE
snmp-server community	Sets up the community access string to permit access to SNMP protocol.	GC
snmp-server community-group	Maps SNMP v1 and v2 security models to the group name.	GC
snmp-server contact	Sets up a system contact (sysContact) string.	GC
snmp-server enable traps	Enables SNMP traps globally or enables specific SNMP traps.	GC
snmp-server engineID local	Specifies the Simple Network Management Protocol (SNMP) engine ID on the local switch.	GC
snmp-server filter	Creates or updates an SNMP server filter entry.	GC
snmp-server group	Configures a new SNMP group or a table that maps SNMP users to SNMP views.	GC
snmp-server host	Specifies the recipient of SNMP notifications.	GC
snmp-server location	Sets the system location string.	GC
snmp-server user	Configures a new SNMP Version 3 user.	GC
snmp-server view	Creates or updates a Simple Network Management Protocol (SNMP) server view entry.	GC
snmp-server v3-host	Specifies the recipient of Simple Network Management Protocol Version 3 (SNMPv3) notifications.	GC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

SSH

Command	Description	Mode[a]
crypto key generate dsa	Generates DSA key pairs for the switch.	GC
crypto key generate rsa	Generates RSA key pairs for the switch.	GC
crypto key pubkey-chain ssh	Enters SSH Public Key-chain configuration mode.	GC

Command	Description	Mode[a]
ip ssh port	Specifies the port to be used by the SSH server.	GC
ip ssh pubkey-auth	Enables public key authentication for incoming SSH sessions.	GC
ip ssh server	Enables the switch to be configured from a SSH server connection.	GC
key-string	Manually specifies a SSH public key.	SK
show crypto key mypubkey	Displays its own SSH public keys stored on the switch.	PE
show crypto key pubkey-chain ssh	Displays SSH public keys stored on the switch.	PE
show ip ssh	Displays the SSH server configuration.	PE
user-key	Specifies which SSH public key is manually configured and enters the SSH public key-string configuration command.	SP

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Syslog

Command	Description	Mode[a]
clear logging	Clears messages from the internal logging buffer.	PE
clear logging file	Clears messages from the logging file.	PE
description	Describes the syslog server.	L
level	Specifies the importance level of syslog messages.	L
logging cli-command	Enable CLI command logging.	GC
logging	Logs messages to a syslog server.	GC
logging audit	Enables switch auditing.	GC
logging buffered	Limits syslog messages displayed from an internal buffer based on severity.	GC

Command	Description	Mode[a]
logging console	Limits messages logged to the console based on severity.	GC
logging file	Limits syslog messages sent to the logging file based on severity.	GC
logging on	Controls error messages logging.	GC
logging snmp	Enables SNMP Set command logging.	GC
logging web-session	Enables web session logging.	GC
port	Specifies the port number of syslog messages.	L
show logging	Displays the state of logging and the syslog messages stored in the internal buffer.	PE
show logging file	Displays the state of logging and the syslog messages stored in the logging file.	PE
show syslog-servers	Displays the syslog servers settings.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

System Management

Command	Description	Mode[a]
asset-tag	Specifies the switch asset-tag.	GC
banner exec	Sets the message that is displayed after a successful login.	GC
banner login	Sets the message that is displayed just before the login prompt.	GC
banner motd	Specifies message-of-the-day banner.	GC
banner motd acknowledge	Acknowledges message-of-the-day banner.	GC
clear checkpoint statistics	Clears the statistics for the checkpointing process.	GC
cut-through mode	Enables the cut-through mode on the switch.	GC
exec-banner	Enables exec banner on the console, telnet or SSH connection.	LC
hostname	Specifies or modifies the switch host name.	GC

Command	Description	Mode[a]
locate	Locates a switch by LED blinking.	PE
login-banner	Enables login banner on the console, telnet, or SSH connection.	LC
media-type	Selects the media-type for the interface. This command only valid on combo ports.	IC
member	Configures the switch.	SG
motd-banner	Enables motd on the console, telnet, or SSH connection.	LC
ping	Sends ICMP echo request packets to another node on the network.	UE
reload	Reloads the operating system.	PE
set description	Associates a text description with a switch in the stack.	SG
slot	Configures a slot in the system.	GC
show banner	Displays banner information.	PE
show boot-version	Displays the boot image version details.	UE
show checkpoint statistics	Displays the statistics for the checkpointing process.	PE
show cut-through mode	Show the cut-through mode on the switch.	PE
show interfaces advanced firmware	Displays the firmware revision of the PHY for a port.	PE
show memory cpu	Checks the total and available RAM space on the switch.	PE
show power-usage-history	Shows the history of unit power consumption for the unit specified in the command and total stack power consumption.	PE
show process cpu	Checks the CPU utilization for each process currently running on the switch.	PE
show sessions	Displays a list of the open telnet sessions to remote hosts.	PE
show slot	Displays information about all the slots in the system or for a specific slot.	UE

Command	Description	Mode[a]
show supported cardtype	Displays information about all card types supported in the system.	UE
show supported switchtype	Displays information about all supported switch types.	UE
show switch	Displays information about the switch status.	UE
show system	Displays system information.	UE
show system id	Displays the service ID information.	UE
show system power	Displays information about the system level power consumption.	UE or PE
show system temperature	Displays information about the system temperature and fan status.	UE or PE
show tech-support	Displays system and configuration information (for debugging/calls to technical support).	PE
show users	Displays information about the active users.	PE
show version	Displays the system version information.	UE
stack	Sets the mode to Stack Global Configuration mode.	GC
telnet	Logs into a host that supports Telnet.	PE
traceroute	Discovers the IP routes that packets actually take when travelling to their destinations.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Telnet Server

Command	Description	Mode[a]
ip telnet server disable	Enables/disables the Telnet service on the switch.	GC
ip telnet port	Configures the Telnet service port number on the switch.	GC
show ip telnet	Displays the status of the Telnet server and the Telnet service port number.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Terminal Length

Command	Description	Mode[a]
terminal length	Sets the terminal length.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Time Ranges

Command	Description	Mode[a]
time-range	Creates a time range identified by name, consisting of one absolute time entry and/or one or more periodic time entries.	GC
absolute	Adds an absolute time entry to a time range.	TRC
periodic	Adds a periodic time entry to a time range.	TRC
show time-range	Displays a time range and all the absolute/periodic time entries that are defined for the time range.	PE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

USB Flash Drive

Command	Description	Mode[a]
unmount usb	Makes the USB flash device inactive.	PE
show usb	Displays the USB flash device details.	PE
dir usb	Displays the USB device contents and memory statistics.	PE

a. For the meaning of each Mode abbreviation, see Mode Types.

User Interface

Command	Description	Mode[a]
enable	Enters the privileged EXEC mode.	UE
end	Gets the CLI user control back to the privileged execution mode or user execution mode.	Any

Command	Description	Mode[a]
exit(configuration)	Exits any configuration mode to the previously highest mode in the CLI mode hierarchy.	(All)
exit(EXEC)	Closes an active terminal session by logging off the switch.	UE
quit	Closes an active terminal session by logging off the switch.	UE

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

Web Server

Command	Description	Mode[a]
common-name	Specifies the common-name for the device.	CC
country	Specifies the country.	CC
crypto certificate generate	Generates a HTTPS certificate.	GC
crypto certificate import	Imports a certificate signed by the Certification Authority for HTTPS.	GC
crypto certificate request	Generates and displays a certificate request for HTTPS.	PE
duration	Specifies the duration in days.	CC
ip http port	Specifies the TCP port for use by a web browser to configure the switch.	GC
ip http server	Enables the switch to be configured from a browser.	GC
ip http secure-certificate	Configures the active certificate for HTTPS.	GC
ip http secure-port	Configures a TCP port for use by a secure web browser to configure the switch.	GC
ip http secure-server	Enables the switch to be configured, monitored, or modified securely from a browser.	GC
key-generate	Specifies the key-generate.	CC
location	Specifies the location or city name.	CC
organization-unit	Specifies the organization-unit or department name.	CC

Command	Description	Mode[a]
show crypto certificate mycertificate	Displays the SSL certificates of your switch.	PE
show ip http server status	Displays the HTTP server status information.	PE
show ip http server secure status	Displays the HTTP secure server status information.	UE or PE
state	Specifies the state or province name.	CC

a. For the meaning of each Mode abbreviation, see Mode Types on page 79.

2

Using the CLI

Introduction

This chapter describes the basics of entering and editing the Dell PowerConnect 70xx Series Command Line Interface (CLI) commands and defines the command hierarchy. It also explains how to activate the CLI and implement its major functions.

This chapter covers the following topics:

- Entering and Editing CLI Commands
- CLI Command Modes
- Starting the CLI
- Using CLI Functions and Tools

Entering and Editing CLI Commands

A CLI command is a series of keywords and arguments. Keywords identify a command and arguments specify configuration parameters. For example, in the command **show interfaces status gigabitethernet** *1/0/5,* **show**, **interfaces** and **status** are keywords; **gigabitethernet** is an argument that specifies the interface type, and *1/0/5* specifies the unit/slot/port.

When working with the CLI, the command options are not displayed. The command is not selected by a menu but is entered manually. To see what commands are available in each mode or within an Interface Configuration, the CLI provides a method of displaying the available commands, the command syntax requirements and in some instances parameters required to complete the command. The standard command to request context-sensitive help is the <?> key.

Two instances where the help information can be displayed are:

- **Keyword lookup** — The <?> key is entered in place of a command. A list of all valid commands and corresponding help messages is displayed.

- **Partial keyword lookup** — A command is incomplete and the <?> key is entered in place of a parameter. The matched parameters for this command are displayed.

The following features and conventions are applicable to CLI command entry and editing:

- History Buffer
- Negating Commands
- Show Command
- Command Completion
- Short Form Commands
- Keyboard Shortcuts
- Operating on Multiple Objects (Range)
- Command Scripting
- CLI Command Notation Conventions
- Interface Naming Conventions

History Buffer

Every time a command is entered in the CLI, it is recorded in an internally managed Command History buffer. Commands are stored in the buffer, which operates on a *First In First Out (FIFO)* basis. These commands can be recalled, reviewed, modified, and reissued. This buffer is not preserved after switch resets.

Table 2-1. History Buffer

Keyword	Source or Destination
Up-arrow key <Ctrl>+<P>	Recalls commands in the history buffer, beginning with the most recent command. Repeats the key sequence to recall successively older commands.
Down-arrow key <Ctrl>+<N>	Returns to more recent commands in the history buffer after recalling commands with the up-arrow key. Repeating the key sequence recalls more recent commands in succession.

By default, the history buffer system is enabled, but it can be disabled at any time. The standard number of 10 stored commands can be increased to 216. By configuring 0, the effect is the same as disabling the history buffer system. For information about the command syntax for configuring the command history buffer, see the **history size** command on page 1449 in the Line command mode chapter of this guide.

Negating Commands

For many commands, the prefix keyword **no** is entered to cancel the effect of a command or reset the configuration to the default value. All configuration commands have this capability. This guide describes the negation effect for all commands to which it applies.

Show Command

The **show** command executes in the User Executive (EXEC) and Privileged Executive (EXEC) modes.

Command Completion

CLI can complete partially entered commands when the user presses the <tab> or <space> key. If a command entered is not complete, is not valid, or if some parameters of the command are not valid or missing, an error message is displayed to assist in entering the correct command. By pressing the <tab> key, an incomplete command is changed into a complete command. If the characters already entered are not enough for the system to identify a single matching command, the <?>key displays the available commands matching the characters already entered.

Short Form Commands

The CLI supports the short forms of all commands. As long as it is possible to recognize the entered command unambiguously, the CLI accepts the short form of the command as if the user typed the full command.

Keyboard Shortcuts

The CLI has a range of keyboard shortcuts to assist in editing the CLI commands. The **help** command, when used in the User EXEC and Privileged EXEC modes, displays the keyboard short cuts.

Table 2-2 contains the CLI shortcuts displayed by the **help** command.

Table 2-2. CLI Shortcuts

Keyboard Key	Description
<Delete, Backspace>	Delete previous character
<Ctrl>+<A>	Go to beginning of line
<Ctrl>+<E>	Go to end of line
<Ctrl>+<F>	Go forward one character
<Ctrl>+<B>	Go backward one character
<Ctrl>+<D>	Delete current character
<Ctrl>+<U,X>	Delete to beginning of line
<Ctrl>+<K>	Delete to the end of the line.
<Ctrl>+<W>	Delete previous word
<Ctrl>+<T>	Transpose previous character
<Ctrl>+<P>	Go to previous line history buffer
<Ctrl>+<R>	Rewrites or pastes the line
<Ctrl>+<N>	Go to next line in history buffer
<Ctrl>+<Y>	Print last deleted character
<Ctrl>+<Q>	Enables serial flow
<Ctrl>+<S>	Disables serial flow
<Ctrl>+<Z>	Return to root command prompt
<Tab, SPACE>	Command-line completion
end	Return to the root command prompt
exit	Go to next lower command prompt
<?>	List choices

Operating on Multiple Objects (Range)

The CLI allows the user to operate on the set of objects at the same time. The guidelines are as follows for range operation:

- Operations on objects with four or more instances support the range operation.

- The **range** key word is used to identify the range of objects on which to operate.
- The range may be specified in the following manner:

  (#-#) — a range from a particular instance to another instance (inclusive). For example, 1/0/1-10 indicates that the operation applies to the gigabit Ethernet ports 1 to 10 on unit 1.

  (#, #, #) — a list of non-consecutive instances. For example, (1/0/1, 1/0/1,1/0/3, 1/0/5) indicates that the operation applies to the gigabit Ethernet ports 1, 3, and 5 on unit 1.

  (#, #-#, #) — ranges and non-consecutive instances listed together. For example, (1/0/1, 1/0/3-5, 1/0/7) indicates that the operation applies to the gigabit Ethernet ports 1, 3, 4, 5, and 7 on unit 1.

  NOTE: Each port must be a fully qualified port identifier in the format *unit*/*slot*/*port*. See Interface Naming Conventions on page 171.
- To specify a range of LAGs, use the following command:

  interface range port-channel *1-48*
- No spaces are allowed anywhere in a range parameter, e.g. gi1/0/1 -2 is not accepted, nor is gi1/0/2, gi1/0/4. Use gi1/0/1-2 and gi/1/0/2,gi1/0/4 respectively.
- When operating on a range of objects, the CLI implementation hides the parameters that may not be configured in a range (for example, parameters that must be uniquely configured for each instance).
- The CLI uses best effort when operating on a list of objects. If the user requests an operation on a list of objects, the CLI attempts to execute the operation on as many objects in the list as possible even if failure occurs for some of the items in the list. The CLI provides the user with a detailed list of all failures, listing the objects and the reasons for the failures.
- Some parameters must be configured individually for each port or interface.

Command Scripting

The CLI can be used as a programmable management interface. To facilitate this function, any characters entered after the <!> character are treated as a comment and ignored by the CLI. Also, the CLI allows the user to disable session timeouts.

CLI Command Notation Conventions

When entering commands there are certain command-entry notations which apply to all commands. Table 2-3 describes these conventions as they are used in syntax definitions.

Table 2-3. CLI Command Notation Conventions

Convention	Description
[ ]	In a command line, square brackets indicate an optional entry.
{ }	In a command line inclusive brackets indicate a selection of compulsory parameters separated by the | character. One option must be selected. For example: **flowcontrol {auto | on | off}** means that for the **flowcontrol** command either **auto**, **on** or **off** must be selected.
Italic	Indicates a variable.
<Enter>	Any individual key on the keyboard.
<Ctrl>+<F4>	Any combination of keys pressed simultaneously on the keyboard.
Screen Display	Indicates system messages and prompts appearing on the console.
all	Indicates a literal parameter, entered into the command as it is.

Interface Naming Conventions

The conventions for naming interfaces in CLI commands are as follows:

Ethernet Interfaces

The gigabit Ethernet and ten-gigabit Ethernet ports are identified in the CLI by the variable *unit/slot/port*, where:

- <Interface Type> Unit#/Slot#/Port# — Identifies a specific interface by the interface type tag followed by the Unit# followed by a / symbol, then the Slot# followed by a / symbol, and then the Port#. For example, gi2/0/10 identifies the gigabit port 10 in slot 0 within the second unit on a non-blade switch. Table 2-4 below lists the supported interface type tags.
- *Unit #* — The unit number is greater than 1 only in a stacking solution where a number of switches are stacked to form a virtual switch. In this case, the Unit# indicates the logical position of the switch in a stack. The range is 1–12. The unit value is 1 for standalone switches.
- *Slot#* — Is the slot number for blade products that connect to a chassis. Certain interfaces have more than one slot. For example, a 10G plugin module may have two slots, each with two ports. Slot numbers range from 0 to one minus the maximum number of slots available on the switch. The slot value is 0 for non-blade switches. on page 1633
- *Port #* — The port number is an integer number assigned to the physical port on the switch and corresponds to the lexan printed next to the port on the front or back panel. Ports are numbered from 1 to the maximum number of ports available on the switch, typically 24 or 48.

Within this document, the tag interface–id refers to an interface identifier that follows the naming convention above.

Table 2-4. Interface Identifiers

Interface Type	Long Form	Short Form	Identifier
Fast Ethernet	fastethernet	fa	unit/slot/port
Gigabit Ethernet	gigabitethernet	gi	unit/slot/port
10-Gigabit Ethernet	tengigabitethernet	te	unit/slot/port
Loopback	loopback	lo	loopback-id (0-7)
Port Channel	port-channel	po	port-channel-number
Tunnel	tunnel	tu	tunnel-id (0-7)
Vlan	vlan	vl	vlan-id (1-4093)

When listed in command line output, gigabit Ethernet interfaces are preceded by the characters *Gi*, and ten-gigabit Ethernet interfaces are preceded by *Te*, as shown in the examples below.

Port Channel Interfaces

Port-channel (or LAG) interfaces are represented in the CLI by the variable *port-channel-number*., which can can assume values from 1-48.

When listed in command line output, port channel interfaces are preceded by the characters *Po*.

Loopback Interfaces

Loopback interfaces are represented in the CLI by the variable *loopback-id*, which can assume values from 0–7.

VLAN Interfaces

VLAN interfaces are represented in the CLI by the variable *vlan-id* , which can can assume values from 1-4093.

Tunnel Interfaces

Tunnel interfaces are represented in the CLI by the variable *tunnel-id* , which can can assume values from 0–7.

Examples

Example #1

```
gigabitethernet 1/0/1
gigabitethernet1/0/1  (there is no space)
gi 1/0/1
gi1/0/1    (there is no space)
port-channel 1
vl 5
```

Example #2

```
console#show vlan
VLAN   Name              Ports          Type
-----  ---------------   -------------  --------------
1      default           Po1-48,        Default
                         Gi1/0/1-24
```

Example #3

CLI Command Modes

Since the set of CLI commands is very large, the CLI is structured as a command-tree hierarchy, where related command sets are assigned to command modes for easier access. At each level, only the commands related to that level are available to the user and only those commands are shown in the context sensitive help for that level.

In this guide, commands are organized into three categories:

- Layer 2 (Data Link Layer) commands
- Layer 3 (Network Layer) commands
- Utility Commands

Layer 2 (Data Link Layer) describes the logical organization of data bits transmitted on a particular medium. This layer defines the framing, addressing and checksumming of Ethernet packets.

Layer 3 (Network Layer) describes how a series of exchanges over various data links can deliver data between any two nodes in a network. This layer defines the addressing and routing structure of the Internet.

Utility describes commands used to manage the switch.

Commands that cause specific actions to be taken immediately by the system and do not directly affect the system configurations are defined at the top of the command tree. For example, commands for rebooting the system or for downloading or backing up the system configuration files are placed at the top of the hierarchy tree.

Commands that result in configuration changes to the switch are grouped in a Configuration sub tree.

There are levels beneath the Configuration mode for further grouping of commands. The system prompt reflects these sub-Configuration modes.

All the parameters are provided with reasonable defaults where possible.

When starting a session, the initial mode is the User EXEC mode. Only a limited subset of commands is available in this mode. This level is reserved for tasks that do not change the configuration. To enter the next level, the Privileged EXEC mode, a password is required.

The Privileged EXEC mode provides access to commands that can not be executed in the User EXEC mode and permits access to the switch Configuration mode.

The Global Configuration mode manages switch configuration on a global level. For specific interface configurations, command modes exist at a sub-level.

Entering a <?> at the system prompt displays a list of commands available for that particular command mode. A specific command is used to navigate from one command mode to another. The standard order to access the modes is as follows: User EXEC mode, Privileged EXEC mode, Global Configuration mode, and Interface Configuration and other specific configuration modes.

User EXEC Mode

After logging into the switch, the user is automatically in the User EXEC command mode unless the user is defined as a privileged user. In general, the User EXEC commands allow the user to perform basic tests, and list system information.

The user-level prompt consists of the switch host name followed by the angle bracket (>).

```
console>
```

The default host name is Console unless it has been changed using the **hostname** command in the Global Configuration mode.

Privileged EXEC Mode

Because many of the privileged commands set operating parameters, privileged access is password-protected to prevent unauthorized use. The password is not displayed on the screen and is case sensitive.

Privileged users enter into the Privileged EXEC mode from User EXEC mode, where the following prompt is displayed.

```
console#
```

Global Configuration Mode

Global Configuration commands apply to features that affect the system as a whole, rather than just a specific interface. The Privileged EXEC mode command **configure** is used to enter the Global Configuration mode.

```
console(config)#
```

The following are the Global Configuration modes:

- **SNMP v3 Host Configuration** — Configures the parameters for the SNMP v3 server host.
- **SNMP Community Configuration** — Configures the parameters for the SNMP server community.

Interface and Other Specific Configuration Modes

Interface configuration modes are used to modify specific interface operations. The following are the Interface Configuration and other specific configuration modes:

- **MST** — The Global Configuration mode command spanning-tree mst configuration is used to enter into the Multiple Spanning Tree configuration mode.
- **Line Interface** — Contains commands to configure the management connections. These include commands such as line speed and timeout settings. The Global Configuration mode command **line** is used to enter the Line Interface mode.
- **VLAN Database** — Contains commands to create a VLAN as a whole. The Global Configuration mode command **vlan database** is used to enter the VLAN Database mode.
- **Router OSPF Configuration** — Global configuration mode command **router ospf** is used to enter into the Router OSPF Configuration mode.
- **Router RIP Configuration** — Global configuration mode command **router rip** is used to enter into the Router RIP Configuration mode.
- **Router OSPFv3 Configuration** — Global configuration mode command **ipv6 router ospf** is used to enter into the Router OSPFv3 Configuration mode.
- **IPv6 DHCP Pool Mode** — Global configuration mode command **ipv6 dhcp pool** is used to enter into the IPv6 DHCP Pool mode.
- **Management Access List** — Contains commands to define management access administration lists. The Global Configuration mode command **management access-list** is used to enter the Management Access List configuration mode.
- **Policy-map** — Use the **policy-map** command to access the QoS policy map configuration mode to configure the QoS policy map.
- **Policy Class** — Use the **class** command to access the QoS Policy-class mode to attach or remove a diffserv class from a policy and to configure the QoS policy class.
- **Class-Map —** This mode consists of class creation/deletion and matching commands. The class matching commands specify layer 2, layer 3 and general match criteria. Use the **class-map class-map-name** commands to access the QoS Class Map Configuration mode to configure QoS class maps.
- **Stack** — Use the stack command to access the Stack Configuration Mode.

- **Ethernet** — Contains commands to manage Ethernet port configuration. The Global Configuration mode command **interface** enters the Interface Configuration mode to configure an Ethernet interface.
- **Port Channel** — Contains commands to configure port-channels, i.e., assigning ports to a port-channel. Most of these commands are the same as the commands in the Ethernet interface mode and are used to manage the member ports as a single entity. The Global Configuration mode command **interface port-channel** *port-channel-number* is used to enter the Port Channel mode.
- **Tunnel** — Contains commands to manage tunnel interfaces. The Global Configuration mode command **interface tunnel** enters the Tunnel Configuration mode to configure an tunnel type interface.
- **Loopback** — Contains commands to manage loopback interfaces. The Global Configuration mode command **interface loopback** enters the Loopback Configuration mode to configure an loopback type interface.
- **SSH Public Key-chain** — Contains commands to manually specify other switch SSH public keys. The Global Configuration mode command **crypto key pub-key chain ssh** is used to enter the SSH Public Key-chain configuration mode.
- **SSH Public Key-string** — Contains commands to manually specify the SSH Public-key of a remote SSH Client. The SSH Public-Key Chain Configuration mode command **user-key** command is used to enter the SSH Public-Key Configuration mode.
- **MAC Access-List** — Configures conditions required to allow traffic based on MAC addresses. The Global Configuration mode command **mac-access-list** is used to enter the MAC Access-List configuration mode.
- **TACACS** — Configures the parameters for the TACACS server.
- **Radius** — Configures the parameters for the RADIUS server.
- **SNMP Host Configuration** — Configures the parameters for the SNMP server host.
- **Crypto Certificate Request** — Configures the parameters for crypto certificate request.
- **Crypto Certificate Generation** — Configures the parameters for crypto certificate generate.
- **Logging** — Configures the parameters for syslog log server.

- **Datacenter-Bridging** — Contains priority-flow-control commands. The datacenter-bridging command for an ethernt or port-channel interface is used to enter the DataCenterBridging mode.

Identifying the Switch and Command Mode from the System Prompt

The system prompt provides the user with the name of the switch (hostname) and identifies the command mode. The following is a formal description of the system command prompt:

[*device name*][([*command mode*-[*object*]])][# | >]

[*device name*] — is the name of the managed switch, which is typically the user-configured hostname established by the **hostname** command.

[*command mode*] — is the current configuration mode and is omitted for the top configuration levels.

[*object*] — indicates specific object or range of objects within the configuration mode.

For example, if the current configuration mode is config-if and the object being operated on is gigabit ethernet 1 on unit 1, the prompt displays the object type and unit (for example, 1/0/1).

[# | >] — The # sign is used to indicate that the system is in the Privileged EXEC mode. The > symbol indicates that the system is in the User EXEC mode, which is a read-only mode in which the system does not allow configuration.

Navigating CLI Command Modes

Table 2-5 describes how to navigate through the CLI Command Mode hierarchy.

Table 2-5. Navigating CLI Command Modes

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
User EXEC	The user is automatically in User EXEC mode unless the user is defined as a privileged user.	console>	logout
Privileged EXEC	Use the **enable** command to enter into this mode. This mode is password protected.	console#	Use the **exit** command, or press <Ctrl>+<Z> to return to the User EXEC mode.
Global Configuration	From Privileged EXEC mode, use the **configure** command.	console(config)#	Use the **exit** command, or press <Ctrl>+<Z> to return to the Privileged EXEC mode.
Line Interface	From Global Configuration mode, use the **line** command.	console(config-line)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Management Access-List	From Global Configuration mode, use the **management access-list** command.	console(config-macal)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
Policy-Class-Map	From Global Configuration mode, use the **policy-map class** command.	console(config-policy-classmap)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Class-Map	From Global Configuration mode, use the **class-map** command.	console(config-classmap)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
MAC Access List	From Global Configuration mode, use the **mac access-list** command.	console(config-mac-access-list)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
SSH Public Key-Chain	From Global Configuration mode, use the **crypto key pubkey-chain ssh** command.	console(config-pubkey-chain)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
SSH Public Key String	From the SSH Public Key- Chain mode, use the **user-key** <*user name*> {**rsa** | **dsa**} command.	console(config-pubkey-key)#	To return to the SSH Public key-chain mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
TACACS	From Global Configuration mode, use the **tacacs-server host** command.	console(tacacs)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Radius	From Global Configuration mode, use the **radius-server host** command.	console(config-radius)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
SNMP Host Configuration	From Global Configuration mode, use the **snmp-server** command.	console(config-snmp)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
SNMP v3 Host Configuration	From Global Configuration mode, use the **snmp-server v3-host** command.	console(config-snmp)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
SNMP Community Configuration	From Global Configuration mode, use the **snmp-server community** command.	console(config-snmp)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode
Crypto Certificate Generation	From Global Configuration mode, use the **crypto certificate** *number* **generate** command.	console(config-crypto-cert)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Crypto Certificate Request	From Privileged EXEC mode, use the **crypto certificate** *number* **request** command.	console(config-crypto-cert)#	To exit to Privileged EXEC mode, use the **exit** command, or press <Ctrl>+<Z>.

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
Stack	From Global Configuration mode, use the **stack** command.	console(config-stack)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Logging	From Global Configuration mode, use the **logging** command.	console(config-logging)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
MST	From Global Configuration mode, use the **spanning-tree mst configuration** command.	console(config-mst)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
VLAN Config	From Global Configuration mode, use the **vlan database** command.	console(config-vlan)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
Router OSPF Conf	From Global Configuration mode, use the **router ospf** command.	console(config-router)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode
Router RIP Config	From Global Configuration mode, use the **router rip** command.	console(config-router)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode
Router OSPFv3 Config	From Global Configuration mode, use the **ipv6 router ospf** command.	console(config-rtr)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode
IPv6 DHCP Pool Mode	From Global Configuration mode, use the **ipv6 dhcp pool** command.	console(config-dhcp6s-pool)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode
Interface Configuration Modes			

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
Gigabit Ethernet	From Global Configuration mode, use the **interface gigabitethernet** command. Or, use the abbreviation **interface gi**.	console (config-if-Gi*unit/slot/port#*	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
10 Gigabit Ethernet	From Global Configuration mode, use the **interface tengigabitethernet** command. Or, use the abbreviation **interface te**.	console (config-if-Te*unit/slot/port#*	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Port Channel	From Global Configuration mode, use the **interface port-channel** command. Or, use the abbreviation **interface po**.	console (config-if-po*port-channel-number*)#	To exit to Global Configuration mode, use the **exit** command, or <Ctrl>+<Z> to Privileged EXEC mode.
VLAN	From Global Configuration mode, use the **interface vlan** command.	console(config-if-vlan *vlan-id*)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.

Command Mode	Access Method	Command Prompt	Exit or Access Previous Mode
Tunnel	From Global Configuration mode, use the **interface tunnel** command. Or, use the abbreviation **interface tu**.	console(config-tunnel *tunnel-id*)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.
Loopback	From Global configuration mode, use the **interface loopback** command. Or, use the abbreviation **interface lo**.	console(config-loopback *loopback-id*)#	To exit to Global Configuration mode, use the **exit** command, or press <Ctrl>+<Z> to Privileged EXEC mode.

Starting the CLI

To begin running the CLI, perform the following steps:

NOTE: This procedure is for use on the console line only.

NOTE: The Easy Setup Wizard is available only when the system is in default state with no user configuration saved previously.

1. Start the switch and wait until the startup procedure is complete and the User EXEC mode is entered. The prompt *console>* is displayed.
2. Configure the switch using the Easy Setup Wizard and enter the necessary commands to complete the required tasks.
3. When finished, exit the session with the **quit** or **exit** command.

The switch can be managed over a direct connection to the switch console port or through a Telnet connection. If access is through a Telnet connection, the switch must have a defined IP address, corresponding management access granted, and a connection to the network.

Easy Setup Wizard

The Easy Setup Wizard guides the user in the basic initial configuration of a newly installed switch so that it can be immediately deployed and functional in its basic operation and be completely manageable through the Web, CLI and the remote Dell Network Manager. After initial setup, the user may enter to the system to set up more advanced configurations.

By default the switch is shipped from the factory with an IP address of 192.168.2.1 but the Easy Setup Wizard provides the opportunity to customize the IP address. The initial activation must be done using the serial interface since, without a unique IP address, the user can not access the other management interfaces.

The wizard sets up the following configuration on the switch:

- Establishes the initial privileged user account with a valid password. The wizard configures one privileged user account during the setup. The user may return to add users later. The initial account is given the highest privilege level (level 15).
- Enables CLI login and HTTP access to use the local authentication setting only, which allows user account access via these management interfaces. The user may return later to configure Radius or TACACS+.
- Sets the IP address for VLAN 1 or enables support for DHCP to configure the IP address dynamically.
- Sets up the SNMP community string to be used by the SNMP manager. The user may choose to skip this step if SNMP management is not used. If it is configured, the default access level is set to the highest available access for the SNMP management interface. The user may return later to add to the community string or reconfigure the access level of the community string. Initially only SNMPv1/2c will be activated. SNMPv3 is disabled until the user returns to configure security access for SNMPv3 (for example, engine ID, view, and so on). The SNMP community string may include spaces. The wizard requires the use of quotation marks when the user wants to enter spaces in the community string. Although spaces are allowed in the community string, their use is discouraged. The default community string contains no spaces.
- Allows the user to specify the management server IP or permit SNMP access from all IP addresses.
- Sets up the default gateway IP address.

If the user chooses not to use the wizard initially, the session defaults to the CLI mode with a warning to refer the documentation. During a subsequent login, the user may again elect not to run the setup wizard. Once the wizard has established configuration, however, the wizard is presented only if the user resets the switch to the factory default settings. While the wizard is running, the system does not display any unsolicited or unrelated status messages. For example, the system does not display event notification or system status messages.

After completing the wizard, the user is given a chance to save his configuration and continue to the CLI. If the user chooses to discard his configuration, any restart of the wizard must be from the beginning. When the user chooses to restart the wizard, any configuration the user saved previously automatically is offered for the user to accept. The user may elect to correct only a few items instead of re-entering all the data.

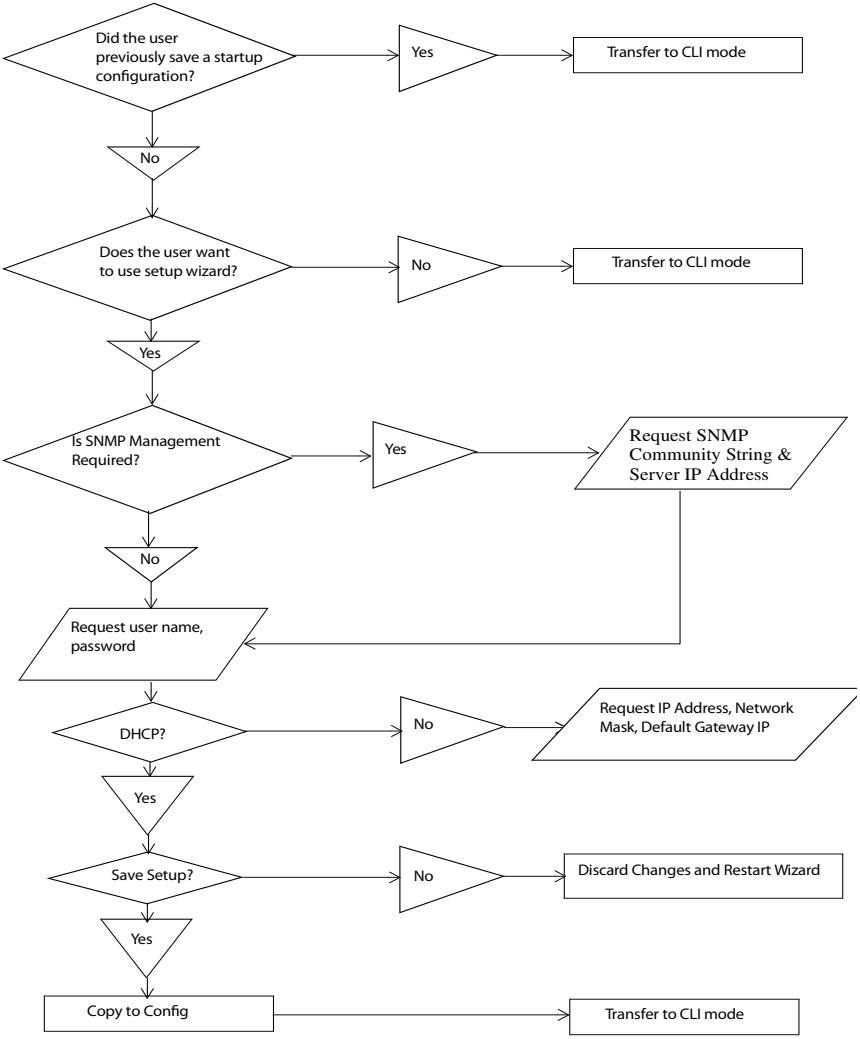
Since a switch may be powered on in the field without a serial connection, the switch waits 60 seconds for the user to respond to the setup wizard question in instances where no configuration files exist. If there is no response, the switch continues normal operation using the default factory configuration. While waiting for the response from the user, normal switch operation will continue, including but not limited to:

- If BOOTP/DHCP is supported and enabled by default, the switch attempts to get its address.
- The switch continues to switch traffic.
- The switch continues do MAC learning. If spanning-tree is on by default, the switch participates in the spanning-tree protocol.

Functional Flow

The functional flow diagram in Figure 2-1 illustrates the procedures for the Easy Setup Wizard.

Figure 2-1. Easy Setup Wizard



Example Session

This section describes an Easy Setup Wizard session. Refer to the state diagram in the previous section for general flow. The following values used by the example session are not the only possible ones:

- IP address for the VLAN 1 is 192.168.1.2:255.255.255.0. This address is on a different subnet than the OOB interface and in the same subnet as the default gateway.
- The user name is *admin*, and the password should be 8-64 characters in length (admin123).
- The network management system IP address is 192.168.2.1.
- The default gateway is 0.0.0.0.
- The SNMP community string to be used is *public*.

The setup wizard configures the initial values as defined above. After the user completes the wizard, the system is configured as follows:

- SNMPv1/2c is enabled and the community string is set up as defined above. SNMPv3 is disabled.
- The admin user account is set up as defined.
- The address of the network management station is configured. From this management station, the user can access the SNMP, HTTP, and CLI interfaces. The user may also choose to allow all IP addresses to access switch management by choosing the (0.0.0.0) IP address.
- An IP address is configured for the default VLAN (1).
- A default gateway address is configured.

The following example contains the sequence of prompts and responses associated with running an example Dell Easy Setup Wizard session, using the input values listed above. Note in this case a static IP address for the management interface is being set up. However it may be requested that the system automatically retrieve an IP address via DHCP. If DHCP is used, the system does not request a network mask or default gateway. In this example, the user employs the setup wizard to configure the initial values as defined above.

NOTE: In the following Easy Setup Wizard example, the possible user options are enclosed in [ ]. Also, where possible, default values are enclosed in [ ]. If the user enters <Return> with no options defined, the default value is accepted. Help text is in parentheses.

After the switch completes the POST and is booted, the following dialog appears:

```
Welcome to Dell Easy Setup Wizard

The Setup Wizard guides you through the initial switch
configuration, and gets you up and running as quickly
as possible. You can skip the setup wizard, and enter
CLI mode to manually configure the switch. You must
respond to the next question to run the setup wizard
within 60 seconds, otherwise the system will continue
with normal operation using the default system
configuration.Note: You can exit the setup wizard at
any point by entering [ctrl+z].

Would you like to run the setup wizard (you must
answer this question within 60 seconds)? [Y/N] y

Step 1:

The system is not setup for SNMP management by
default. To manage the switch using SNMP (required for
Dell Network Manager) you can:

o Set up the initial SNMP version 2 account now.

o Return later and setup other SNMP accounts. (For
more information on setting up an SNMP version 1 or 3
account, see the user documentation).

Would you like to setup the SNMP management interface
now? [Y/N] y

To setup the SNMP management account you must specify
the management system IP address and the "community
string" or password that the particular management
system uses to access the switch. The wizard
automatically assigns the highest access level
[Privilege Level 15] to this account. You can use Dell
```

Network Manager or other management interfaces to change this setting, and to add additional management system later. For more information on adding management systems, see the user documentation.

To add a management station:

Please enter the SNMP community string to be used.

{public}:

public<Enter>

Please enter the IP address of the Management System (A.B.C.D) or wildcard (0.0.0.0) to manage from any Management Station.

{0.0.0.0}:

192.168.2.1<Enter>

Step 2:

Now we need to setup your initial privilege (Level 15) user account. This account is used to login to the CLI and Web interface. You may setup other accounts and change privilege levels later. For more information on setting up user accounts and changing privilege levels, see the user documentation.

To setup a user account:

Please enter the user name: admin<Enter>

Please enter the user password: ********<Enter>

Please reenter the user password: ********<Enter>

Step 3:

Next, an IP address is setup. The IP address is defined on the default VLAN (VLAN #1), of which all ports are members. This is the IP address you use to access the CLI, Web interface, or SNMP interface for the switch.

Optionally you may request that the system automatically retrieve an IP address from the network via DHCP (this requires that you have a DHCP server running on the network).

To setup an IP address:

Please enter the IP address of the device (A.B.C.D) or enter "DHCP" (without the quotes) to automatically request an IP address from the network DHCP server.

192.168.1.2<Enter>

Please enter the IP subnet mask (A.B.C.D or /nn):

255.255.255.0<Enter>

Step 4:

Finally, set up the gateway. Please enter the IP address of the gateway from which this network is reachable

192.168.1.1<Enter>

This is the configuration information that has been collected:

SNMP Interface = "public"@192.168.2.1

User Account setup = admin

Password = **********

Management IP address = 192.168.2.1 255.255.255.0

Gateway = 0.0.0.0

Step 5:

If the information is correct, please select (Y) to save the configuration, and copy to the start-up configuration file. If the information is incorrect, select (N) to discard configuration and restart the wizard: [Y/N]

y<Enter>

```
Thank you for using the Dell Easy Setup Wizard. You
will now enter CLI mode.

.....

console>
```

Using CLI Functions and Tools

The CLI has been designed to manage the switch's configuration file system and to manage switch security. A number of resident tools exist to support these and other functions.

Configuration Management

All managed systems have software images and databases that must be configured, backed up and restored. Two software images may be stored on the system, but only one of them is active. The other one is a backup image. The same is true for configuration images, which store the configuration parameters for the switch. The system has three configuration images. One image is a memory-only image and is the current configuration image for the switch. The second image is the one that is loaded by the system when it reboots. There is one backup configuration image. The system also provides methods to back up these images to a remote system.

File System Commands

All files are stored in a flat file system. The commands shown in Table 2-6 are used to perform operations on these files.

Table 2-6. File System Commands

Command	Description
delete *file*	Deletes file.
filedescr *file description*	Adds a description to a file (up to 20 characters can be used).
copy *source destination*	Copies a file from source file to destination file.

Copying Files

The **copy** command not only provides a method for copying files within the file system, but also to and from remote servers. With the copy command and URLs to identify files, the user can back up images to local or remote systems or restore images from local or remote systems.

To use the **copy** command, the user specifies the source file and the destination file. For example, **copy** *tftp://remotehost/pub/backupfile backup-config* copies a file from the remote TFTP server to a local backup configuration file. In this case, if the local configuration file does not exist, then it is created by the command. If it does exist, it is overwritten. If there is not enough space on the local file system to accommodate the file, an error is flagged.

Refer to the copy command description on page 1415 in the Layer 2 commands section of the guide for command details.

Referencing External/Internal File systems

Configuration or software images are copied to or retrieved from remote file systems using TFTP and XMODEM protocols.

- tftp://server-name/path/filename — identifies a file on a remote file system accessible through the server-name. Trivial file transfer protocol is a simplified FTP and uses a UDP port instead of TCP and does not have password protection.
- xmodem: filename — identifies the file available on the XMODEM connection.

Special System Files

The following special filenames are used to refer to special virtual system files, which are under control of the system and may not be removed or added. These file names are reserved and may not be used as user-defined files. When the user copies a local source file into one of these special files and the source file has an attached file description, it also is copied as the file description for the special file.

- **backup-config** — This file refers to the backup configuration file.
- **running-config** — This file refers to the configuration file currently active in the system. It is possible to copy the running-config image to a backup-config file or to the startup-config file.
- **startup-config** — This file refers to the special configuration image stored in flash memory which is loaded when the system next reboots. The user may copy a particular configuration file (remote or local) to this special file name and reboot the system to force it to use a particular configuration.
- **image1 & image2** — These files refer to software images. One of these will be loaded when the system next reboots. Either image1 or image2 can be chosen for the next reboot using the command **boot system.**

CLI prevents the user from accidentally copying a configuration image onto a software image and vice versa.

Management Interface Security

This section describes the minimum set of management interface security measures implemented by the CLI. Management interface security consists of user account management, user access control and remote network/host access controls.

CLI through Telnet, SSH, Serial Interfaces

The CLI is accessible through a local serial interface, the service port (out-of-band interface), or in-band interfaces. Since the serial interface requires a physical connection for access, it is used if all else fails. The serial interface is the only interface from which the user may access the Easy Setup Wizard. It is the only interface that the user can access if the remote authentication servers are down and the user has not configured the system to revert to local managed accounts.

The following rules and specifications apply to these interfaces:

- The CLI is accessible from remote telnet through the IP address for the switch. IP addresses are assigned separately for the service port and the in-band ports.
- The CLI is accessible from a secure shell interface.
- The CLI generates keys for SSH locally.
- The serial session defaults to 9600 baud rate, eight data bits, non-parity and one stop bit.

User Accounts Management

The CLI provides authentication for users either through remote authentication servers supporting TACACS+ or Radius or through a set of locally managed user accounts. The setup wizard asks the user to create the initial administrator account and password at the time the system is booted.

The following rules and specifications apply:

- The user may create five local user accounts.
- User accounts have an access level, a user name, and a user password.
- The user is able to delete the user accounts but the user will not be able to delete the last level 15 account.
- The user password is saved internally in encrypted format and never appears in clear text anywhere on the CLI.
- The CLI supports TACACS+ and Radius authentication servers.
- The CLI allows the user to configure primary and secondary authentication servers. If the primary authentication server fails to respond within a configurable period, the CLI automatically tries the secondary authentication server.
- The user can specify whether the CLI should revert to using local user accounts when the remote authentication servers do not respond or if the CLI simply fails the login attempt because the authentication servers are down. This requirement applies only when the user is logged in through a telnet or an SSH session.
- The CLI always allows the user to log in to a local serial port even if the remote authentication server(s) are down. In this case, CLI reverts to using the locally configured accounts to allow the user to log in.

User Access Control

In addition to authenticating a user, the CLI also assigns the user access to one of two security levels. Level 1 has read-only access. This level allow the user to read information but not configure the switch. The access to this level cannot be modified. Level 15 is the special access level assigned to the superuser of the switch. This level has full access to all functions within the switch and can not be modified.

If the user account is created and maintained locally, each user is given an access level at the time of account creation. If the user is authenticated through remote authentication servers, the authentication server is configured to pass the user access level to the CLI when the user is authenticated. When Radius is used, the *Vendor-Specific Option* field returns the access level for the user. Two vendor specific options are supported. These are CISCO-AV-Pairs(Shell:priv-lvl=x) and Dell Radius VSA (user-group=x). TACACS+ provides the appropriate level of access.

The following rules and specifications apply:

- The user determines whether remote authentication servers or locally defined user authentication accounts are used.
- If authentication servers are used, the user can identify at least two remote servers (the user may choose to configure only one server) and what protocol to use with the server, TACACS+ or Radius. One of the servers is primary and the other is the secondary server (the user is not required to specify a secondary server). If the primary server fails to respond in a configurable time period, the CLI automatically attempts to authenticate the user with the secondary server.
- The user is able to specify what happens when both primary and secondary servers fail to respond. In this case, the user is able to indicate that the CLI should either use the local user accounts or reject all requests.
- Even if the user configures the CLI to fail login when the remote authentication servers are down, the CLI allows the user to log in to the serial interface authenticated by locally managed account data.

Syslogs

The CLI uses syslog support to send logging messages to a remote syslog server. The user configures the switch to generate all logging messages to a remote log server. If no remote log server exists, then the CLI maintains a rolling log of at most the last 1000 critical system events.

The following rules and specifications apply:

- The CLI permits the user to configure a remote syslog server to which all system logging messages are sent.
- Log messages are implementation-dependent but may contain debug messages, security or fault events.
- If a log server is not specified by the user, the CLI maintains at most the last 1000 critical system events. In this case, less important events are not recorded.

Security Logs

Security logs are maintained to record all security events including the following:

- User login.
- User logout.
- Denied login attempts.
- User attempt to exceed security access level.
- Denied attempts by external management system to access the system.

The security log record contains the following information:

- The user name, if available, or the protocol being accessed if the event is related to a remote management system.
- The IP address from which the user is connecting or the IP address of the remote management system.
- A description of the security event.
- A timestamp of the event

If syslog is available, the CLI sends the security log records to the syslog server. If syslog is not available, the CLI records the last 1000 security log records in a log separate from the system log records itemized above. Also in

this case, the CLI suppresses repeated events from the same source and instead the CLI records one event within a period of time and includes that count as part of the log.

Management ACL

In addition to user access control, the system also manages access for in-band interfaces. The system allows individual hosts or subnets to access only specific management protocols.

The user defines a management profile, which identifies management protocols such as the following:

- Telnet.
- SSH and the keying information to use for SSH.
- HTTP.
- HTTPS and the security certificate to be used.
- SNMPv1/v2c and the read and read/write community strings to be used.
- SNMPv3 and the security information for used this protocol.

For each of these management profiles, the user defines the list of hosts or subnets from which the management profiles may be used.

Other CLI Tools and Capabilities

The CLI has several other capabilities associated with its primary functions.

Terminal Paging

The terminal width and length for CLI displays is 79 characters and 25 lines, respectively. The length setting is used to control the number of lines the CLI will display before it pauses. For example, the CLI pauses at 24 lines and prompts the user with the *-more-* prompt on the 25th line. The CLI waits for the user to press either <q> or any other key. If the user presses any key except <q>, the CLI shows the next page. A <q> key stops the display and returns to the CLI prompt.

Boot Message

The boot message is a system message that is not user-configurable and is displayed when the system is booting. Displayed information includes the following:

- Operational code date
- The board type
- The CPU
- Memory size

To start the normal booting process, select item 1 in the Boot Menu. The following is a sample log for booting information.

Boot Utility Menu

If a user is connected through the serial interface during the boot sequence, pressing the <esc> key interrupts the boot process and displays a Boot Utility Menu. Selecting item 2 displays the menu and may be typed only during the initial boot up sequence. When the system boot up is complete, typing the escape sequence *does not* display the menu.

```
Boot Menu 4.1.0.6


Options available
1  - Start operational code
2  - Change baud rate
3  - Retrieve event log using XMODEM
4  - Load new operational code using XMODEM
5  - Display operational code vital product data
6  - Abort boot code update
7  - Update boot code
8  - Delete backup image
9  - Reset the system
10 - Restore configuration to factory defaults (delete
config files)
```

```
11 - Activate Backup Image
12 - Password Recovery Procedure
13 - Reformat and restore file system

[Boot Menu] 2


Select baud rate:
1 - 1200
2 - 2400
3 - 4800
4 - 9600
5 - 19200
6 - 38400
7 - 57600
8 - 115200
0 - no change

Baud rate is not changed
[Boot Menu] 3
Sending event log, start XMODEM receive.....
File asciilog.bin Ready to SEND in binary mode

Estimated File Size 0K, 12 Sectors, 89 Bytes

Estimated transmission time 14 seconds
```

```
Send several Control-X characters to cancel before
transfer starts.



[Boot Menu] 4

Ready to receive the file with XMODEM/CRC....

Ready to RECEIVE File xcode.bin in binary mode


Send several Control-X characters to cancel before
transfer starts.

CKCK


[Boot Menu] 5


The following image is in the Flash File System:


File Name.....................................image2

CRC.........................................0x3431
(13361)

Target
Device.............................0x00508548

Size.........................................0xc178
dc (12679388)

Number of Components.........................3


Operational Code
Size.......................0xa73af4 (10959604)
```

```
Operational Code Offset.....................0x74
(116)
Operational Code FLASH flag.................1
Operational Code CRC........................0x20E7
Operational Compression flag................2
(lzma)


Boot Code Version...........................1
Boot Code
Size.............................0x100000
(1048576)
Boot Code
Offset...........................0xa73b68
(10959720)
Boot Code FLASH flag........................0
Boot Code CRC...............................0x578


VPD - rel 4 ver 1 maint_lvl 0 build_num 6
      Timestamp - Mon Feb 28 16:43:14 2011


      File - PC7000_M6348v4.1.0.6.opr


[Boot Menu] 6



[Boot Menu] 7
Do you wish to update Boot Code and reset? (y/n) y
```

```
Validating image2....OK
Extracting boot code from image...CRC valid
Erasing Boot Flash.....Done.
Wrote 0x10000 bytes.
Wrote 0x20000 bytes.
Wrote 0x30000 bytes.
Wrote 0x40000 bytes.
Wrote 0x50000 bytes.
Wrote 0x60000 bytes.
Wrote 0x70000 bytes.
Wrote 0x80000 bytes.
Wrote 0x90000 bytes.
Wrote 0xa0000 bytes.
Wrote 0xb0000 bytes.
Wrote 0xc0000 bytes.
Wrote 0xd0000 bytes.
Wrote 0xe0000 bytes.
Wrote 0xf0000 bytes.
Wrote 0x100000 bytes.
Validating Flash.....Passed
Flash update completed.
Rebooting...

CPU Card ID:   0x508548
CFI Probe: Found 2x16 devices in x16 mode
```

```
/DskVol//  - disk check in progress ...
/DskVol//  - Volume is OK
Change volume Id from 0x0 to 0x79

volume descriptor ptr (pVolDesc):    0x814cf10
XBD device block I/O handle: 0x10001
auto disk check on mount:      DOS_CHK_REPAIR
|DOS_CHK_VERB_2
volume write mode:         copyback (DOS_WRITE)
volume options:
max # of simultaneously open files:    52
file descriptors in use:       0
# of different files in use:       0
# of descriptors for deleted files:    0
# of  obsolete descriptors:        0

current volume configuration:
 - volume label:   NO LABEL ; (in boot sector:
)
 - volume Id:       0x79
 - total number of sectors:   124,408
 - bytes per sector:     512
 - # of sectors per cluster: 4
 - # of reserved sectors:    1
 - FAT entry size:      FAT16
 - # of sectors per FAT copy:    122
```

```
 - # of FAT table copies:   2
 - # of hidden sectors:      8
 - first cluster is in sector #  260
 - Update last access date for open-read-close = FALSE



Boot Menu 4.1.0.6
Select an option. If no selection in 10 seconds then
operational code will start.

1 - Start operational code.
2 - Start Boot Menu.
Select (1, 2):2


Boot Menu 4.1.0.6

Options available
1  - Start operational code
2  - Change baud rate
3  - Retrieve event log using XMODEM
4  - Load new operational code using XMODEM
5  - Display operational code vital product data
6  - Abort boot code update
7  - Update boot code
```

```
8  - Delete backup image

9  - Reset the system

10 - Restore configuration to factory defaults (delete
config files)

11 - Activate Backup Image

12 - Password Recovery Procedure

13 - Reformat and restore file system


[Boot Menu] 8


Are you SURE you want to delete: image1 ? (y/n):y

image1 deleted...



[Boot Menu] 10


Are you SURE you want to delete the configuration?
(y/n):y



[Boot Menu] 11

Backup image - image1 activated.



[Boot Menu] 12
```

```
Operational Code Date: Mon Feb 28 16:43:14 2011

Uncompressing.....

Bulk Class Driver Successfully Initialized

Adding 0 symbols for standalone.
CFI Probe: Found 2x16 devices in x16 mode

volume descriptor ptr (pVolDesc):    0x5157150
XBD device block I/O handle: 0x10001
auto disk check on mount:      DOS_CHK_REPAIR
|DOS_CHK_VERB_2
volume write mode:         copyback (DOS_WRITE)
volume options:
max # of simultaneously open files:    52
file descriptors in use:       0
# of different files in use:       0
# of descriptors for deleted files:    0
# of  obsolete descriptors:        0

current volume configuration:
 - volume label:    NO LABEL ; (in boot sector: )
 - volume Id:       0x79
 - total number of sectors:   124,408
 - bytes per sector:     512
```

```
 - # of sectors per cluster: 4
 - # of reserved sectors:    1
 - FAT entry size:      FAT16
 - # of sectors per FAT copy:    122
 - # of FAT table copies:   2
 - # of hidden sectors:      8
 - first cluster is in sector #  260
 - Update last access date for open-read-close = FALSE



PCI unit 0: Dev 0xb634, Rev 0x11, Chip BCM56634_B0,
Driver BCM56634_B0
SOC unit 0 attached to PCI device BCM56634_B0
soc_reset_bcm56634_a0: TCAM PLL not locked.
Adding BCM transport pointers
Configuring CPUTRANS TX
Configuring CPUTRANS RX
Instantiating /download as rawFs,  device = 0x20001
Formatting /download for DOSFS
Instantiating /download as rawFs, device = 0x20001
Formatting...OK.



<186> NOV 15 10:03:48 0.0.0.0-1 General[1073741072]:
bootos.c(220) 1 %% Event(0xaaaaaaaa)
```

```
Instantiating RamCP: as rawFs,  device = 0x30001
Formatting RamCP: for DOSFS
Instantiating RamCP: as rawFs, device = 0x30001
Formatting...OK.


(Unit 1 - Waiting to select management unit)>USB Auto
Configuration process is completed!


Applying Global configuration, please wait ...


Welcome to Dell Easy Setup Wizard


The setup wizard guides you through the initial switch
configuration, and gets you up and running as quickly
as possible. You can skip the setup wizard, and enter
CLI mode to manually configure the switch. You must
respond to the next question to run the setup wizard
within 60 seconds, otherwise the system will continue
with normal operation using the default system
configuration. Note: You can exit the setup wizard at
any point by entering [ctrl+z].
```

```
Would you like to run the setup wizard (you must
answer this question within 60 seconds)? [Y/N] n


Thank you for using the Dell Easy Setup Wizard. You
will now enter CLI mode.


Applying Interface configuration, please wait ...


console>en


console#reload


Management switch has unsaved changes.


Are you sure you want to continue? (y/n) y


Configuration Not Saved!


Are you sure you want to reload the stack? (y/n) y


Reloading all switches.


Boot Menu 4.1.0.6
CPU Card ID:   0x508548
CFI Probe: Found 2x16 devices in x16 mode
```

```
/DskVol//  - disk check in progress ...

/DskVol//files
/DskVol//files/image2
/DskVol//files/boot.dim
/DskVol//files/crashdump.ctl
/DskVol//files/dh512.pem
/DskVol//files/dh1024.pem
/DskVol//files/sslt_cert1.pem
/DskVol//files/sslt_key1.pem
/DskVol//files/ssh_host_key
/DskVol//files/ssh_host_dsa_key
/DskVol//files/ssh_host_rsa_key
/DskVol//files/log2.bin
/DskVol//files/hpc_broad.cfg
/DskVol//files/slog0.txt
/DskVol//files/olog0.txt
/DskVol//files/sslt.rnd


/DskVol//  - Volume is OK

volume descriptor ptr (pVolDesc):    0x814cf10
XBD device block I/O handle: 0x10001
auto disk check on mount:      DOS_CHK_REPAIR
|DOS_CHK_VERB_2
```

```
volume write mode:         copyback (DOS_WRITE)
volume options:
max # of simultaneously open files:    52
file descriptors in use:       0
# of different files in use:       0
# of descriptors for deleted files:    0
# of  obsolete descriptors:        0

current volume configuration:
 - volume label:   NO LABEL ; (in boot sector:
)
 - volume Id:       0x79
 - total number of sectors:   124,408
 - bytes per sector:     512
 - # of sectors per cluster: 4
 - # of reserved sectors:    1
 - FAT entry size:      FAT16
 - # of sectors per FAT copy:    122
 - # of FAT table copies:   2
 - # of hidden sectors:      8
 - first cluster is in sector #  260
 - Update last access date for open-read-close = FALSE

Boot Menu 4.1.0.6
Select an option. If no selection in 10 seconds then
operational code will start.
```

```
1 - Start operational code.
2 - Start Boot Menu.
Select (1, 2):2


Boot Menu 4.1.0.6


Options available
1  - Start operational code
2  - Change baud rate
3  - Retrieve event log using XMODEM
4  - Load new operational code using XMODEM
5  - Display operational code vital product data
6  - Abort boot code update
7  - Update boot code
8  - Delete backup image
9  - Reset the system
10 - Restore configuration to factory defaults (delete
config files)
11 - Activate Backup Image
12 - Password Recovery Procedure
13 - Reformat and restore file system
[Boot Menu] 13
Instantiating /RamDisk/ as rawFs,  device = 0x20001
Formatting /RamDisk/ for DOSFS
```

```
Instantiating /RamDisk/ as rawFs, device = 0x20001

Formatting.../RamDisk/: file system is marked clean,
skipping check

OK.

copying file /DskVol/files/image1 -> /RamDisk/image1

copying file /DskVol/files/image2 -> /RamDisk/image2

copying file /DskVol/files/startup-config ->
/RamDisk/startup-config

copying file /DskVol/files/vpd.bin ->
/RamDisk/vpd.bin

copying file /DskVol/files/hpc_broad.cfg ->
/RamDisk/hpc_broad.cfg

copying file /DskVol/files/boot.dim ->
/RamDisk/boot.dim

copying file /DskVol/files/dh512.pem ->
/RamDisk/dh512.pem

copying file /DskVol/files/dh1024.pem ->
/RamDisk/dh1024.pem

copying file /DskVol/files/sslt_cert1.pem ->
/RamDisk/sslt_cert1.pem

copying file /DskVol/files/sslt_key1.pem ->
/RamDisk/sslt_key1.pem

copying file /DskVol/files/ssh_host_key ->
/RamDisk/ssh_host_key

copying file /DskVol/files/ssh_host_dsa_key ->
/RamDisk/ssh_host_dsa_key

copying file /DskVol/files/ssh_host_rsa_key ->
/RamDisk/ssh_host_rsa_key

image2                          12679504   11/15/113
9:30:36
```

```
hpc_broad.cfg                    148        11/15/113
10:04:30
boot.dim                          77         4/22/105
8:00:02
dh512.pem                        156         5/30/113
0:20:24
dh1024.pem                       245         5/30/113
0:20:24
sslt_cert1.pem                   863         6/2/113
5:09:30
sslt_key1.pem                    887         6/2/113
5:09:30
ssh_host_key                     517         5/30/113
0:20:24
ssh_host_dsa_key                 672         5/30/113
0:20:24
ssh_host_rsa_key                 887         5/30/113
0:20:24

Filesystem size 25484288
Bytes used      12683956
Bytes free      12800332
Erasing FFS: CFI Probe: Found 2x16 devices in x16 mode
Formatted 1 of 251 units = 0.3 %
Formatted 2 of 251 units = 0.7 %
Formatted 3 of 251 units = 1.1 %
Formatted 4 of 251 units = 1.5 %
Formatted 5 of 251 units = 1.9 %
Formatted 6 of 251 units = 2.3 %
```

```
Formatted 7 of 251 units = 2.7 %
Formatted 8 of 251 units = 3.1 %
Formatted 9 of 251 units = 3.5 %
Formatted 10 of 251 units = 3.9 %
Formatted 11 of 251 units = 4.3 %
Formatted 12 of 251 units = 4.7 %
Formatted 13 of 251 units = 5.1 %
Formatted 14 of 251 units = 5.5 %
Formatted 15 of 251 units = 5.9 %
Formatted 16 of 251 units = 6.3 %
Formatted 17 of 251 units = 6.7 %
Formatted 18 of 251 units = 7.1 %
Formatted 19 of 251 units = 7.5 %
Formatted 20 of 251 units = 7.9 %
Formatted 21 of 251 units = 8.3 %
Formatted 22 of 251 units = 8.7 %
Formatted 23 of 251 units = 9.1 %
Formatted 24 of 251 units = 9.5 %
Formatted 25 of 251 units = 9.9 %
Formatted 26 of 251 units = 10.3 %
Formatted 27 of 251 units = 10.7 %
Formatted 28 of 251 units = 11.1 %
Formatted 29 of 251 units = 11.5 %
Formatted 30 of 251 units = 11.9 %
Formatted 31 of 251 units = 12.3 %
Formatted 32 of 251 units = 12.7 %
```

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Formatted 33 of 251 units = 13.1 %
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Formatted 42 of 251 units = 16.7 %
Formatted 43 of 251 units = 17.1 %
Formatted 44 of 251 units = 17.5 %
Formatted 45 of 251 units = 17.9 %
Formatted 46 of 251 units = 18.3 %
Formatted 47 of 251 units = 18.7 %
Formatted 48 of 251 units = 19.1 %
Formatted 49 of 251 units = 19.5 %
Formatted 50 of 251 units = 19.9 %
Formatted 51 of 251 units = 20.3 %
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Formatted 54 of 251 units = 21.5 %
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Formatted 56 of 251 units = 22.3 %
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```

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Formatted 59 of 251 units = 23.5 %
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Formatted 61 of 251 units = 24.3 %
Formatted 62 of 251 units = 24.7 %
Formatted 63 of 251 units = 25.0 %
Formatted 64 of 251 units = 25.4 %
Formatted 65 of 251 units = 25.8 %
Formatted 66 of 251 units = 26.2 %
Formatted 67 of 251 units = 26.6 %
Formatted 68 of 251 units = 27.0 %
Formatted 69 of 251 units = 27.4 %
Formatted 70 of 251 units = 27.8 %
Formatted 71 of 251 units = 28.2 %
Formatted 72 of 251 units = 28.6 %
Formatted 73 of 251 units = 29.0 %
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Formatted 77 of 251 units = 30.6 %
Formatted 78 of 251 units = 31.0 %
Formatted 79 of 251 units = 31.4 %
Formatted 80 of 251 units = 31.8 %
Formatted 81 of 251 units = 32.2 %
Formatted 82 of 251 units = 32.6 %
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Formatted 84 of 251 units = 33.4 %
```

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Formatted 88 of 251 units = 35.0 %
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Formatted 90 of 251 units = 35.8 %
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Formatted 93 of 251 units = 37.0 %
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Formatted 105 of 251 units = 41.8 %
Formatted 106 of 251 units = 42.2 %
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Formatted 111 of 251 units = 44.2 %
Formatted 112 of 251 units = 44.6 %
Formatted 113 of 251 units = 45.0 %
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Formatted 129 of 251 units = 51.3 %
Formatted 130 of 251 units = 51.7 %
Formatted 131 of 251 units = 52.1 %
Formatted 132 of 251 units = 52.5 %
Formatted 133 of 251 units = 52.9 %
Formatted 134 of 251 units = 53.3 %
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Formatted 136 of 251 units = 54.1 %
```

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Formatted 137 of 251 units = 54.5 %
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Formatted 183 of 251 units = 72.9 %
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```

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Formatted 189 of 251 units = 75.2 %
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Formatted 207 of 251 units = 82.4 %
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Formatted 210 of 251 units = 83.6 %
Formatted 211 of 251 units = 84.0 %
Formatted 212 of 251 units = 84.4 %
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Formatted 214 of 251 units = 85.2 %
```

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Formatted 215 of 251 units = 85.6 %
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Formatted 232 of 251 units = 92.4 %
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Formatted 236 of 251 units = 94.0 %
Formatted 237 of 251 units = 94.4 %
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```

```
Formatted 241 of 251 units = 96.0 %
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Formatted 243 of 251 units = 96.8 %
Formatted 244 of 251 units = 97.2 %
Formatted 245 of 251 units = 97.6 %
Formatted 246 of 251 units = 98.0 %
Formatted 247 of 251 units = 98.4 %
Formatted 248 of 251 units = 98.8 %
Formatted 249 of 251 units = 99.2 %
Formatted 250 of 251 units = 99.6 %
Formatted 251 of 251 units = 100.0 %

CFI Probe: Found 2x16 devices in x16 mode

Recreating FFS: CFI Probe: Found 2x16 devices in x16
mode
/DskVol/: file system is marked clean, skipping check

volume descriptor ptr (pVolDesc):    0x9a67710
XBD device block I/O handle: 0x40001
auto disk check on mount:      DOS_CHK_REPAIR
|DOS_CHK_VERB_2
volume write mode:         copyback (DOS_WRITE)
volume options:
max # of simultaneously open files:    52
file descriptors in use:       0
# of different files in use:       0
```

```
# of descriptors for deleted files:    0
# of  obsolete descriptors:        0

current volume configuration:
 - volume label:   NO LABEL ; (in boot sector:
)
 - volume Id:       0x0
 - total number of sectors:   124,408
 - bytes per sector:     512
 - # of sectors per cluster: 4
 - # of reserved sectors:    1
 - FAT entry size:      FAT16
 - # of sectors per FAT copy:    122
 - # of FAT table copies:   2
 - # of hidden sectors:      8
 - first cluster is in sector #  260
 - Update last access date for open-read-close = FALSE




done
.
..

Filesystem size 63567872
```

```
Bytes used      0

Bytes free      63567872

copying file /RamDisk/image1 -> /DskVol/files/image1

copying file /RamDisk/image2 -> /DskVol/files/image2

copying file /RamDisk/startup-config ->
/DskVol/files/startup-config

copying file /RamDisk/vpd.bin ->
/DskVol/files/vpd.bin

copying file /RamDisk/hpc_broad.cfg ->
/DskVol/files/hpc_broad.cfg

copying file /RamDisk/boot.dim ->
/DskVol/files/boot.dim

copying file /RamDisk/dh512.pem ->
/DskVol/files/dh512.pem

copying file /RamDisk/dh1024.pem ->
/DskVol/files/dh1024.pem

copying file /RamDisk/sslt_cert1.pem ->
/DskVol/files/sslt_cert1.pem

copying file /RamDisk/sslt_key1.pem ->
/DskVol/files/sslt_key1.pem

copying file /RamDisk/ssh_host_key ->
/DskVol/files/ssh_host_key

copying file /RamDisk/ssh_host_dsa_key ->
/DskVol/files/ssh_host_dsa_key

copying file /RamDisk/ssh_host_rsa_key ->
/DskVol/files/ssh_host_rsa_key

.

..

image2                          12679504   11/15/113
9:30:36
```

```
hpc_broad.cfg                    148        11/15/113
10:04:30
boot.dim                          77         4/22/105
8:00:02
dh512.pem                        156         5/30/113
0:20:24
dh1024.pem                       245         5/30/113
0:20:24
sslt_cert1.pem                   863          6/2/113
5:09:30
sslt_key1.pem                    887          6/2/113
5:09:30
ssh_host_key                     517         5/30/113
0:20:24
ssh_host_dsa_key                 672         5/30/113
0:20:24
ssh_host_rsa_key                 887         5/30/113
0:20:24

Filesystem size 63567872
Bytes used      12683956
Bytes free      50883916
[Boot Menu]
```

Monitoring Traps from CLI

It is possible to connect to the CLI session and monitor the events or faults that are being sent as traps from the system. This feature is equivalent to the alarm-monitoring window in a typical network management system. The user enables events or monitor traps from the CLI by entering the command **logging console**. Traps generated by the system are dumped to all CLI

sessions that have requested monitoring mode to be enabled. The **no logging console** command disables trap monitoring for the session. By default, console logging is enabled.

3

Layer 2 Switching Commands

The chapters that follow describe commands that conform to the OSI model data link layer (Layer 2). Layer 2 commands provide a logical organization for transmitting data bits on a particular medium. This layer defines the framing, addressing, and checksum functions for Ethernet packets.

This section of the document contains the following Layer 2 topics:

AAA Commands	Email Alerting Commands	IPv6 MLD Snooping Commands	Port Monitor Commands
ACL Commands	Ethernet Configuration Commands	IPv6 MLD Snooping Querier Commands	QoS Commands
Address Table Commands	Ethernet CFM Commands	IP Source Guard Commands	RADIUS Commands
Auto-VoIP Commands	–	iSCSI Optimization Commands	Spanning Tree Commands
CDP Interoperability Commands	GVRP Commands	Link Dependency Commands	TACACS+ Commands
DHCP Layer 2 Relay Commands	IGMP Snooping Commands	LLDP Commands	VLAN Commands
DHCP Management Interface Commands	IGMP Snooping Querier Commands	Multicast VLAN Registration Commands	Voice VLAN Commands
DHCP Snooping Commands	IP Addressing Commands	–	802.1x Commands
Dynamic ARP Inspection Commands	IPv6 Access List Commands	Port Channel Commands	–

4

AAA Commands

Management access to the switch is via telnet, HTTP, SSH, or the serial console (SNMP access is discussed in SNMP Commands). To ensure that only authorized users can access and change the configuration of the switch, users must be authenticated.

Users can be authenticated based on:

- Login mode
- Switch access method
- Access to Privileged EXEC mode
- Two levels of access:
  - 1 = Read-only
  - 15 = Write-only

The supported authentication methods for management access are:

- Local: The user's locally stored ID and password are used for authentication.
- RADIUS: The user's ID and password are authenticated using the RADIUS server.
- TACACS+: The user's ID and password are authenticated using the TACACS+ server.
- None: No authentication is used.
- Enable: Uses the enable password for authentication.
- Line: Uses the line password for authentication.
- Authentication Preference Lists (APLs): An Authentication Preference List is an ordered list of authentication methods.

To authenticate a user, the authentication methods in the APL for the access line are attempted in order until an authentication attempt returns a success or failure return code. If a method times out, the next method in the list is attempted. The component requesting authentication is unaware of the ultimate authentication source. If a method in the preference list does not

support the concept of timeout, subsequent entries in the list are never attempted. For example, the local authentication method implementation does not supply a time-out value. If a list contains the local method, followed by the radius authentication method, the radius method is not attempted.

Once an APL is created, a reference to that APL can be stored in the access line configuration to determine how specific components should authenticate users. The APL and associated component ID are stored together. A single APL can be referenced by multiple users and components.

The administrator can enable/disable/reorder authentication methods on a per method basis (see above).

Commands in this Chapter

This chapter explains the following commands:

aaa authentication dot1x default	enable authentication	password (User EXEC)
aaa authentication enable	enable password	show aaa ias-users
aaa authentication login	ip http authentication	show authentication methods
aaa authorization network default radius	ip https authentication	show users accounts
aaa ias-user username	login authentication	show users login-history
aaa new-model	password (aaa IAS User Configuration)	username
clear (IAS)	password (Line Configuration)	–

aaa authentication dot1x default

Use the **aaa authentication dot1x default** command in Global Configuration mode to specify an authentication method for 802.1x clients. Use the **no** form of the command to return the authentication method to its default settings.

aaa authentication dot1x default does not support the **local** method. This is true for all switches using the 4.1.0.6 firmware.

Syntax

aaa authentication dot1x default {radius| ias|local|none}

no aaa authentication dot1x default

Parameter Description

Parameter	Description
radius	Uses the list of all authenticationservers for authentication.
ias	Uses the internal authentication server.
local	Use the local authentication method.
none	Uses no authentication.

Default Configuration

No default authentication method is defined.

Command Mode

Global Configuration mode

User Guidelines

Only one authentication method may be specified in the command. For the RADIUS authentication method, if the RADIUS server cannot be contacted, the supplicant fails authentication. The **none** method always allows access. the **ias** method utililizes the internal authentication server.

Example

The following example configures 802.1x authentication to use no authentication. Absent any other configuration, this command allows all 802.1x users to pass traffic through the switch.

```
console(config)# aaa authentication dot1x default
none
```

The following example configures 802.1x authentication to use a RADIUS server. A RADIUS server must be configured using the **radius-server host auth** command for the radius method to succeed.

```
console(config)#aaa authentication dot1x default
radius
```

aaa authentication enable

Use the **aaa authentication enable** command in Global Configuration mode to set authentication for accessing higher privilege levels. To return to the default configuration, use the **no** form of this command.

Syntax

aaa authentication enable {**default** | *list-name*} *method1* [*method2*...]

no aaa authentication enable {**default** | *list-name*}

- **default** — Uses the listed authentication methods that follow this argument as the default list of methods, when using higher privilege levels.
- *list-name* — Character string used to name the list of authentication methods activated, when using access higher privilege levels. (Range: 1-15 characters)
- *method1* [*method2*...] — Specify at least one from the following table:

Keyword	Source or destination
enable	Uses the enable password for authentication.
line	Uses the line password for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The default enable list is **enableList**. It is used by console, telnet, and SSH and only contains the method **none**.

Command Mode

Global Configuration mode

User Guidelines

The default and optional list names created with the **aaa authentication enable** command are used with the **enable authentication** command.

Create a list by entering the **aaa authentication enable** *list-name method* command where *list-name* is any character string used to name this list. The *method* argument identifies the list of methods that the authentication algorithm tries in the given sequence.

The additional methods of authentication are used only if the previous method returns an error, not if it fails to authenticate the user. Only the RADIUS or TACACS methods can return an error. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line. Note that **enable** will not succeed for a level one user if no authentication method is defined. A level one user must authenticate to get to privileged EXEC mode. For example, if **none** is specified as an authentication method after **radius**, no authentication is used if the RADIUS server is down.

NOTE: Requests sent by the switch to a RADIUS server include the username "$enabx$", where x is the requested privilege level. For enable to be authenticated on Radius servers, add "$enabx$" users to them. The login user ID is also sent to TACACS+ servers for enable authentication.

Example

The following example sets authentication when accessing higher privilege levels.

```
console(config)# aaa authentication enable default
enable
```

aaa authentication login

Use the **aaa authentication login** command in Global Configuration mode to set the authentication method required for user at login. To return to the default configuration, use the **no** form of this command.

Syntax

aaa authentication login {**default** | *list-name*} *method1* [*method2...*]

no aaa authentication login {**default** | *list-name*}

- **default** — Uses the listed authentication methods that follow this argument as the default list of methods when a user logs in.
- *list-name* — Character string used to name the list of authentication methods activated when a user logs in. (Range: 1-15 characters)
- *method1* [*method2*...] — Specify at least one from the following table:

Keyword	Source or destination
enable	Uses the enable password for authentication.
line	Uses the line password for authentication.
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The default login lists are **defaultList** and **networkList**. **defaultList** is used by the console and only contains the method **none**. **networkList** is used by telnet and SSH and only contains the method **local**.

Command Mode

Global Configuration mode

User Guidelines

The default and optional list names created with the **aaa authentication login** command are used with the **login authentication** command. Create a list by entering the **aaa authentication login** *list-name method* command for a particular protocol, where *list-name* is any character string used to name this list. The *method* argument identifies the list of methods that the authentication algorithm tries, in the given sequence.

The additional methods of authentication are used only if the previous method returns an error, not if there is an authentication failure. Only the RADIUS or TACACS+ methods can return an error. To ensure that the authentication succeeds even if all methods return an error, specify **none** as

the final method in the command line. For example, if **none** is specified as an authentication method after **radius**, no authentication is used if the RADIUS server is down.

Example

The following example configures authentication login.

```
console(config)# aaa authentication login default
radius local enable none
```

aaa authorization network default radius

Use the **aaa authorization network default radius** command in Global Configuration mode to enable the switch to accept VLAN assignment by the RADIUS server.

Syntax

aaa authorization network default radius

no aaa authorization network default radius

Default Configuration

By default, the switch does not accept VLAN assignments by the RADIUS server.

Command Mode

Global Configuration mode

User Guidelines

The RADIUS server can place a port in a particular VLAN based on the result of the authentication. VLAN assignment must be configured on the external RADIUS server.

Example

The following example enables RADIUS-assigned VLANs.

```
console(config)#aaa authorization network default
radius
```

aaa ias-user username

Use the **aaa ias-user username** command in Global Configuration mode to configure IAS users and their attributes. Username and password attributes are supported. The ias-user name is composed of up to 64 alphanumeric characters. This command also changes the mode to a user config mode. Use the **no** form of this command to remove the user from the internal user database.

Syntax

aaa ias-user username *user*

no aaa ias-user username *user*

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Examples

```
console#configure
console(config)#aaa ias-user username client-1
console(Config-IAS-User)#exit
console(config)#no aaa ias-user username client-1
```

aaa new-model

The **aaa new-model** command in Global Configuration mode is a no-op command. It is present only for compatibility purposes. PowerConnect switches only support the new model command set.

Syntax

aaa new-model

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the switch to use the new model command set.

```
(config)# aaa new-model
```

clear (IAS)

Use the **clear aaa ias-users** command in Privileged EXEC mode to delete all IAS users.

Syntax

clear aaa ias-users

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear aaa ias-users
```

enable authentication

Use the **enable authentication** command in Line Configuration mode to specify the authentication method list when accessing a higher privilege level from a remote telnet or console. To return to the default specified by the **enable authentication** command, use the **no** form of this command.

Syntax

enable authentication {**default** | *list-name*}

no enable authentication

- **default** — Uses the default list created with the **aaa authentication enable** command.
- *list-name* — Uses the indicated list created with the **aaa authentication enable** command. (Range: 1-12 characters)

Default Configuration

Uses the default set with the command **aaa authentication enable**.

Command Mode

Line Configuration mode

User Guidelines

Use of the no form of the command does not disable authentication. Instead, it sets the authentication list to the default list (same as enable authentication default).

Example

The following example specifies the default authentication method when accessing a higher privilege level console.

```
console(config)# line console
console(config-line)# enable authentication default
```

enable password

Use the **enable password** command in Global Configuration mode to set a local password to control access to the privileged EXEC mode. To remove the password requirement, use the **no** form of this command.

Syntax

enable password *password* [**encrypted**]

no enable password

- *password* — Password for this level (Range: 8- 64 characters).
- **encrypted** — Encrypted password entered, copied from another switch configuration.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

The 4.x firmware emulates industry standard behavior for enable mode authentication over SSH and telnet. In 4.x, the default enable authentication method for telnet and SSH uses the enableNetList method, which requires an enable password. If users are unable to enter privileged mode when accessing the switch via telnet or SSH, the administrator will need to either change the enable authentication method, e.g. to enableList, or set an enable password.

Example

The following example defines password "xxxyyyzzz" to control access to user and privilege levels.

```
console(config)# enable password xxxyyyzzz
```

ip http authentication

Use the **ip http authentication** command in Global Configuration mode to specify authentication methods for http server users. To return to the default, use the **no** form of this command.

Syntax

ip http authentication *method1* [*method2*...]

no ip http authentication

- *method1* [*method2*...] — Specify at least one from the following table:

Keyword	Source or destination
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The local user database is checked. This action has the same effect as the command **ip http authentication local**.

Command Mode

Global Configuration mode

User Guidelines

The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line. For example, if **none** is specified as an authentication method after **radius**, no authentication is used if the RADIUS server is down.

Example

The following example configures the http authentication.

```
console(config)# ip http authentication radius local
```

ip https authentication

Use the **ip https authentication** command in Global Configuration mode to specify authentication methods for https server users. To return to the default configuration, use the **no** form of this command.

Syntax

ip https authentication *method1* [*method2...*]

no ip https authentication

Parameter Description

method1 [*method2...*] — Specify at least one from the following table:

Keyword	Source or destination
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The local user database is checked. This action has the same effect as the command **ip https authentication local**.

Command Mode

Global Configuration mode

User Guidelines

The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line. If **none** is specified as an authentication method after **radius**, no authentication is used if the RADIUS server is down.

Example

The following example configures https authentication.

```
console(config)# ip https authentication radius local
```

login authentication

Use the **login authentication** command in Line Configuration mode to specify the login authentication method list for a line (console, telnet, or SSH). To return to the default specified by the authentication login command, use the **no** form of this command.

Syntax

login authentication {**default** | *list-name*}

no login authentication

- **default** — Uses the default list created with the **aaa authentication login** command.
- *list-name* — Uses the indicated list created with the **aaa authentication login** command.

Default Configuration

Uses the default set with the command **aaa authentication login**.

Command Mode

Line Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example specifies the default authentication method for a console.

```
console(config)# line console
console(config-line)# login authentication default
```

password (aaa IAS User Configuration)

Use the **password** command in aaa IAS User Configuration mode to configure a password for a user. The password is composed of up to 64 alphanumeric characters. An optional parameter [encrypted] is provided to indicate that the password given to the command is already pre-encrypted. To clear the user's password, use the **no** form of this command.

Syntax

password *password* [**encrypted**]

no password

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

aaa IAS User Configuration

User Guidelines

This command has no user guidelines.

Example

```
console#configure
console(config)#aaa ias-user username client-1
console(Config-IAS-User)#password client123
console(Config-IAS-User)#no password
```

Example of a adding a MAB Client to the Internal user database:

```
console#configure
console(config)#aaa ias-user username 1f3ccb1157
console(Config-IAS-User)#password 1f3ccb1157
console(Config-IAS-User)#exit
console(config)#
```

password (Line Configuration)

Use the **password** command in Line Configuration mode to specify a password on a line. To remove the password, use the **no** form of this command.

NOTE: For commands that configure password properties, see Password Management Commands on page 1463.

Syntax

password *password* [**encrypted**]

no password

- *password* — Password for this level. (Range: 8- 64 characters)
- **encrypted** — Encrypted password to be entered, copied from another switch configuration.

Default Configuration

No password is specified.

Command Mode

Line Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example specifies a password "mcmxxyyy" on a line.

```
console(config-line)# password mcmxxyyy
```

password (User EXEC)

Use the **password** command in User EXEC mode to allow a currently logged in user to change the password for only that user without having read/write privileges. This command should be used after the password has aged. The user is prompted to enter the old password and the new password.

NOTE: For commands that configure password properties, see Password Management Commands.

Syntax

password

Parameter Description

This command does not require a parameter description.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows the prompt sequence for executing the password command.

```
console>password
Enter old password:********
Enter new password:********
Confirm new password:********
```

show aaa ias-users

Use the show aaa ias-users command in Privileged EXEC mode to display configured IAS users and their attributes. Passwords configured are not shown in the show command output.

Syntax

show aaa ias-users [*username*]

Parameter Description

This command does not require a parameter description.

Default Behavior

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show aaa ias-users


UserName

------------------

Client-1

Client-2
```

Following are the IAS configuration commands shown in the output of the **show running-config** command. Passwords shown in the command output are always encrypted.

```
aaa ias-user username client-1

password
a45c74fdf50a558a2b5cf05573cd633bac2c6c598d54497ad4c46
104918f2c encrypted

exit
```

show authentication methods

Use the **show authentication methods** command in Privileged EXEC mode to display information about the authentication methods.

Syntax

show authentication methods

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the authentication configuration.

```
console#show authentication methods

Login Authentication Method Lists
---------------------------------
defaultList         : none
networkList         :  local

Enable Authentication Method Lists
----------------------------------
enableList          : enable   none
enableNetList       :  enable

Line     Login Method List    Enable Method List
-------  -----------------    ------------------
Console  defaultList          enableList
Telnet    networkList          enableNetList
SSH       networkList          enableNetList

HTTPS       :local
HTTP        :local
DOT1X       :
```

show users accounts

Use the **show users accounts** command in Privileged EXEC mode to display the local user status with respect to user account lockout and password aging.

Syntax

show users accounts

Parameter Description

The following fields are displayed by this command.

Parameter	Description
User Name	Local user account's user name.
Privilege	User's access level (read only or read/write).
Lockout Status	Indicates whether the user account is locked out or not.
Password Expiration Date	Current password expiration date in date format.
Lockout	Displays the user's lockout status (**True** or **False**).

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays information about the local user database.

```
console#show users accounts
UserName    Privilege Password  Password    Lockout
                      Aging     Expiry date
----------- --------- --------- ----------- -------
```

```
admin       15        ---       ---         False
guest       15        ---       ---         False
brcm1       1         ---       ---         False

console#show users accounts long

User Name
------------
asd
thisisaverylongusernameitisquitelong
```

show users login-history

Use the **show users login-history** command in Global Configuration mode to display information about the login history of users.

Syntax

show users login-history [long]

- *name* — name of user. (Range: 1-20 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example show user login history outputs.

```
console#show users login-history
Login Time            Username  Protocol  Location
--------------------  --------- --------- -----------
Jan 19 2005 08:23:48  Bob       Serial
Jan 19 2005 08:29:29  Robert    HTTP      172.16.0.8
Jan 19 2005 08:42:31  John      SSH       172.16.0.1
Jan 19 2005 08:49:52  Betty     Telnet    172.16.1.7
```

username

Use the **username** command in Global Configuration mode to add a new user to the local user database. The default privilege level is 1. This command can be used to unlock a locked user account for an already existing user. Use the **no** form of this command to remove the username from the local user database.

Syntax

username *name* **password** *password* [**privilege** *level*] [**encrypted**]

no username *name*

Parameter Description

Parameter	Description
name	The name of the user. Range: 1-32 printable characters. The special characters allowed in the password include ! # $ % & ‘ ( ) * + , - . / : ; < = > @ [\ ] ^ _ ` { | } ~. User names can contain blanks if the name is surrounded by double quotes.
password	The authentication password for the user. Range: 8-64 characters. This value can be 0 [zero] if the **no passwords min-length** command has been executed. The special characters allowed in the password include ! # $ % & ‘ ( ) * + , - . / : ; < = > @ [\ ] ^ _ ` { | } ~.

Parameter	Description
level	The user level. Level 0 can be assigned by a level 15 user to another user to suspend that user's access. Range: 0-15. Enter access level 1 for Read Access or 15 for Read/Write Access.
encrypted	Encrypted password entered, copied from another switch configuration.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

To use the ! character as part of the username or password string, it should be enclosed within quotation marks. For example, username "test!xyz" password "test!xyz" includes an exclamation point in both the username and password. Up to 8 users may be created.

Example

The following example configures user **bob** with password **xxxyymmmm** and user level 15.

```
console(config)# username bob password ?

<password>    Enter the password. The special characters
allowed in the password include ~ ` ! @ # $ % ^ & * ( ) _ -
+ = [ ] { } \ | : ; ' < > . , /.


console(config)# username bob password xxxyyymmm privilege
15
```

username password encrypted

The Administrator uses the **username password encrypted** command in Global Configuration mode to transfer local user passwords between devices without having to know the passwords. The *password* parameter must be

exactly 128 hexadecimal characters. The user represented by the *username* parameter must be a pre-existing local user. If the password strength feature is enabled, it checks for password strength and returns an appropriate error if it fails to meet the password strength criteria.

Syntax

username *name* **password** *password* [**level** *level*] [**encrypted**]

Parameter Description

This command does not require a parameter description.

Default Behavior

This command has no default configuration.

Command Modes

Global Configuration mode

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	Message
Error Completion Message	Could not set user password!

Message Type	Message Description
Reason behind the failure	**1** Exceeds Minimum Length of a Password. Password should be in the range of 8-64 characters in length. Set minimum password length to 0 by using the **passwords min-length 0** command. **2** Password should contain Minimum <number> uppercase-letters, <number> lowercase-letters, <number> numeric numbers, <number> special characters and <number> character classes and Maximum limit of <number> consecutive alphabetic and numeric characters. Maximum repetition of <number> alphabetic and number characters. **3** Password should not contain the keywords <keyword1>, <keyword2> and <keyword3> in any form (reversed, substring or case-insensitive).

Examples

```
console(config)#username test password xxxxPassword
level 1 encrypted

console(config)#username test password xxxxPassword
level 1

console(config)#username test password testPassword
encrypted

console(config)#username test password testPassword
```

username unlock

Use the **username unlock** command in Global Configuration mode to unlock a locked user account. Only a user with read/write access can re-activate a locked user account.

Syntax

username *username* **unlock**

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

5

ACL Commands

Access to a switch or router can be made more secure through the use of Access Control Lists (ACLs) to control the type of traffic allowed into or out of specific ports. An ACL consists of a series of rules, each of which describes the type of traffic to be processed and the actions to take for packets that meet the classification criteria. Rules within an ACL are evaluated sequentially until a match is found, if any. Every ACL is terminated by an implicit **deny all** rule, which covers any packet not matching a preceding explicit rule. ACLs can help to ensure that only authorized users have access to specific resources while blocking out any unwarranted attempts to reach network resources.

ACLs may be used to restrict contents of routing updates, decide which types of traffic are forwarded or blocked and, above all, provide security for the network. ACLs are normally used in firewall routers that are positioned between the internal network and an external network, such as the Internet. They can also be used on a router positioned between two parts of the network to control the traffic entering or exiting a specific part of the internal network.

The PowerConnect ACL feature allows classification of packets based upon Layer 2 through Layer 4 header information. An Ethernet IPv6 packet is distinguished from an IPv4 packet by its unique Ethertype value; thus, all IPv4 and IPv6 classifiers include the Ethertype field.

Multiple ACLs per interface are supported. The ACLs can be a combination of Layer 2 and/or Layer 3/4 ACLs. ACL assignment is appropriate for both physical ports and LAGs. ACLs can also be time based.

ACL Logging

Access list rules are monitored in hardware to either permit or deny traffic matching a particular classification pattern, but the network administrator currently has no insight as to which rules are being *hit*. Some hardware platforms have the ability to count the number of hits for a particular

classifier rule. The ACL logging feature allows these hardware hit counts to be collected on a per-rule basis and reported periodically to the network administrator using the system logging facility and an SNMP trap.

The PowerConnect ACL permit/deny rule specification supports a **log** parameter that enables hardware hit count collection and reporting. Depending on platform capabilities, logging can be specified for deny rules, permit rules, or both. A five minute logging interval is used, at which time trap log entries are written for each ACL logging rule that accumulated a nonzero hit count during that interval. The logging interval is not user configurable.

How to Build ACLs

This section describes how to build ACLs that are less likely to exhibit false matches.

Administrators are cautioned to specify ACL access-list, permit and deny rule criteria as fully as is possible in order to avoid false matches. This is especially true in networks with protocols such as FCoE that have newly introduced Ether type values. As an example, rules that specify a TCP or UDP port value should also specify the TCP or UDP protocol and the IPv4 or IPv6 Ether type. Rules that specify an IP protocol should also specify the Ether type value for the frame. In general, any rule that specifies matching on an upper layer protocol field should also include matching constraints for each of the lower layer protocols. For example, a rule to match packets directed to the well-known UDP port number 22 (SSH) should also include matching constraints on the IP protocol field (protocol = 0x11 or UDP) and the Ether type field (Ether type = 0x0800 or IPv4). In Table 5-1 is a list of commonly used Ether types and, in Table 5-2 commonly used IP protocol numbers.

Table 5-1. Common Ethertypes

EtherType	Protocol
0x0800	Internet Protocol version 4 (IPv4)
0x0806	Address Resolution Protocol (ARP)
0x0842	Wake-on LAN Packet
0x8035	Reverse Address Resolution Protocol (RARP)
0x8100	VLAN tagged frame (IEEE 802.1Q)
0x86DD	Internet Protocol version 6 (IPv6)
0x8808	MAC Control
0x8809	Slow Protocols (IEEE 802.3)
0x8870	Jumbo frames
0x888E	EAP over LAN (EAPOL – 802.1x)
0x88CC	Link Layer Discovery Protocol
0x8906	Fibre Channel over Ethernet
0x8914	FCoE Initialization Protocol
0x9100	Q in Q

Table 5-2. Common IP Protocol Numbers

IP Protocol Numbers	Protocol
0x00	IPv6 Hop-by-hop option
0x01	ICMP
0x02	IGMP
0x06	TCP
0x08	EGP
0x09	IGP
0x11	UDP

Commands in this Chapter

This chapter explains the following commands:

access-list	mac access-list extended rename
deny | permit (IP ACL)	service-acl input
deny | permit (Mac-Access-List-Configuration)	show service-acl interface
ip access-group	show ip access-lists
mac access-group	show mac access-list
mac access-list extended	

access-list

Use the **access-list** command in Global Configuration mode to create an Access Control List (ACL) that is identified by the parameter *list-name*.

The command specifies the queue identifier to which packets matching this rule are assigned. The command may also specify the mirror or redirect interface (unit/slot/port) to which packets matching this rule are copied or forwarded, respectively.

The time-range parameter allows imposing time limitation on the ACL rule as defined by the parameter *time-range-name*. If a time range with the specified name does not exist, and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with specified name exists and the ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive.

access-list *list-name* {**deny** | **permit**} {**every** | {{**icmp** | **igmp** | **ip** | **tcp** | **udp** | *number*} **any**| *srcip srcmask*[{**eq** {*portkey* | *0-65535*}] *dstip dstmask* [{**eq** {*portkey* | *0-65535*}] [**precedence** *precedence* | **tos** *tos tosmask* | **dscp** *dscp*] }[**log**] [**time-range** *time-range-name*] [**assign-queue** *queue-id*] [{**mirror** | **redirect**} *interface-id*]

no access-list *list-name*

Parameter Description

Parameter	Description
list-name	Access-list name up to 31 characters in length.
deny | permit	Specifies whether the IP ACL rule permits or denies an action.
every	Allows all protocols.
eq	Equal. Refers to the Layer 4 port number being used as match criteria. The first reference is source match criteria, the second is destination match criteria.
number	Standard protocol number. Protocol keywords icmp,igmp,ip,tcp,udp.
srcip	Source IP address.
srcmask	Source IP mask.
dstip	Destination IP address.
dstmask	Destination IP mask.
portvalue	The source layer 4 port match condition for the ACL rule is specified by the port value parameter (Range: 0–65535).
portkey	Or you can specify the *portkey*, which can be one of the following keywords: domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp, and www.
log	Specifies that this rule is to be logged.
time-range-name	Displays the name of the time-range if the ACL rule has referenced a time range.
assign-queue *queue-id*	Specifies the particular hardware queue for handling traffic that matches the rule. (Range: 0-6)
mirror *interface*	Allows the traffic matching this rule to be copied to the specified interface.
redirect *interface*	This parameter allows the traffic matching this rule to be forwarded to the specified unit/slot/port.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

Access list names can consist of any printable character. Names can be up to 31 characters in length.

Examples

The following examples create an ACL to discard any HTTP traffic from 192.168.77.171, but allow all other traffic from 192.168.77.171:

```
console(config)#access-list alpha deny ip
192.168.77.171 0.0.0.0 0.0.0.0 255.255.255.255 eq
http

console(config)#access-list alpha permit ip
192.168.77.171 0.0.0.0 any
```

deny | permit (IP ACL)

Use this command in Ipv4-Access-List Configuration mode to create a new rule for the current IP access list. Each rule is appended to the list of configured rules for the list.

The command is enhanced to accept the optional **time-range** parameter. The **time-range** parameter allows imposing a time limitation on the IP ACL rule as defined by the parameter *time-range-name*. If a time range with the specified name does not exist, and the IP ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with the specified name exists, and the IP ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied when the time-range with a specified name becomes active. The ACL rule is removed when the time-range with a specified name becomes inactive.

Syntax

{**deny** | **permit**} {*every* | **any**} {*dstmac* | **any**} [*ethertypekey* | *0x0600-0xFFFF*] **vlan** {**eq** *0-4095*}] [**cos** *0-7*] [[**log**] [**time-range** *time-range-name*] [**assign-queue** *queue-id*] [{**mirror** | **redirect**} *interface-id*]

{deny | permit} {every | {{icmp | igmp | ip | tcp | udp | *number*} *srcip srcmask* [{eq {*portkey* | *0-65535*} *dstip dstmask* [{eq {*portkey*| *0-65535*}] [precedence *precedence* | tos *tos tosmask* | dscp *dscp*] [log] [time-range *time-range-name*] [assign-queue *queue-id*] [{mirror | redirect} *interface-id*]

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Ipv4-Access-List Configuration mode

User Guidelines

Administrators are cautioned to specify permit and deny rule matches as fully as is possible in order to avoid false matches. Rules that specify a port value should also specify the protocol and ethertype. Rules that specify a protocol should also specify the ethertype value for the frame. In general, any rule that specifies matching on an upper layer protocol field should also include matching constraints for lower layer protocol fields. For example, a rule to match packets directed to the well-known UDP port number 22 (SSH) should also include constraints on the IP protocol field (UDP) and the ethertype field (0x800 – IPv4). Below is a list of commonly used ethertypes:

Ethertype	Protocol
0x0800	Internet Protocol version 4 (IPv4)
0x0806	Address Resolution Protocol (ARP)
0x0842	Wake-on LAN Packet
0x8035	Reverse Address Resolution Protocol (RARP)
0x8100	VLAN tagged frame (IEEE 802.1Q)
0x86DD	Internet Protocol version 6 (IPv6)
0x8808	MAC Control

Ethertype	Protocol
0x8809	Slow Protocols (IEEE 802.3)
0x8870	Jumbo frames
0x888E	EAP over LAN (EAPOL – 802.1x)
0x88CC	Link Layer Discovery Protocol
0x8906	Fibre Channel over Ethernet
0x8914	FCoE Initialization Protocol
0x9100	Q in Q

deny | permit (Mac-Access-List-Configuration)

Use the **deny** command in Mac-Access-List Configuration mode to deny traffic if the conditions defined in the deny statement are matched. Use the **permit** command in Mac-Access-List Configuration mode to allow traffic if the conditions defined in the permit statement are matched.

Use this command in Mac-Access-List Configuration mode to create a new rule for the current MAC access list. Each rule is appended to the list of configured rules for the list.

The command is enhanced to accept the optional **time-range** parameter. The **time-range** parameter allows imposing a time limitation on the MAC ACL rule as defined by the parameter *time-range-name*. If a time range with the specified name does not exist, and the MAC ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with the specified name exists, and the MAC ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied when the time-range with a specified name becomes active. The ACL rule is removed when the time-range with a specified name becomes inactive.

Syntax

{**deny** | **permit**} {{any | *srcmac srcmacmask*} {any | bpdu | *dstmac* dstmacmask}} [*ethertypekey* | *0x0600-0xFFFF*] **vlan** {**eq** *0-4095*}] [**cos** *0-7*] [[**log**] [**time-range** *time-range-name*] [**assign-queue** *queue-id*] [{**mirror** | **redirect**} *interface-id*]

Parameter Description

Parameter	Description
srcmac	Valid source MAC address in format xxxx.xxxx.xxxx.
srcmacmask	Valid MAC address bitmask for the source MAC address in format xxxx.xxxx.xxxx.
any	Packets sent to or received from any MAC address
dstmac	Valid destination MAC address in format xxxx.xxxx.xxxx.
destmacmask	Valid MAC address bitmask for the destination MAC address in format xxxx.xxxx.xxxx.
bpdu	Bridge protocol data unit
ethertypekey	Either a keyword or valid four-digit hexadecimal number. (Range: Supported values are appletalk, arp, ibmsna, ipv4, ipv6, ipx, mplsmcast, mplsucast, Netbios, novell, pppoe, rarp.)
0x0600-0xFFFF	Specify custom ethertype value (hexadecimal range 0x0600-0xFFFF).
vlan eq	VLAN number. (Range 0-4095)
cos	Class of service. (Range 0-7)
log	Specifies that this rule is to be logged.
time-range-name	Use the **time-range** parameter to impose a time limitation on the MAC ACL rule as defined by the parameter *time-range-name*.
assign-queue	Specifies particular hardware queue for handling traffic that matches the rule.
queue-id	0-6, where n is number of user configurable queues available for that hardware platform.
mirror	Copies the traffic matching this rule to the specified interface.
redirect	Forwards traffic matching this rule to the specified physical interface.
interface	Valid physical interface in *unit/slot/port* format, for example 1/0/12.

Default Configuration

This command has no default configuration.

Command Mode

Mac-Access-List Configuration mode

User Guidelines

The **no** form of this command is not supported, as the rules within an ACL cannot be deleted individually. Rather the entire ACL must be deleted and respecified.

The assign-queue and redirect parameters are only valid for permit commands.

Example

The following example configures a MAC ACL to deny traffic from MAC address 0806.c200.0000.

```
console(config)#mac access-list extended DELL123

console(config-mac-access-list)#deny 0806.c200.0000
ffff.ffff.ffff any
```

ip access-group

Use the **ip access-group** command in Global and Interface Configuration modes to apply an IP based egress ACL on an Ethernet interface or a group of interfaces. An IP based ACL should have been created by the **access-list** *name* … command with the same name specified in this command.

Use the **no ip access-group** command to disable an IP based egress ACL on an Ethernet interface or a group of interfaces.

Syntax

ip access-group *name* [*direction] [seqnum]*

no ip access-group *name direction seqnum*

- *name* — Access list name. (Range: Valid IP access-list name up to 31 characters in length)

- *direction* — Direction of the ACL. (Range: **in** or **out**. Default is **in.**)
- *seqnum* — Precedence for this interface and direction. A lower sequence number has higher precedence. Range: 1 – 4294967295. Default is**1**.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration and Interface Configuration (Ethernet, VLAN, or Port Channel) modes

User Guidelines

Global mode command configures the ACL on all the interfaces, whereas the interface mode command does so for the interface.

Examples

```
console(config)#ip access-group aclname in

console(config)#no ip access-group aclname in

console(config)#ip access-group aclname1 out

console(config-if-1/0/1)#ip access-group aclname out
2

console(config-if-1/0/1)#no ip access-group aclname
out
```

mac access-group

Use the **mac access-group** command in Global Configuration or Interface Configuration mode to attach a specific MAC Access Control List (ACL) to an interface in the in-bound direction.

Syntax

mac access-group *name [direction] [sequence]*

no mac access-group *name*

- name — Name of the existing MAC access list. (Range: 1-31 characters)

- direction — Only the in-bound direction is supported.
- sequence — Order of access list relative to other access lists already assigned to this interface and direction. (Range: 1-4294967295)

Default Configuration

The default direction is **in** (in-bound).

Command Mode

Global Configuration mode or Interface Configuration (Ethernet, VLAN or Port Channel) mode

User Guidelines

An optional sequence number may be specified to indicate the order of this access-list relative to the other access-lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number already is in use for this interface and direction, the specified access-list replaces the currently attached access list using that sequence number. If the sequence number is not specified for this command, a sequence number is selected that is one greater than the highest sequence number currently in use for this interface and direction.

This command specified in Interface Configuration mode only affects a single interface.

Example

The following example assigns a MAC access group to port 1/0/1 with the name DELL123.

```
console(config)#interface 1/0/1

console(config-if-1/0/1)#mac access-group DELL123
```

mac access-list extended

Use the **mac access-list extended command** in Global Configuration mode to create the MAC Access Control List (ACL) identified by the *name* parameter.

Syntax

mac access-list extended *name*

no mac access-list extended *name*

- *name* — Name of the access list. (Range: 1-31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

Use this command to create a mac access control list. The CLI mode is changed to Mac-Access-List Configuration when this command is successfully executed.

Example

The following example creates MAC ACL and enters MAC-Access-List-Configuration mode.

```
console(config)#mac access-list extended LVL7DELL
console(config-mac-access-list)#
```

mac access-list extended rename

Use the **mac access-list extended rename** command in Global Configuration mode to rename the existing MAC Access Control List (ACL).

Syntax

mac access-list extended rename *name newname*

- *name* — Existing name of the access list. (Range: 1-31 characters)
- *newname* — New name of the access list. (Range: 1-31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

Command fails if the new name is the same as the old one.

Example

The following example shows the **mac access-list extended rename** command.

```
console(config)#mac access-list extended rename DELL1
DELL2
```

service-acl input

Use the **service-acl input** command in Interface Configuration mode to block Link Local Protocol Filtering (LLPF) protocol(s) on a given port. Use the **no** form of this command to unblock link-local protocol(s) on a given port.

Syntax

service-acl input {blockcdp | blockvtp | blockdtp | blockudld | blockpagp | blocksstp | blockall}

no service-acl input

Parameter Description

Parameter	Description
blockcdp	To block CDP PDU's from being forwarded.
blockvtp	To block VTP PDU's from being forwarded.
blockdtp	To block DTP PDU's from being forwarded.
blockudld	To block UDLD PDU's from being forwarded.
blockpagp	To block PAgP PDU's from being forwarded.
blocksstp	To block SSTP PDU's from being forwarded.
blockall	To block all the PDU's with MAC of 01:00:00:0c:cc:cx (x-don't care) from being forwarded.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, Port-channel)

User Guidelines

To specify multiple protocols, enter the protocol parameters together on the command line, separated by spaces. This command can only be entered once per interface if no intervening **no service-acl input** command has been entered.

show service-acl interface

This command displays the status of LLPF rules configured on a particular port or on all the ports.

Syntax

show service-acl interface {*interface-id* | all}

Parameter Description

Parameter	Description
interface-id	Any physical or logical interface. See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show service-acl interface gi1/0/1


Block CDP.............................. Enable
Block VTP..............................Enable
Block DTP..............................Enable
Block UDLD.............................. Enable
Block PAGP..............................Enable
Block SSTP.............................. Enable
Block All.............................. Enable
```

show ip access-lists

Use the **show ip access-lists** command in Privileged EXEC mode to display an IP ACL and time-range parameters.

Syntax

show ip access-lists [*accesslistnumber*]

Parameter Description

Parameter	Description
accesslistnumber	The number used to identify the IP ACL.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays IP ACLs configured on a device.

```
console#show ip access-lists
Current number of ACLs: 2  Maximum number of ACLs: 100

    ACL Name             Rules       Interface(s)
      Vlan(s)
-------------------------------------------------------
ACL40                    1
ACL41                    1
```

show mac access-list

Use the **show mac access-list** command in Privileged EXEC mode to display a MAC access list and all of the rules that are defined for the MAC ACL. Use the [*name*] parameter to identify a specific MAC ACL to display.

Syntax

show mac access-list *name*

Parameter Description

Parameter	Description
Name	Use the *name* parameter to identify a specific MAC ACL to display.

Default Configuration

This command has no default configuration

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a MAC access list and all associated rules.

```
console#show mac access-list DELL123
```

The command output provides the following information:

Fields	Description
MAC ACL Name	The name of the MAC access list.
Rules	The number of user-configured rules defined for the MAC ACL. The implicit 'deny all' rule defined at the end of every MAC ACL is not included.
Interfaces	Displays the list of interfaces (unit/slot/port) to which the MAC ACL is attached in a given direction.

6

Address Table Commands

Static MAC Filtering allows the administrator to add a number of unicast or multicast MAC addresses directly to the forwarding database. This is typically a small number relative to the total size of the database. Associated with each static MAC address is a set of source ports, a set of destination ports and VLAN information.

Any packet with a particular static MAC address in a particular VLAN is admitted only if the ingress port is in the set of source ports; otherwise, the packet is dropped. On the egress side, the packet, if admitted, is sent out of all the ports that are in the set of destination ports.

Upon ingress, each packet's destination MAC address is compared against the forwarding database. If the address is not in the table, the packet is flooded to all other ports in the VLAN. If the address is in the table, then it is checked to see if it has been defined as a filter. If the MAC address is not defined as a filter, then the packet is forwarded.

If the specific destination MAC address is defined as a filter, then the ingress port number is compared to the set of source ports listed for the address. If the port of ingress is not in the set of source ports, then the packet is immediately discarded. If the ingress port is a member of the set of source ports, then the packet is admitted.

For packets admitted because of a MAC filter match only, the following additional steps are performed. Note that all other egress processing remains unchanged. At the egress port, if the destination port number is in the set of destination ports, the packet is forwarded. If the destination port is not in the set of destination ports, then the packet is discarded.

Static entries are never aged and can only be removed by user command.

Commands in this Chapter

This chapter explains the following commands:

clear mac address-table	mac address-table static	show mac address-table count

mac address-table aging-time	port security	show mac address-table dynamic
mac address-table multicast filtering	port security max	show mac address-table interface
mac address-table multicast forbidden address	show mac address-table multicast	show mac address-table static
mac address-table multicast forbidden forward-unregistered	show mac address-table filtering	show mac address-table vlan
mac address-table multicast forward-all	show mac address-table	show ports security
mac address-table multicast forward-unregistered	show mac address-table address	show ports security addresses
mac address-table multicast static	show mac address-table count	

clear mac address-table

Use the **clear mac address-table** command in Privileged EXEC mode to remove learned entries from the forwarding database.

Syntax

clear mac address-table dynamic [**address** *mac-addr* | **interface** *interface-id* | **vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-addr	Delete the specified MAC address.
interface-id	Delete all dynamic MAC addresses on the specified physical port or port channel.
vlan-id	Delete all dynamic MAC addresses for the specified VLAN. The range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, the mac address-table tables are cleared.

```
console#clear mac address-table dynamic
```

mac address-table aging-time

Use the **mac address-table aging-time** command in Global Configuration mode to set the aging time of the address. To restore the default, use the **no** form of the **mac address table aging-time** command.

Syntax

mac address-table aging-time {*0* | *10-1000000*}

no mac address-table aging-time

Parameter Description

Parameter	Description
0	Disable aging time for the MAC Address Table
10-1000000	Set the number of seconds aging time for the MAC Address Table

Default Configuration

300 seconds

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

In this example the MAC Address Table aging time is set to 400.

```
console(config)#mac address-table aging-time 400
```

mac address-table multicast filtering

Use the **mac address-table multicast filtering** command in Global Configuration mode to enable filtering of Multicast addresses. To disable filtering of Multicast addresses, use the **no** form of the command.

Syntax

mac address-table multicast filtering

no mac address-table multicast filtering

Parameter Description

This command has no arguments or keywords.

Default Configuration

Multicast filtering is disabled by default. The switch will flood multicast packets to all ports belonging to the received VLAN and ignores the settings of the **mac address-table multicast forbidden** and **mac address-table multicast forward-unregistered** commands.

Command Mode

Global Configuration mode

User Guidelines

If switches exist on the VLAN, and IGMP snooping is not enabled, use the **mac address-table multicast forward-all** command to enable forwarding all Multicast packets to the Multicast routers.

Example

In this example, multicast filtering is enabled and multicast frames will behave according to the setting of the **mac address-table multicast forward-unregistered** and **mac address-table multicast forbidden forward-unregistereed** command settings.

```
console(config)#mac address-table multicast filtering
```

mac address-table multicast forbidden address

Use the **mac address-table multicast forbidden address** command in Global Configuration mode to forbid adding a specific Multicast address to specific ports. To return to the system default, use the **no** form of this command. If routers exist on the VLAN, do not change the unregistered multicast addresses state to *drop* on the routers ports.

Syntax

mac address-table multicast forbidden address vlan *vlan-id* {*mac-multicast-address* | *ip-multicast-address*} {**add** | **remove**} **interface** {**gigabitethernet** | **port-channel** | **tengigabitethernet**} *interface-list*

no mac address-table multicast forbidden address vlan *vlan-id* {*mac-multicast-address* | *ip-multicast-address*}

Parameter Description

Parameter	Description
add	Adds ports to the group. If no option is specified, this is the default option.
remove	Removes ports from the group.
vlan vlan-id	A valid vlan-id. (Range 1-4093)

Parameter	Description
mac-multicast-address	MAC Multicast address in the format xxxx.xxxx.xxxx.
ip-multicast-address	IP Multicast address.
interface-list	Specify a comma separated list of interfaces, a range of interfaces, or a combination of both. Interfaces can be port-channel numbers or physical ports in unit/slot/port format.

Default Configuration

No forbidden addresses are defined.

Command Mode

Global Configuration mode

User Guidelines

Before defining forbidden ports, ensure that the Multicast group is registered.

Examples

In this example the MAC address 0100.5e02.0203 is forbidden on port 2/0/9 within VLAN 8.

```
console(config)#mac address-table multicast forbidden
address vlan 8 0100.5e02.0203 add gigabitethernet
2/0/9
```

mac address-table multicast forbidden forward-unregistered

Use the **mac address-table multicast forbidden forward-unregistered** command in Global Configuration mode to forbid forwarding unregistered–multicast–addresses. Use the **no** form of this command to return to the default.

Syntax

mac address-table multicast forbidden forward-unregistered vlan *vlan-id*

no mac address-table multicast forbidden forward-unregistered vlan *vlan-id*

Parameter Description

Parameter	Description
vlan *vlan-id*	Valid VLAN ID (Range 1-4093).

Default Configuration

The default for this command is not forbidden.

Command Mode

Global configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example forbids forwarding unregistered multicast addresses on VLAN8.

```
console(config)#mac address-table multicast forbidden
forward-unregistered vlan 8
```

mac address-table multicast forward-all

Use the **mac address-table multicast forward-all** command in Interface Configuration mode to enable forwarding of all Multicast packets. To restore the default, use the **no** form of the **mac address-table multicast forward-all** command.

Syntax

mac address-table multicast forward-all vlan *vlan-id*

no mac address-table multicast forward-all vlan *vlan-id*

Parameter Description

Parameter	Description
vlan *vlan-id*	A valid VLAN ID (Range 1-4093).

Default Configuration

Forward-unregistered.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

In this example, all VLAN1 Multicast packets are forwarded.

```
console(config)#mac address-table multicast forward-
all vlan 1
```

mac address-table multicast forward-unregistered

Use the **mac address-table multicast forward-unregistered** command in Global Configuration mode to enable the forwarding of unregistered multicast addresses.

Syntax

mac address-table multicast forward-unregistered vlan *vlan-id*

Parameter Description

Parameter	Description
vlan *vlan-id*	A valid VLAN ID (Range 1-4093).

Default Configuration

Forward-unregistered

Command Mode

Global Configuration mode

User Guidelines

If routers exist on the VLAN, do not change the unregistered multicast addresses state to *drop* on the routers ports.

NOTE: Do not use the **mac address-table multicast forbidden forward-unregistered** command with the **mac address-table multicast forward-unregistered** command on the same interface.

Example

The following example displays how to enable forwarding of unregistered multicast addresses.

```
console(config)#bridge multicast forward-unregistered
vlan 1
```

mac address-table multicast static

Use the **mac address-table multicast static** command in Global Configuration mode to register MAC layer Multicast addresses to the bridge table and to add ports to the group statically. To deregister the MAC address, use the **no** form of the **mac address-table multicast static** command.

Syntax

mac address-table multicast static vlan *vlan-id* {*mac-multicast-address* | *ip-multicast-address*} [**add** | **remove**] [**interface** {**gigabitethernet** | **port-channel** | **tengigabitethernet**} *interface-list*]

no mac address-table multicast static vlan

Parameter Description

Parameter	Description
add	Adds ports to the group. If no option is specified, this is the default option.
remove	Removes ports from the group.
vlan *vlan-id*	Valid vlan ID (1-4093).
mac-multicast-address	MAC multicast address in the format xxxx.xxxx.xxxx.
ip-multicast-address	IP multicast address.
interface *interface-list*	Specify a comma separated list of interfaces, a range of interfaces, or a combination of both. Interfaces can be port-channel numbers or physical ports in unit/slot/port format.

Default Configuration

No Multicast addresses are defined.

Command Mode

Global Configuration mode

User Guidelines

If the command is executed without **add** or **remove**, the command registers only the group in the bridge database.

Static Multicast addresses can be defined only on static VLANs.

Examples

The following example registers the MAC address.

```
console(config)#mac address-table vlan 8 multicast
static 0100.5e02.0203
```

The following example registers the MAC address and adds ports statically.

```
console(config)#interface vlan 8
```

```
console(config)# mac address-table vlan 8 multicast
static 0100.5e02.0203 add interface gigabitethernet
1/0/1-9, 1/0/2
```

mac address-table static

Use the **mac address-table static** command in Global Configuration mode to add a static MAC-layer station source address to the bridge table. To delete the MAC address, use the **no** form of the **mac address-table static** command.

Syntax

mac address-table static *mac-addr* **vlan** *vlan-id* **interface** {**gigabitethernet** | **port-channel** | **tengigabitethernet**} *interface-id*

no mac address-table static *mac-addr* **vlan** *vlan-id* [**interface** {**gigabitethernet** | **port-channel** | **tengigabitethernet**} *interface-id]*

Syntax Description

Parameter	Description
mac-address	A valid MAC address in the format xxxx.xxxx.xxxx.
vlan-id	Valid VLAN ID (1-4093)
interface-id	A valid physical unit/slot/port or port-channel number.

Default Configuration

No static addresses are defined. The default mode for an added address is permanent.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example adds a permanent static MAC-layer station source address 3aa2.64b3.a245 to the MAC address table.

```
console(config)# mac address-table static
3AA2.64B3.A245 vlan 1 interface gigabitethernet 1/0/8
```

port security

Use the **port security** command in Interface Configuration mode to disable the learning of new addresses on an interface. To enable new address learning, use the **no** form of the **port security** command.

Syntax

port security [**discard**]

no port security

- **discard** — Discards frames with unlearned source addresses. This is the default if no option is indicated.

Default Configuration

Disabled—No port security

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

When port security is enabled on an interface, all dynamic entries learned up to that point are flushed, and new entries can be learned only to the limit set by the **port security max** command. The default limit is 100 dynamic MAC addresses.

Example

In this example, frame forwarding is enabled without learning, and with traps sent every 100 seconds on port gi1/0/1.

```
console(config)#interface gigabitethernet 1/0/1
console(config-if-1/0/1)#port security trap 100
```

port security max

Use the **port security max** command in Interface Configuration mode to configure the maximum addresses that can be learned on the port while the port is in port security mode. To return to the system default, use the **no** form of this command.

Syntax

port security max *max-addr*

no port security max

- *max-addr* — The maximum number of addresses that can be learning on the port. (Range: 0-600)

Default Configuration

The default value for this command is 100.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example shows using this command in Ethernet Interface Configuration mode.

```
console(config-if-1/0/3)# port security max 80
```

show mac address-table multicast

Use the **show mac address-table multicast** command in Privileged EXEC mode to display Multicast MAC address table information.

Syntax

show mac address-table multicast [**vlan** *vlan-id*] [**address** {*mac-multicast-address* | *ip-multicast-address*}] [**format** {**ip** | **mac**}]

- *vlan_id* — A valid VLAN ID value.
- *mac-multicast-address* — A valid MAC Multicast address.
- *ip- multicast-address* — A valid IP Multicast address.
- **format** — Multicast address format. Can be **ip** or **mac**.

Default Configuration

If format is unspecified, the default is **mac**.

Command Mode

Privileged EXEC mode

User Guidelines

A MAC address can be displayed in IP format only if it is in the range 01:00:5e:00:00:00 through 01:00:5e:7f:ff:ff.

Example

In this example, Multicast MAC address table information is displayed.

```
console#show mac address-table multicast

Vlan      MAC Address         Type     Ports
-----   -----------------  -------   -----------------
1         0100.5E05.0505      Static

Forbidden ports for multicast addresses:

Vlan         MAC Address                Ports
----  ----------------------  --------------------------
1       0100.5E05.0505
```

NOTE: A multicast MAC address maps to multiple IP addresses, as shown above.

show mac address-table filtering

Use the **show mac address-table filtering** command in Privileged EXEC mode to display the Multicast filtering configuration.

Syntax

show mac address-table filtering *vlan-id*

- *vlan_id* — A valid VLAN ID value.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, the Multicast configuration for VLAN 1 is displayed.

```
console#show mac address-table filtering 1


Filtering: Enabled
VLAN: 1
Mode:
Forward-Unregistered
```

show mac address-table

Use the **show mac address-table** command in User EXEC or Privileged EXEC mode to display all entries in the bridge-forwarding database.

Syntax

show mac address-table

Parameter Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, all classes of entries in the mac address-table are displayed.

```
console#show mac address-table

Aging time is 300 Sec

Vlan  Mac Address      Type        Port
---- ---------------- ---------- -----------
0     001E.C9AA.AE19 Management  CPU Interface:  0/5/
1     001E.C9AA.AC19 Dynamic     Gi1/0/21
1     001E.C9AA.AE1B Management  Vl1
10    001E.C9AA.AE1B Management  Vl10
90    001E.C9AA.AE1B Management  Vl90

Total MAC Addresses in use: 5
```

show mac address-table address

Use the **show mac address-table address** command in User EXEC or Privileged EXEC mode to display all entries in the bridge-forwarding database for the specified MAC address.

Syntax

show mac address-table address *mac-address* [**interface** *interface-id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-address	A MAC address with the format xxxx.xxxx.xxxx.

Parameter	Description
interface-id	Display information for a specific interface. Valid interfaces include physical ports and port channels.
vlan-id	Display entries for the specific VLAN only. The range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, the mac address table entry for 0000.E26D.2C2A is displayed.

```
console#show mac address-table address 0000.E26D.2C2A


Vlan Mac Address    Type     Port
---- -------------- -------- -------------
1    0000.E26D.2C2A Dynamic  1/0/1
```

show mac address-table count

Use the **show mac address-table count** command in User EXEC or Privileged EXEC mode to display the number of addresses present in the Forwarding Database.

Syntax

show mac address-table count [**vlan** *vlan-id* | **interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	Specify an interface type; valid interfaces include physical ports and port channels.
vlan-id	Specify a valid VLAN, the range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the addresses in the Forwarding Database:

```
console#show mac address-table count
Capacity: 8192
Used: 109
Static addresses: 2
Secure addresses: 1
Dynamic addresses: 97
Internal addresses: 9
```

show mac address-table dynamic

Use the **show mac address-table** command in User EXEC or Privileged EXEC mode to display all dynamic entries in the bridge-forwarding database.

Syntax

show mac address-table dynamic [**address** *mac-address*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-address	A MAC address with the format xxxx.xxxx.xxxx.
interface-id	Display information for a specific interface. Valid interfaces include physical ports and port channels.
vlan-id	Display entries for the specific VLAN only. The range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, all dynamic entries in the mac address-table are displayed.

```
console#show mac address-table dynamic
Aging time is 300 Sec
Vlan Mac Address    Type    Port
---- -------------- ------- -------------
1    0000.0001.0000 Dynamic gi1/0/1
1    0000.8420.5010 Dynamic gi1/0/1
1    0000.E26D.2C2A Dynamic gi1/0/1
1    0000.E89A.596E Dynamic gi1/0/1
```

```
1    0001.02F1.0B33 Dynamic gi1/0/1
```

show mac address-table interface

Use the **show mac address-table** command in User EXEC or Privileged EXEC mode to display all entries in the mac address-table.

Syntax

show mac address-table interface *interface-id* [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
interface-id	Specify an interface type.Valid interfaces include physical ports and port channels.
vlan-id	Specify a valid VLAN. The range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, all classes of entries in the bridge-forwarding database for gigabit Ethernet interface 1/0/1 are displayed.

```
console#show mac address-table interface
gigabitethernet 1/0/1

Aging time is 300 Sec

Vlan Mac Address    Type    Port
```

```
---- -------------- ----    -------------
1    0000.0001.0000 Dynamic gi1/0/1
1    0000.8420.5010 Dynamic gi1/0/1
1    0000.E26D.2C2A Dynamic gi1/0/1
1    0000.E89A.596E Dynamic gi1/0/1
1    0001.02F1.0B33 Dynamic gi1/0/1
```

show mac address-table static

Use the **show mac address-table static** command in User EXEC or Privileged EXEC mode to display static entries in the bridge-forwarding database.

Syntax

show mac address-table static [**address** *mac-address*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
mac-address	A MAC address with the format xxxx.xxxx.xxxx.
interface-id	Specify an interface type; valid interfaces include physical ports and port channels.
vlan-id	Specify a valid VLAN; the range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, all static entries in the bridge-forwarding database are displayed.

```
console#show mac address-table static


Vlan Mac Address    Type     Port
---- -------------- -----    -----
1    0001.0001.0001 Static   gi1/0/1
```

show mac address-table vlan

Use the **show mac address-table vlan** command in User EXEC or Privileged EXEC mode to display all entries in the bridge-forwarding database for the specified VLAN.

Syntax

show mac address-table [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
vlan-id	Specify a valid VLAN; the range is 1 to 4093.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, all classes of entries in the bridge-forwarding database are displayed.

```
console#show mac address-table vlan 1

       Mac Address Table

-------------------------------------

Vlan  Mac Address     Type    Ports

----  --------------- ------- -------

   1  0000.0001.0000  Dynamic gi1/0/1

   1  0000.8420.5010  Dynamic gi1/0/1

   1  0000.E26D.2C2A  Dynamic gi1/0/1

   1  0000.E89A.596E  Dynamic gi1/0/1

   1  0001.02F1.0B33  Dynamic gi1/0/1

Total Mac Addresses for this criterion: 5
```

show ports security

Use the **show ports security** command in Privileged EXEC mode to display the port-lock status.

Syntax

show ports security [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In this example, all classes of entries in the port-lock status are displayed.

```
console#show ports security

Port  Status   Action            Maximum  Trap    Frequency
----  ------    ----------       --------- ------- -------
1/0/1 Locked   Discard           3        Enable   100
1/0/2 Unlocked -                 28       -        -
1/0/3  Locked  Discard, Shutdown 8        Disable  -
```

The following table describes the fields in this example.

Field	Description
Port	The port number.
Status	The status can be one of the following: Locked or Unlocked.
Actions	Action on violations.
Maximum	The maximum addresses that can be associated on this port in Static Learning mode or in Dynamic Learning mode.
Trap	Indicates if traps would be sent in case of violation.
Frequency	The minimum time between consecutive traps.

show ports security addresses

Use the **show ports security addresses** command in Privileged EXEC mode to display current dynamic addresses in locked ports.

Syntax

show ports security addresses {**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following example displays dynamic addresses for port channel number 1/0/1.

```
console#show ports security addresses gigabitethernet
1/0/1


Dynamic addresses: 83


Maximum addresses: 100



Learned addresses
------- ---------
```

7

Auto-VoIP Commands

Voice over Internet Protocol (VoIP) allows network users to make telephone calls using a computer network over a data network like the Internet. With the increased prominence of delay-sensitive applications (voice, video, and other multimedia applications) deployed in networks today, proper QoS configuration ensures high-quality application performance. The Auto-VoIP feature is intended to provide an easy classification mechanism for voice packets so that they can be prioritized above data packets in order to provide better QoS.

The Auto-VoIP feature explicitly matches VoIP streams in Ethernet switches and provides them with a better class of service than ordinary traffic. The Auto VoIP module provides the capability to assign the highest priority for the following VoIP packets:

- Session Initiation Protocol (SIP)
- H.323
- Skinny Client Control Protocol (SCCP)

Auto-VoIP borrows ACL lists from the global system pool. ACL lists allocated by Auto-VoIP reduce the total number of ACLs available for use by the network operator. Enabling Auto-VoIP uses one ACL list to monitor for VoIP sessions. Each monitored VoIP session utilizes two rules from an additional ACL list. This means that the maximum number of ACL lists allocated by Auto-VoIP is two. The Auto-VoIP feature limits the maximum number of simultaneous users to 16. Administrators should utilize the Voice VLAN feature for deployment of IP voice service in an enterprise network because Voice VLAN scales to significantly higher numbers of users.

Commands in this Chapter

This chapter explains the following commands:

show switchport voice	switchport voice detect auto

show switchport voice

Use the **show switchport voice** command to show the status of Auto-VoIP on an interface or all interfaces.

Syntax

show switchport voice [**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*]

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example shows command output when a port is specified:

```
console#show switchport voice


Interface  Auto VoIP Mode Traffic Class
---------  -------------- -------------
Gi1/0/1    Disabled       6
Gi1/0/2    Disabled       6
Gi1/0/3    Disabled       6
Gi1/0/4    Disabled       6
Gi1/0/5    Disabled       6
Gi1/0/6    Disabled       6
Gi1/0/7    Disabled       6
```

```
Gi1/0/8    Disabled       6
Gi1/0/9    Disabled       6
Gi1/0/10   Disabled       6
Gi1/0/11   Disabled       6
Gi1/0/12   Disabled       6
Gi1/0/13   Disabled       6
Gi1/0/14   Disabled       6
Gi1/0/15   Disabled       6
Gi1/0/16   Disabled       6
Gi1/0/17   Disabled       6
Gi1/0/18   Disabled       6
Gi1/0/19   Disabled       6
Gi1/0/20   Disabled       6
Gi1/0/21   Disabled       6
Gi1/0/22   Disabled       6
Gi1/0/23   Disabled       6
Gi1/0/24   Disabled       6
Po1        Disabled       6
Po2        Disabled       6
Po3        Disabled       6
Po4        Disabled       6
Po5        Disabled       6
Po6        Disabled       6
Po7        Disabled       6
Po8        Disabled       6
Po9        Disabled       6
```

```
Po10        Disabled        6
Po11        Disabled        6
Po12        Disabled        6
Po13        Disabled        6
Po14        Disabled        6
Po15        Disabled        6


--More-- or (q)uit
```

The following example shows command output when a port is specified:

```
console#show switchport voice gigabitethernet 1/0/1

Interface  Auto VoIP Mode Traffic Class
---------  -------------- -------------
Gi1/0/1    Disabled       6
```

The command output provides the following information:

- **AutoVoIP Mode**—The Auto VoIP mode on the interface.
- **Traffic Class**—The Cos Queue or Traffic Class to which all VoIP traffic is mapped. This is not configurable and defaults to the highest COS queue available in the system for data traffic.

switchport voice detect auto

The **switchport voice detect auto** command is used to enable the VoIP Profile on all the interfaces of the switch (global configuration mode) or for a specific interface (interface configuration mode).Use the **no** form of the command to disable the VoIP Profile.

Syntax

switchport voice detect auto

no switchport voice detect auto

Default Configuration

This feature is disabled by default.

Command Mode

Global Configuration mode

Interface (gigabitethernet, port-channel, tengigabitethernet) Configuration mode

User Guidelines

This command has no user guidelines

Example

```
console(config)#interface gigabitethernet 1/0/1


console(config-if-Gi1/0/1)#switchport voice detect auto
```

8

CDP Interoperability Commands

Industry Standard Discovery Protocol (ISDP) is a proprietary Layer 2 network protocol which inter-operates with Cisco network equipment and is used to share information between neighboring devices. PowerConnect switches participate in the ISDP protocol and are able to both discover and be discovered by devices that support the Cisco Discovery Protocol (CDP). ISDP is based on CDP, which is a precursor to LLDP.

Commands in this Chapter

This chapter explains the following commands:

clear isdp counters	show isdp
clear isdp table	show isdp entry
isdp advertise-v2	show isdp interface
isdp enable	show isdp neighbors
isdp holdtime	show isdp traffic
isdp timer	

clear isdp counters

The **clear isdp counters** command clears the ISDP counters.

Syntax

clear isdp counters

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear isdp counters
```

clear isdp table

The **clear isdp table** command clears entries in the ISDP table.

Syntax

clear isdp table

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear isdp table
```

isdp advertise-v2

The **isdp advertise-v2** command enables the sending of ISDP version 2 packets from the device. Use the "no" form of this command to disable sending ISDP version 2 packets.

Syntax

isdp advertise-v2

no isdp advertise-v2

Default Configuration

ISDP sends version 2 packets by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#isdp advertise-v2
```

isdp enable

The **isdp enable** command enables ISDP on the switch. User the "no" form of this command to disable ISDP. Use this command in global configuration mode to enable the ISDP function on the switch. Use this command in interface mode to enable sending ISDP packets on a specific interface.

Syntax

isdp enable

no isdp enable

Default Configuration

ISDP is enabled.

Command Mode

Global Configuration mode.

Interface (Ethernet) configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example enables isdp on interface 1/0/1.

```
console(config)#interface gigabitethernet 1/0/1
console(config-if-1/0/1)#isdp enable
```

isdp holdtime

The **isdp holdtime** command configures the hold time for ISDP packets that the switch transmits. The hold time specifies how long a receiving device should store information sent in the ISDP packet before discarding it. The range is given in seconds. Use the "no" form of this command to reset the holdtime to the default.

Syntax

isdp holdtime *time*

no isdp holdtime

Parameter Description

Parameter	Description
time	The time in seconds (range 10–255 seconds).

Default Configuration

The default holdtime is 180 seconds.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

The following example sets isdp holdtime to 40 seconds.

```
console(config)#isdp holdtime 40
```

isdp timer

The **isdp timer** command sets period of time between sending new ISDP packets. The range is given in seconds. Use the "no" form of this command to reset the timer to the default.

Syntax

isdp timer *time*

no isdp timer

Parameter Description

Parameter	Description
time	The time in seconds (range: 5–254 seconds).

Default Configuration

The default timer is 30 seconds.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

The following example sets the isdp timer value to 40 seconds.

```
console(config)#isdp timer 40
```

show isdp

The **show isdp** command displays global ISDP settings.

Syntax

show isdp

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show isdp
Timer.............................. 30
Hold Time.......................... 180
Version 2 Advertisements.............. Enabled
Neighbors table last time changed.... 0 days 00:06:01
Device ID.......................... QTFMPW82400020
Device ID format capability.......... Serial Number
Device ID format..................... Serial Number
```

show isdp entry

The **show isdp entry** command displays ISDP entries. If a device id specified, then only the entry about that device is displayed.

Syntax

show isdp entry { **all** | *deviceid* }

Parameter Description

Parameter	Description
all	Show ISDP settings for all devices.
deviceid	The device ID associated with a neighbor.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show isdp entry Switch


Device ID                       Switch
Address(es):
    IP Address:                 172.20.1.18
    IP Address:                 172.20.1.18
Capability                      Router IGMP
Platform                        cisco WS-C4948
Interface                       1/0/1
Port ID                         GigabitEthernet1/1
Holdtime                        64
Advertisement Version           2
Entry last changed time         0 days 00:13:50
Version :
Cisco IOS Software, Catalyst 4000 L3 Switch Software
(cat4000 I9K91S-M), Version 12.2(25)EWA9, RELEASE
SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
```

```
Compiled Wed 21-Mar-07 12:20 by tinhuang
```

show isdp interface

The **show isdp interface** command displays ISDP settings for the specified interface.

Syntax

show isdp interface { **all** | **gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port* }

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show isdp interface all


Interface        Mode
---------------  ----------
1/0/1             Enabled
1/0/2             Enabled
1/0/3             Enabled
1/0/4             Enabled
1/0/5             Enabled
1/0/6             Enabled
1/0/7             Enabled
```

```
1/0/8              Enabled
1/0/9              Enabled
1/0/10             Enabled
1/0/11             Enabled
1/0/12             Enabled
1/0/13             Enabled
1/0/14             Enabled
1/0/15             Enabled
1/0/16             Enabled
1/0/17             Enabled
1/0/18             Enabled
1/0/19             Enabled
1/0/20             Enabled
1/0/21             Enabled
1/0/22             Enabled
1/0/23             Enabled
1/0/24             Enabled

console#show isdp interface gigabitethernet 1/0/1

Interface        Mode
---------------  ----------
1/0/1             Enabled
```

show isdp neighbors

The **show isdp neighbors** command displays the list of neighboring devices.

Syntax

show isdp neighbors {[**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port* | **detail**] }

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show isdp neighbors


Capability Codes: R - Router, T - Trans Bridge, B - Source
Route, S - Switch, H - Host, I - IGMP, r - Repeater


Device ID  Intf  Hold Cap. Platform      Port ID
---------  ---- ----- ---- --------      -------
Switch     1/0/1  165  RI cisco WS-C4948 GigabitEthernet1/1


console#show isdp neighbors detail


Device ID                       Switch
Address(es):
    IP Address:                 172.20.1.18
    IP Address:                 172.20.1.18
Capability                      Router IGMP
Platform                        cisco WS-C4948
```

```
Interface                       1/0/1
Port ID                         GigabitEthernet1/1
Holdtime                        162
Advertisement Version           2
Entry last changed time         0 days 00:55:20
Version :
Cisco IOS Software, Catalyst 4000 L3 Switch Software
(cat4000-I9K91S-M), Version 12.2(25)EWA9, RELEASE SOFTWARE
(fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 21-Mar-07 12:20 by tinhuang
```

show isdp traffic

The **show isdp traffic** command displays ISDP statistics.

Syntax

show isdp traffic

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show isdp traffic

ISDP Packets Received..........................  4253
```

```
ISDP Packets Transmitted..................... 127
ISDPv1 Packets Received...................... 0
ISDPv1 Packets Transmitted................... 0
ISDPv2 Packets Received...................... 4253
ISDPv2 Packets Transmitted................... 4351
ISDP Bad Header.............................. 0
ISDP Checksum Error.......................... 0
ISDP Transmission Failure.................... 0
ISDP Invalid Format.......................... 0

ISDP Table Full.............................. 392
ISDP Ip Address Table Full................... 737
```

9

DHCP Layer 2 Relay Commands

In the majority of network configurations, DHCP clients and their associated servers do not reside on the same IP network or subnet. Therefore, some kind of third-party agent is required to transfer DHCP messages between clients and servers. Such an agent is known as a DHCP Relay agent.

The DHCP Relay agent accepts DHCP requests from any routed interface, including VLANs. The agent relays requests from a subnet without a DHCP server to a server or next-hop agent on another subnet. Unlike a router which switches IP packets transparently, a DHCP Relay agent processes DHCP messages and generates new DHCP messages as a result.

The PowerConnect DHCP Relay supports DHCP Relay Option 82 circuit-id and remote-id for a VLAN.

Commands in this Chapter

This chapter explains the following commands:

dhcp l2relay (Global Configuration)	show dhcp l2relay stats interface
dhcp l2relay (Interface Configuration)	show dhcp l2relay subscription interface
dhcp l2relay circuit-id	show dhcp l2relay agent-option vlan
dhcp l2relay remote-id	show dhcp l2relay vlan
dhcp l2relay trust	show dhcp l2relay circuit-id vlan
dhcp l2relay vlan	show dhcp l2relay remote-id vlan
show dhcp l2relay all	clear dhcp l2relay statistics interface
show dhcp l2relay interface	–

dhcp l2relay (Global Configuration)

Use the **dhcp l2relay** command to enable Layer 2 DHCP Relay functionality. The subsequent commands mentioned in this section can only be used when the L2-DHCP Relay is enabled. Use the **no** form of this command to disable L2-DHCP Relay.

Syntax

dhcp l2relay

no dhcp l2relay

Default Configuration

DHCP L2 Relay is disabled by default.

Command Mode

Global Configuration.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#dhcp l2relay
```

dhcp l2relay (Interface Configuration)

Use the **dhcp l2relay** command to enable DHCP L2 Relay for an interface. Use the "no" form of this command to disable DHCP L2 Relay for an interface.

Syntax

dhcp l2relay

no dhcp l2relay

Default Configuration

DHCP L2Relay is disabled on all interfaces by default.

Command Mode

Interface Configuration (Ethernet, Port-channel).

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-1/0/1)#dhcp l2relay
```

dhcp l2relay circuit-id

Use the **dhcp l2relay circuit-id** command to enable setting the DHCP Option 82 Circuit ID for a VLAN. When enabled, the interface number is added as the Circuit ID in DHCP option 82. Use the "no" form of this command to disable setting the DHCP Option 82 Circuit ID.

Syntax

dhcp l2relay circuit-id vlan *vlan-range*

no dhcp l2relay circuit-id vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	The list of VLAN IDs.

Default Configuration

Setting the DHCP Option 82 Circuit ID is disabled by default.

Command Mode

Global Configuration

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#dhcp l2relay circuit-id vlan 340-350
```

dhcp l2relay remote-id

Use the **dhcp l2relay remote-id** command to enable setting the DHCP Option 82 Remote ID for a VLAN. When enabled, the supplied string is used for the Remote ID in DHCP Option 82. Use the "no" form of this command to disable setting the DHCP Option 82 Remote ID.

Syntax

dhcp l2relay remote-id *remoteId* **vlan** *vlan-range*

no dhcp l2relay remote-id *remoteId* **vlan** *vlan-range*

Parameter Description

Parameter	Description
remoteId	The string to be used as the remote ID in the Option 82 (Range: 1 - 128 characters).

Default Configuration

Setting the DHCP Option 82 Remote ID is disabled by default.

Command Mode

Global Configuration.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#dhcp l2relay remote-id dslforum vlan
10,20-30
```

dhcp l2relay trust

Use the **dhcp l2relay trust** command to configure an interface to mandate Option-82 on receiving DHCP packets.

Syntax

dhcp l2relay trust

no dhcp l2relay trust

Default Configuration

DHCP Option 82 is discarded by default.

Configuration Mode

Interface Configuration (Ethernet, Port-channel).

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-1/0/1)#dhcp l2relay trust
```

dhcp l2relay vlan

Use the **dhcp l2relay vlan** command to enable the L2 DHCP Relay agent for a set of VLANs. All DHCP packets which arrive on interfaces in the configured VLAN are subject to L2 Relay processing. Use the "no" form of this command to disable L2 DHCP Relay for a set of VLANs.

Syntax

dhcp l2relay vlan *vlan-range*

no dhcp l2relay vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	The list of VLAN IDs.

Default Configuration

DHCP L2 Relay is disabled on all VLANs by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#dhcp l2relay vlan 10,340-345
```

show dhcp l2relay all

Use the **show dhcp l2relay all** command in Privileged EXEC mode to display the summary of DHCP L2 Relay configuration.

Syntax

show dhcp l2relay all

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console #show dhcp l2relay all


DHCP L2 Relay is Enabled.


Interface   L2RelayMode  TrustMode
----------  -----------  --------------
```

```
 Gi1/0/2     Enabled      untrusted
 Gi1/0/4     Disabled     trusted

VLAN Id   L2 Relay    CircuitId   RemoteId
--------- ----------  ----------- ------------
 3           Disabled    Enabled    --NULL--
 5           Enabled     Enabled    --NULL--
 6           Enabled     Enabled    broadcom
 7           Enabled     Disabled   --NULL--
 8           Enabled     Disabled   --NULL--
 9           Enabled     Disabled   --NULL--
 10          Enabled     Disabled   --NULL--
```

show dhcp l2relay interface

Use the **show dhcp l2relay interface** command in Privileged EXEC mode to display DHCP L2 Relay configuration specific to interfaces.

Syntax

show dhcp l2relay interface {**all** | *interface-id*}

Parameter Description

Parameter	Description
all	Show all interfaces.
interface-id	A physical interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show dhcp l2relay interface all


DHCP L2 Relay is  Enabled.


Interface  L2RelayMode   TrustMode
----------  -----------  --------------
 0/2        Enabled      untrusted
 0/4        Disabled     trusted
```

show dhcp l2relay stats interface

Use the **show dhcp l2relay stats interface** command in Privileged EXEC mode to display DHCP L2 Relay statistics specific to interfaces.

Syntax

show dhcp l2relay stats interface {**all** | *interface-id*}

Parameter Description

Parameter	Description
all	Show all interfaces.
interface-id	A physical interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show dhcp l2relay stats interface all


DHCP L2 Relay is  Enabled.


Interface  UntrustedServer  UntrustedClient  TrustedServer
TrustedClient
           MsgsWithOpt82    MsgsWithOpt82    MsgsWithoutOpt82
MsgsWithoutOpt82
---------  --------------- -----------------  ----------------- ---
-----------
 Gi1/0/1     0                 0                 0                0
 Gi1/0/2     0                 0                 3                7
 Gi1/0/3     0                 0                 0                0
```

show dhcp l2relay subscription interface

Use the **show dhcp l2relay subscription interface** command in Privileged EXEC mode to display DHCP L2 Relay Option-82 configuration specific to interfaces.

Syntax

show dhcp l2relay subscription interface {**all** | *interface-id*}

Parameter Description

Parameter	Description
all	Show all interfaces.
interface-id	A physical interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

show dhcp l2relay agent-option vlan

Use the **show dhcp l2relay agent-option vlan** command in Privileged EXEC mode to display DHCP L2 Relay Option-82 configuration specific to VLANs.

Syntax

show dhcp l2relay agent-option vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	Show information for the specified VLAN range. A range may be a single VLAN ID or two VLAN IDs separated by a single dash with no embedded spaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console# show dhcp l2relay agent-option vlan 5-10
```

```
DHCP L2 Relay is  Enabled.

VLAN Id    L2 Relay    CircuitId   RemoteId
--------- ----------  ----------- ------------
5           Enabled     Enabled    --NULL--
6           Enabled     Enabled    broadcom
7           Enabled     Disabled   --NULL--
8           Enabled     Disabled   --NULL--
9           Enabled     Disabled   --NULL--
10          Enabled     Disabled   --NULL—
```

show dhcp l2relay vlan

Use the **show dhcp l2relay vlan** command in Privileged EXEC mode to display whether DHCP L2 Relay is globally enabled on the specified VLAN or VLAN range.

Syntax

show dhcp l2relay vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	Show information for the specified VLAN range. A range may be a single VLAN ID or two VLAN IDs separated by a single dash with no embedded spaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show dhcp l2relay vlan 100
DHCP L2 Relay is  Enabled.
DHCP L2 Relay is enabled on the following VLANs:
100
```

show dhcp l2relay circuit-id vlan

Use the **show dhcp l2relay circuit-id vlan** command in Privileged EXEC mode to display whether DHCP L2 Relay is globally enabled and whether the DHCP Circuit-ID option is enabled on the specified VLAN or VLAN range.

Syntax

show dhcp l2relay circuit-id vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	Show information for the specified VLAN range. A range may be a single VLAN ID or two VLAN IDs separated by a single dash with no embedded spaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show dhcp l2relay circuit-id vlan 300

DHCP L2 Relay is  Enabled.

DHCP Circuit-Id option is enabled on the following
VLANs:

300
```

show dhcp l2relay remote-id vlan

Use the **show dhcp l2relay remote-id vlan** command in Privileged EXEC mode to display whether DHCP L2 Relay is globally enabled and shows the remote ID configured on the specified VLAN or VLAN range.

Syntax

show dhcp l2relay remote-id vlan *vlan-range*

Parameter Description

Parameter	Description
vlan-range	Show information for the specified VLAN range. A range may be a single VLAN ID or two VLAN IDs separated by a single dash with no embedded spaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show dhcp l2relay remote-id vlan 200


DHCP L2 Relay is  Enabled.


VLAN ID     Remote Id
--------    -------------
200         remote_22
```

clear dhcp l2relay statistics interface

Use the **show dhcp l2relay statistics interface** command in Privileged EXEC mode to reset the DHCP L2 Relay counters to zero. Specify the port with the counters to clear, or use the **all** keyword to clear the counters on all ports.

Syntax

clear dhcp l2relay statistics interface {**all** | *interface-id*}

Parameter Description

Parameter	Description
all	Show all interfaces.
interface-id	A physical interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear dhcp l2relay statistics interface
gi1/0/1
```

10

DHCP Management Interface Commands

PowerConnect switches support an embedded DHCP client. Any IP interface can use DHCP to obtain an IP address. The DHCP client can run on multiple interfaces simultaneously.

For IPv4, an IP interface can either use manually configured addresses or be enabled for DHCP. The options are mutually exclusive. When the operator enables DHCPv4 on an IP interface, all manually configured IP addresses on that interface are removed from the running configuration. When the operator configures an IP address, the system automatically releases any IPv4 address assigned by a DHCP server and disables DHCPv4 on the interface.

For IPv6, DHCP can coexist with configured addresses. The operator may enable DHCPv6 and configure IPv6 addresses on the same interface. Only a single in-band interface can be configured as a DHCPv6 client.

DHCP is disabled by default on all in-band interfaces.

The DHCP client retains an IP address even if the IP interface goes down. The client does not attempt to renew its IP address until the lease expires, regardless of changes in link state.

The operator may renew or release an IP address at any time using the new release dhcp and renew dhcp CLI commands (or web or SNMP equivalents).

When an IPv6 address is leased from a DHCP server, the address has a mask length of 128. A local route for the network is only installed if the router receives and accepts IPv6 router advertisements on the interface. Because router advertisements are not accepted on a routing interface, a leased IPv6 address on a routing interface is not necessarily useful.

Commands in this Chapter

This chapter explains the following commands:

release dhcp	debug dhcp packet

release dhcp

Use the **release dhcp** command in Privileged EXEC mode to force the DHCPv4 client to release a leased address.

Syntax

release dhcp *interface-id*

Parameter Description

Parameter	Description
interface-id	Any valid VLAN interface. See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

The DHCP client sends a DHCP RELEASE message telling the DHCP server that it no longer needs the IP address, and that the IP address can be reassigned to another client. The interface method does not change and will still be DHCP even after issuing this command. To lease an IP address again, issue either the **renew dhcp** *interface-id* command below or **ip address dhcp (Interface Config)** command on page 487 in interface mode. If the IPv4 address on the interface was not assigned by DHCP, then the command fails and displays the following error message:

```
Interface does not have a DHCP-originated address.
```

The release dhcp option is applicable only for routing interfaces and not for Out-of-Band port. Use the **ip address (Out-of-Band) none** command on the Out-of-Band interface to clear a DHCP-acquired address.

Example

```
console#release dhcp vlan2
```

renew dhcp

Use the **renew dhcp** command in Privileged EXEC mode to force the DHCP client to immediately renew an IPv4 address lease.

Syntax

renew dhcp {*interface-id* | **out-of-band**}

Parameter Description

Parameter	Description
interface-id	Any valid routing interface. See Interface Naming Conventions for interface representation.
out-of-band	Keyword to identify the out-of-band interface. The DHCP client renews the leased address on this interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

If the interface has a leased IPv4 address when this command is issued, the DHCP client sends a DHCP REQUEST message telling the DHCP server that it wants to continue using the IP address. If DHCP is enabled on the interface, but the interface does not currently have an IPv4 address (for example, if the address was previously released), then the DHCP client sends a DISCOVER to acquire a new address. If DHCP is not enabled on the interface, then the command fails and displays the following error message:

```
DHCP is not enabled on this interface
```

Examples

The first example is for routing interfaces.

```
console#renew dhcp vlan 2
```

The second example is for out-of-band port.

```
console#renew dhcp out-of-band
```

debug dhcp packet

Use the **debug dhcp packet** command in Privileged EXEC mode to display debug information about DHCPv4 client activities and to trace DHCPv4 packets to and from the local DHCPv4 client. To disable debugging, use the **no** form of this command.

Syntax

debug dhcp packet [**transmit** | **receive**]
no debug dhcp packet [**transmit** | **receive**]

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

DHCP client already has packet tracing. This command turns the packet tracing on.

Example

The first example is for transmit and receive flows.

```
console#debug dhcp packet
```

The second example is for transmit flow.

```
console#debug dhcp packet transmit
```

The third example is for receive flow.

```
console#debug dhcp packet receive
```

show dhcp lease

Use the **show dhcp lease** command in Privileged EXEC mode to display IPv4 addresses leased from a DHCP server.

Syntax

show dhcp lease [**interface** *interface-id*]

Parameter Description

Parameter	Description
interface-id	Any valid IP interface (VLAN only). See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command lists all IPv4 addresses currently leased from a DHCP server on a routing interface. This command only applies to routing interfaces.

This command output provides the following information.

Term	Description
IP address, Subnet mask	The IP address and network mask leased from the DHCP server.
DHCP Lease server	The IPv4 address of the DHCP server that leased the address.

Term	Description
State	State of the DHCPv4 Client on this interface.
DHCP transaction id	The transaction ID of the DHCPv4 Client.
Lease	The time (in seconds) that the IP address was leased by the server.
Renewal	The time (in seconds) when the next DHCP renew Request is sent by DHCPv4 Client to renew the leased IP address.
Rebind	The time (in seconds) when the DHCP Rebind process starts.
Retry count	Number of times the DHCPv4 client sends a DHCP REQUEST message before the server responds.

Examples

The following example shows the output from this command when the device has leased two IPv4 addresses from the DHCP server.

```
console#show dhcp lease
IP address: 10.1.20.1  on interface VLAN10
Subnet mask: 255.255.255.0
       DHCP Lease server: 10.1.20.3, state: 5 Bound
       DHCP transaction id: 0x7AD
       Lease: 86400 secs,  Renewal: 43200 secs,  Rebind: 75600 secs
       Retry count: 0

IP address: 10.1.1.2  on interface VLAN20
Subnet mask: 255.255.255.0
       DHCP Lease server: 10.1.1.1, state: 5 Bound
       DHCP transaction id: 0x11EB
       Lease: 86400 secs,  Renewal: 43200 secs,  Rebind: 75600 secs
       Retry count: 0

console#show dhcp lease interface vl10
IP address: 10.1.20.1  on interface VLAN10
Subnet mask: 255.255.255.0
```

```
DHCP Lease server: 10.1.20.3, state: 5 Bound
DHCP transaction id: 0x7AD
Lease: 86400 secs,  Renewal: 43200 secs,  Rebind: 75600 secs
Retry count: 0
```

11

DHCP Snooping Commands

DHCP Snooping is a security feature that monitors DHCP messages between DHCP clients and DHCP server to filter harmful DHCP messages and build a bindings database of {MAC address, IP address, VLAN ID, interface} tuples that are considered authorized.

The DHCP snooping application processes incoming DHCP messages. For DHCPRELEASE and DHCPDECLINE messages, the application compares the receive interface and VLAN with the client's interface and VLAN in the bindings database. If the interfaces do not match, the application logs the event and drops the message. For valid client messages, DHCP snooping compares the source MAC address to the DHCP client hardware address. When there is a mismatch, DHCP snooping logs and drops the packet. DHCP Snooping forwards valid client messages on trusted members within the VLAN. If DHCP Relay and/or DHCP Server coexist with DHCP Snooping, the DHCP client message is sent to the DHCP Relay or/and DHCP Server for further processing.

The DHCP Snooping application uses DHCP messages to build and maintain the binding's database. The binding's database only includes data for clients on untrusted ports. DHCP Snooping creates a tentative binding from DHCP DISCOVER and REQUEST messages. Tentative bindings tie a client to a port (the port where the DHCP client message was received). Tentative bindings are completed when DHCP Snooping learns the client's IP address from a DHCP ACK message on a trusted port. DHCP Snooping removes bindings in response to DECLINE, RELEASE, and NACK messages. The DHCP Snooping application ignores the ACK messages as a reply to the DHCP Inform messages received on trusted ports. The network administrator can enter static bindings into the binding database.

IP Source Guard and Dynamic ARP Inspection use the DHCP Snooping bindings database for the validation of IP and ARP packets.

Commands in this Chapter

This chapter explains the following commands:

clear ip dhcp snooping binding	ip dhcp snooping trust
clear ip dhcp snooping statistics	ip dhcp snooping verify mac-address
ip dhcp snooping	show ip dhcp snooping
ip dhcp snooping binding	show ip dhcp snooping binding
ip dhcp snooping database	show ip dhcp snooping database
ip dhcp snooping database write-delay	show ip dhcp snooping interfaces
ip dhcp snooping limit	show ip dhcp snooping statistics
ip dhcp snooping log-invalid	

clear ip dhcp snooping binding

Use the **clear ip dhcp snooping binding** command to clear all DHCP Snooping bindings on a specific interface or on all interfaces.

Syntax

clear ip dhcp snooping binding {* | **interface** interface-id}

Syntax Description

Parameter	Description
*	Clear all DHCP Snooping entries.
interface-id	Clear all DHCP Snooping entries on the specified interface.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

There are no user guidelines for this command.

clear ip dhcp snooping statistics

Use the **clear ip dhcp snooping statistics** command to clear all DHCP Snooping statistics.

Syntax

clear ip dhcp snooping statistics

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear ip dhcp snooping statistics
```

ip dhcp snooping

Use the **ip dhcp snooping** command to enable DHCP snooping globally. Use the "no" form of this command to disable DHCP snooping.

NOTE: Effective with the October 2011 A03 release, the **ip dhcp snooping** command in Interface Configuration (VLAN) mode is deprecated in favor of the **ip dhcp snooping** command in Global Configuration mode.

Syntax

ip dhcp snooping

no ip dhcp snooping

Default Configuration

DHCP Snooping is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip dhcp snooping


console(config-if-vlan1)#ip dhcp snooping
```

ip dhcp snooping binding

Use the **ip dhcp snooping binding** command to configure a static DHCP Snooping binding. Use the "no" form of this command to remove a static binding.

Syntax

ip dhcp snooping binding *mac-address* **vlan** *vlan-id ip-address* **interface** {**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port*}

no ip dhcp snooping binding mac-address

Parameter Description

Parameter	Description
mac-address	The client's MAC address.
vlan-id	The number of the VLAN the client is authorized to use.
ip-address	The IP address of the client.
interface	The interface on which the client is authorized. The form is unit/slot/port.

Default Configuration

There are no static DHCP snooping bindings by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip dhcp snooping binding
00:00:00:00:00:01 vlan 10 10.131.12.134 interface
1/0/1
```

ip dhcp snooping database

Use the **ip dhcp snooping database** command to configure the persistent storage location of the DHCP snooping database. This can be local to the switch or on a remote machine.

Syntax

ip dhcp snooping database { **local** | **tftp:**//*hostIP*/*filename* }

Parameter Description

Parameter	Description
hostIP	The IP address of the remote host.
filename	The name of the file for the database on the remote host. The filename may contain any printable character and is checked only when attempting to open the file.

Default Configuration

The database is stored locally by default.

Configuration Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the storage location of the snooping database as local.

```
console(config)#ip dhcp snooping database local
```

The following example configures the storage location of the snooping database as remote.

```
console(config)#ip dhcp snooping database
tftp://10.131.11.1/db.txt
```

ip dhcp snooping database write-delay

Use the **ip dhcp snooping database write-delay** command to configure the interval in seconds at which the DHCP Snooping database will be stored in persistent storage. Use the "no" form of this command to reset the write delay to the default.

Syntax

ip dhcp snooping database write-delay *seconds*

no ip dhcp snooping database write-delay

Parameter Description

Parameter	Description
seconds	The write delay (Range: 15–86400 seconds).

Default Configuration

The write delay is 300 seconds by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip dhcp snooping database write-delay 500
```

ip dhcp snooping limit

Use the **ip dhcp snooping limit** command to control the maximum rate of DHCP messages. Use the **no** form of this command to reset the limit to the default.

Syntax

ip dhcp snooping limit {**none** | **rate** *rate* [**burst interval** *seconds*]}

no ip dhcp snooping limit

- *rate*—The maximum number of packets per second allowed (Range: 0–300 pps).
- *seconds*—The time allowed for a burst (Range: 1–15 seconds).

Default Configuration

DHCP snooping rate limiting is disabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

There are no user guidelines for this command.

Examples

```
console(config-if-1/0/1)#ip dhcp snooping limit none


console(config-if-1/0/1)#ip dhcp snooping limit rate
100 burst interval 1
```

ip dhcp snooping log-invalid

Use the **ip dhcp snooping log-invalid** command to enable logging of DHCP messages filtered by the DHCP Snooping application. Use the "no" form of this command to disable logging.

Syntax

ip dhcp snooping log-invalid

no ip dhcp snooping log-invalid

Default Configuration

Logging of filtered messages is disabled by default.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-1/0/1)#ip dhcp snooping log-invalid


console(config-if-1/0/1)#no ip dhcp snooping log-
invalid
```

ip dhcp snooping trust

Use the **ip dhcp snooping trust** command to configure a port as trusted. Use the "no" form of this command to configure a port as untrusted.

Syntax

ip dhcp snooping trust

no ip dhcp snooping trust

Default Configuration

Ports are untrusted by default.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-1/0/1)#ip dhcp snooping trust


console(config-if-1/0/1)#no ip dhcp snooping trust
```

ip dhcp snooping verify mac-address

Use the **ip dhcp snooping verify mac-address** command to enable the verification of the source MAC address with the client MAC address in the received DHCP message. Use the "no" form of this command to disable verification of the source MAC address.

Syntax

ip dhcp snooping verify mac-address

no ip dhcp snooping verify mac-address

Default Configuration

Source MAC address verification is enabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip dhcp snooping verify mac-address
```

show ip dhcp snooping

Use the **show ip dhcp snooping** command to display the DHCP snooping global configuration.

Syntax

show ip dhcp snooping

Syntax Description

This command has no arguments or keywords.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ip dhcp snooping


DHCP snooping is Disabled
DHCP snooping source MAC verification is enabled
DHCP snooping is enabled on the following VLANs:
11 - 30, 40

Interface   Trusted    Log Invalid Pkts
```

```
---------   --------   ----------------
1/0/1         Yes             No
1/0/2         No              Yes
1/0/3         No              Yes
1/0/4         No              No
1/0/6         No              No
```

show ip dhcp snooping binding

Use the **show ip dhcp snooping binding** command to display the DHCP snooping binding entries.

Syntax

show ip dhcp snooping binding [{ **static** | **dynamic** }] [**interface** *interface-id*] [**vlan** *vlan-id*]

- **static** | **dynamic**—Use these keywords to filter by static or dynamic bindings.
- interface-id—The interface for which to show bindings.
- vlan-id—The number of the VLAN for which to show bindings.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ip dhcp snooping binding


Total number of bindings: 2
```

```
MAC Address          IP Address   VLAN  Interface  Lease time(Secs)
-----------------  ------------  ----  ---------  -------------
00:02:B3:06:60:80   210.1.1.3      10   1/0/1        86400
00:0F:FE:00:13:04   210.1.1.4      10   1/0/1        86400
```

show ip dhcp snooping database

Use the **show ip dhcp snooping database** command to display the DHCP snooping configuration related to the database persistence.

Syntax

show ip dhcp snooping database

Syntax Description

This command has no arguments or keywords.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ip dhcp snooping database


agent url:  /10.131.13.79:/sai1.txt


write-delay:  5000
```

show ip dhcp snooping interfaces

Use the **show ip dhcp snooping interfaces** command to show the DHCP Snooping status of the interfaces.

Syntax

show ip dhcp snooping interfaces [*interface*]

- interface—A valid physical interface.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ip dhcp snooping interfaces

Interface     Trust State     Rate Limit      Burst Interval
                                 (pps)           (seconds)
----------   -------------   -------------   ---------------

      1/0/1              No              15                 1
      1/0/2              No              15                 1
      1/0/3              No              15                 1

console#show ip dhcp snooping interfaces gigabitethernet 1/0/15

Interface     Trust State     Rate Limit      Burst Interval
                                 (pps)           (seconds)
----------   -------------   -------------   ---------------
```

```
1/0/15              Yes              15                1
```

show ip dhcp snooping statistics

Use the **show ip dhcp snooping statistics** command to display the DHCP snooping filtration statistics.

Syntax

show ip dhcp snooping statistics

Syntax Description

This command has no arguments or keywords.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

The following fields are displayed by this command:

Fields	Description
MAC Verify Failures	The number of DHCP messages that were filtered on an untrusted interface because of source MAC address and client MAC address mismatch.
Client Ifc Mismatch	The number of DHCP release and Deny messages received on the different ports than previously learned.
DHCP Server Msgs	The number of DHCP server messages received on untrusted ports.

Example

```
console#show ip dhcp snooping statistics
```

Interface	MAC Verify Failures	Client Ifc Mismatch	DHCP Server Msgs Rec'd
1/0/2	0	0	0
1/0/3	0	0	0
1/0/4	0	0	0
1/0/5	0	0	0
1/0/6	0	0	0
1/0/7	0	0	0
1/0/8	0	0	0
1/0/9	0	0	0
1/0/10	0	0	0
1/0/11	0	0	0
1/0/12	0	0	0
1/0/13	0	0	0
1/0/14	0	0	0
1/0/15	0	0	0
1/0/16	0	0	0
1/0/17	0	0	0
1/0/18	0	0	0
1/0/19	0	0	0
1/0/20	0	0	0

12

Dynamic ARP Inspection Commands

Dynamic ARP Inspection (DAI) is a security feature that rejects invalid and malicious ARP packets. The feature prevents a class of man-in-the-middle attacks, where an unfriendly station intercepts traffic for other stations by poisoning the ARP caches of its neighbors. The miscreant sends ARP requests or responses mapping another station IP address to its own MAC address.

DAI drops ARP packets whose sender MAC address and sender IP address do not match an entry in the DHCP Snooping bindings database.

Commands in this Chapter

This chapter explains the following commands:

arp access-list	ip arp inspection vlan
clear ip arp inspection statistics	permit ip host mac host
ip arp inspection filter	show arp access-list
ip arp inspection limit	show ip arp inspection
ip arp inspection trust	show ip arp inspection vlan
ip arp inspection validate	

arp access-list

Use the **arp access-list** command to create an ARP ACL. It will place the user in ARP ACL Configuration mode. Use the "no" form of this command to delete an ARP ACL.

Syntax

arp access-list *acl-name*

no arp access-list *acl-name*

- *acl-name* — A valid ARP ACL name (Range: 1–31 characters).

Default Configuration

There are no ARP ACLs created by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#arp access-list tier1
```

clear ip arp inspection statistics

Use the **clear ip arp inspection statistics** command in Privileged EXEC mode to reset the statistics for Dynamic Address Resolution Protocol (ARP) inspection on all VLANs.

Syntax

clear ip arp inspection statistics

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear ip arp inspection statistics
```

ip arp inspection filter

Use the **ip arp inspection filter** command to configure the ARP ACL to be used for a single VLAN or a range of VLANs to filter invalid ARP packets. If the static keyword is given, packets that do not match a permit statement are dropped without consulting the DHCP snooping bindings. Use the "no" form of this command to unconfigure the ARP ACL.

Syntax

ip arp inspection filter *acl-name* **vlan** *vlan-range* [**static**]

no ip arp inspection filter *acl-name* **vlan** *vlan-range* [**static**]

- *acl-name* —The name of a valid ARP ACL. (Range: 1–31 characters)
- *vlan-range* —A valid VLAN range.

Default Configuration

No ARP ACL is configured.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip arp inspection filter tier1 vlan 2-10 static
console(config)#ip arp inspection filter tier1 vlan 20-30
```

ip arp inspection limit

Use the **ip arp inspection limit** command to configure the rate limit and burst interval values for an interface.

Configuring **none** for the limit means the interface is not rate limited for Dynamic ARP Inspection.

Syntax

ip arp inspection limit { **none** | **rate** *pps* [**burst interval** *seconds*] }

no ip arp inspection limit

- **none** — To set no rate limit.
- *pps* — The number of packets per second (Range: 0–300).
- *seconds* — The number of seconds (Range: 1–15).

Default Configuration

The default rate limit is 15 packets per second.

The default burst interval is 1 second.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-1/0/1)#ip arp inspection limit none

console(config-if-1/0/1)#ip arp inspection limit rate 100
burst interval 2
```

ip arp inspection trust

The **ip arp inspection trust** command configures an interface as trusted for Dynamic ARP Inspection. Use the "no" form of this command to configure an interface as untrusted.

Syntax

ip arp inspection trust

no ip arp inspection trust

Default Configuration

Interfaces are configured as untrusted by default.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-1/0/3)#ip arp inspection trust
```

ip arp inspection validate

Use the **ip arp inspection validate** command to enable additional validation checks like source MAC address validation, destination MAC address validation or IP address validation on the received ARP packets. Each command overrides the configuration of the previous command. For example, if a command enables source MAC address and destination MAC address validations and a second command enables IP address validation only, the source MAC address and destination MAC address validations are disabled as a result of the second command. Use the "no" form of this command to disable additional validation checks.

Syntax

ip arp inspection validate {[**src-mac**] [**dst-mac**] [**ip**]}

no ip arp inspection validate {[**src-mac**] [**dst-mac**] [**ip**]}

- **src-mac**—For validating the source MAC address of an ARP packet.
- **dst-mac**—For validating the destination MAC address of an ARP packet.
- **ip**—For validating the IP address of an ARP packet.

Default Configuration

There is no additional validation enabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command

Example

```
console(config)#ip arp inspection validate src-mac
dst-mac ip
console(config)#ip arp inspection validate src-mac ip
console(config)#ip arp inspection validate dst-mac ip
console(config)#ip arp inspection validate ip
```

ip arp inspection vlan

Use the **ip arp inspection vlan** command to enable Dynamic ARP Inspection on a single VLAN or a range of VLANs. Use the **no** form of this command to disable Dynamic ARP Inspection on a single VLAN or a range of VLANs.

Syntax

ip arp inspection vlan *vlan-range* [**logging**]

no ip arp inspection vlan *vlan-range* [**logging**]

- *vlan-range* — A valid range of VLAN IDs.
- **logging** — Use this parameter to enable logging of invalid packets.

Default Configuration

Dynamic ARP Inspection is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip arp inspection vlan 200-300
console(config)#ip arp inspection vlan 200-300 logging
```

permit ip host mac host

Use the **permit ip host mac host** command to configure a rule for a valid IP address and MAC address combination used in ARP packet validation. Use the "no" form of this command to delete an ARP ACL rule.

Syntax

permit ip host *sender-ip* mac host *sender-mac*

no permit ip host *sender-ip* **mac host** *sender-mac*

- *sender-ip* — Valid IP address used by a host.
- *sender-mac* —Valid MAC address in combination with the above sender-ip used by a host.

Default Configuration

There are no ARP ACL rules created by default.

Command Mode

ARP Access-list Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(Config-arp-access-list)#permit ip host
1.1.1.1 mac host 00:01:02:03:04:05
```

show arp access-list

Use the **show arp access-list** command to display the configured ARP ACLs with the rules. Giving an ARP ACL name as the argument would display only the rules in that ARP ACL.

Syntax

show arp access-list [*acl-name*]

acl-name — A valid ARP ACL name (Range: 1–31 characters).

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

There are no user guidelines for this command.

Example

```
console#show arp access-list
ARP access list H2
    permit ip host 1.1.1.1 mac host 00:01:02:03:04:05
    permit ip host 1.1.1.2 mac host 00:03:04:05:06:07
ARP access list H3
ARP access list H4
    permit ip host 2.1.1.2 mac host 00:03:04:05:06:08
```

show ip arp inspection

Use the **show ip arp inspection** command in Privileged EXEC mode to display the Dynamic ARP Inspection and status.

Syntax

show ip arp inspection [interfaces [*interface-id*] | **statistics** [**vlan** *vlan-range*] | vlan *vlan-range*]

Parameter Description

Parameter	Description
interfaces [interface-id]	Display the Dynamic ARP Inspection configuration on all the DAI enabled interfaces. Giving an interface argument, it displays the values for that interface.
statistics [vlan vlan-range]	Display the statistics of the ARP packets processed by Dynamic ARP Inspection. Given vlan-range argument, it displays the statistics on all DAI-enabled VLANs in that range. In the case of no argument, it lists the summary of the forwarded and dropped ARP packets.
vlan vlan-range	Display the Dynamic ARP Inspection configuration on all the VLANs in the given VLAN range. It also displays the global configuration values for source MAC validation, destination MAC validation and invalid IP validation.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

The following information is displayed for each VLAN when a VLAN range is supplied:

Field	Description
VLAN	The VLAN-ID for each displayed row.
Forwarded	The total number of valid ARP packets forwarded in this VLAN.
Dropped	The total number of invalid ARP packets dropped in this VLAN.

DHCP Drops	The number of packets dropped due to DHCP Snooping binding database match failure.
ACL Drops	The number of packets dropped due to ARP ACL rule match failure.
DHCP Permits	The number of packets permitted due to DHCP snooping binding database match.
ACL Permits	The number of packets permitted due to ARP ACL rule match.
Bad Src MAC	The number of packets dropped due to Source MAC validation failure.
Bad Dest MAC	The number of packets dropped due to Destination MAC validation failure.
Invalid IP	The number of packets dropped due to invalid IP checks.

Example

Following is an example of the **show ip arp inspection** command.

```
console#show ip arp inspection

Source MAC Validation.................. Disabled
Destination MAC Validation............. Disabled
IP Address Validation.................. Disabled

VLAN Configuration Log Invalid ACL Name  Static flag
---- ------------- ----------- --------  -----------
1     Disabled      Enabled
console#
```

Following is an example of the **show ip arp inspection interfaces** command.

```
console#show ip arp inspection interfaces

 Interface        Trust State   Rate Limit   Burst Interval
```

```
                                    (pps)        (seconds)
 --------------- -----------  ---------- ---------------
 1/0/1              Untrusted           15                1
 1/0/2              Untrusted           10               10
```

Following is an example of the **show ip arp inspection statistics** command.

```
console#show ip arp inspection statistics


VLAN  Forwarded  Dropped
----  ---------  -------
  10         90       14
  20         10        3


console#show ip arp inspection statistics vlan 10,20

VLAN    DHCP      ACL        DHCP       ACL       Bad Src   Bad Dest   Invalid
        Drops     Drops     Permits    Permits       MAC       MAC       IP
---- ---------- ---------- ---------- ---------- ---------- ---------- ------
10          11         1         65         25          1          1         0
20           1         0          8          2          0          1         1
```

show ip arp inspection vlan

Use the **show ip arp inspection vlan** command to display the Dynamic ARP Inspection configuration on all the VLANs in the given VLAN range. It also displays the global configuration values for source MAC validation, destination MAC validation and invalid IP validation.

Syntax

show ip arp inspection vlan [*vlan-range*]

Parameter Description

Parameter	Description
vlan-range	A valid VLAN range.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

The following global parameters are displayed:

Parameter	Description
Source Mac Validation	If Source Mac validation of ARP frame is enabled.
Destination Mac Validation	If Destination Mac validation of ARP Response frame is enabled.
IP Address Validation	If IP address validation of ARP frame is enabled.

The following fields are displayed for each VLAN:

Field	Description
VLAN	The VLAN-ID for each displayed row.
Configuration	Whether DAI is enabled on the VLAN.
Log Invalid	Whether logging of invalid ARP packets is enabled on the VLAN.
ACL Name	ARP ACL Name if configured on the VLAN.
Static flag	If the ARP ACL is configured static on the VLAN.

Example

```
console#show ip arp inspection vlan 10-12
```

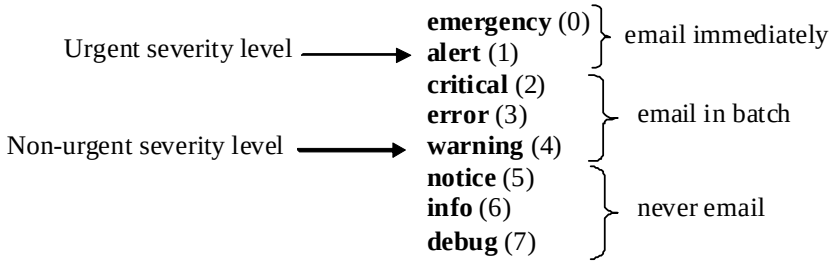
```
Source Mac Validation      : Disabled
Destination Mac Validation : Disabled
IP Address Validation      : Disabled

 Vlan          Configuration    Log Invalid   ACL Name   Static flag
 ----          -------------    -----------   ---------  -----------
   10          Enabled          Enabled       H2         Enabled
   11          Disabled         Enabled
   12          Enabled          Disabled
```

13

Email Alerting Commands

Email Alerting is an extension of the logging system. The PowerConnect logging system allows the user to configure a variety of destinations for log messages. This feature adds email configuration capabilities, by which the log messages are sent to a configured SMTP server such that an operator may receive the log in an e-mail account of their choice.

Figure 1: Log Messages Severity Level



The network operator can adjust the urgent and non-urgent severity levels. These levels are global and apply to all destination email addresses. Log messages in the urgent group are sent immediately to SMTP server with each log message in a separate mail. Log messages in the non-urgent group are batched into a single email message and after a configurable delay.

Only the minimum part (MUA functionality of RFC 4409) required by the switch or router to send the messages to the SMTP server is supported. Some SMTP servers insist on authentication before the messages may be received by them. The minimum part (MUA functionality of RFC 4954) required by the switch or router to become authenticated by the SMTP server is supported. Only plain text authentication is supported.

Commands in this Chapter

This chapter explains the following commands:

logging email	show logging email statistics
logging email urgent	clear logging email statistics
logging traps	security
logging email message-type to-addr	mail-server ip-address | hostname
logging email from-addr	port (Mail Server Configuration Mode)
logging email message-type subject	username (Mail Server Configuration Mode)
logging email logtime	password (Mail Server Configuration Mode)
logging email test message-type	show mail-server

logging email

Use the **logging email** command in Global Configuration mode to enable email alerting and set the lowest severity level for which log messages are emailed. Use the **no** form of the command to disable email alerting.

Syntax

logging email [*severity*]

no logging email

Parameter Description

Parameter	Description
severity	If you specify a severity level, log messages at or above the severity level are emailed. The severity level may either be specified by keyword or as an integer from 0 to 7. The accepted keywords, and the numeric severity level each represents, are as follows. • emergency (0) • alert (1) • critical (2) • error (3) • warning (4) • notice (5) • info (6) • debug (7)

Default Configuration

Email alerting is disabled by default. When email alerting is enabled, log messages at or above severity Warning are emailed.

Command Mode

Global Configuration mode

User Guidelines

The **logging email** command with no arguments enables email alerting. Specify a severity to set the severity level of log messages that are emailed in a non-urgent manner. Log messages at or above this severity level, but below the urgent severity level, are collected together until the log time expires (the time specified in the logging email logtime command) and then emailed in a single email message. If you set the non-urgent severity level to the same value as the urgent severity level, then no log messages are emailed non-urgently. See the logging email urgent command to specify the urgent severity level. The command **no logging email** disables all email alerting.

logging email urgent

Use the **logging email urgent** command in Global Configuration mode to set the lowest severity level at which log messages are emailed in an urgent manner. To revert the urgent severity level to its default value, use the **no** form of this command.

Syntax

logging email urgent {*severity* | none}

no logging email urgent

Parameter Description

Parameter	Description
severity	Log messages at or above this severity level are emailed immediately. The severity level may either be specified by keyword or as an integer from 0 to 7. The accepted keywords, and the numeric severity level each represents, are as follows. • emergency (0) • alert (1) • critical (2) • error (3) • warning (4) • notice (5) • info (6) • debug (7)
none	If you specify this keyword, no log messages are emailed urgently. All log messages at or above the non-urgent level (configured with the **logging email** command) are emailed in batch.

Default Configuration

The default severity level is alert.

Command Mode

Global Configuration mode

User Guidelines

Log messages at or above this severity level are considered urgent. By default, Emergency and Alert log messages are considered urgent. Urgent log messages are emailed immediately, one log message per email message, and do not wait for the log time to expire. Urgent log messages are not emailed unless you enable email alerting with the **logging email** command.

logging traps

Use the **logging traps** command in Global Configuration mode to set the lowest severity level at which SNMP traps are logged. To revert the urgent severity level to its default value, use the **no** form of this command.

Syntax

logging traps *severity*

no logging traps

Parameter Description

Parameter	Description
severity	The severity level at which SNMP traps are logged. The severity level may either be specified by keyword or as an integer from 0 to 7. The accepted keywords, and the numeric severity level each represents, are as follows: • emergency (0) • alert (1) • critical (2) • error (3) • warning (4) • notice (5) • info (6) • debug (7)

Default Configuration

The default severity level is info(6).

Command Mode

Global Configuration mode

User Guidelines

You can filter log messages that appear in the buffered log by severity level. You can specify the severity level of log messages that are emailed. You can use this command to specify the severity level at which SNMP traps are logged, and thus control whether traps appear in the buffered log or are emailed and, if they are emailed, whether traps are considered urgent or non-urgent.

logging email message-type to-addr

Use the **logging email message-type to-addr** command in Global Configuration mode to configure the **To** address field of the email. The message types supported now are **urgent**, **non-urgent**, and **both**. For each supported severity level, multiple email addresses can be configured. For example, for urgent type of messages, there could be multiple addresses configured.

Syntax

logging email message-type {**urgent** | **non-urgent** | **both**} **to-addr** *to-email-addr*

no logging email to-addr *to-addr* **message-type**

no logging email message-type {**urgent** | **non-urgent** | **both**} **to-addr** *to-email-addr*

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

This command removes the configured **to-addr** field of email.

logging email from-addr

Use the **logging email from-addr** command in Global Configuration mode to configure the **From** address of the email. Use the **no** form of this command to remove the email source address.

Syntax

logging email from-addr *from-email-addr*

no logging email from-addr

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

There are no user guidelines for this command.

logging email message-type subject

Use the **logging email message-type subject** command in Global Configuration mode to configures subject of the email. Use the **no** form of this command to remove the existing subject and return to the default subject.

Syntax

logging email message-type *message-type* **subject** *subject*

no logging email message-type *message-type* **subject**

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

The user must enter the message-type parameter manually as tab and space bar completion do not work for this parameter.

logging email logtime

Use the **logging email logtime** command in Global Configuration mode to configure the value of how frequently the queued messages are sent.

Syntax

logging email logtime *time duration*

no logging email logtime

Parameter Description

Parameter	Description
Time Duration	Time in minutes. Range: 30 – 1440.

Default Configuration

The default value is 30 minutes.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

logging email test message-type

Use the **logging email test message-type** command in Global Configuration mode to test whether or not an e-mail is being sent to an SMTP server.

Syntax

logging email test message-type *message-type* message-body *message-body*

Parameter Description

Parameter	Description
message-type	Urgent, non-urgent, or both
message-body	The message to log. Enclose the message in double quotes if it contains any spaces.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

show logging email statistics

Use the **show logging email statistics** command in Privileged EXEC mode to show the statistics about the emails. The command displays information on how many emails are sent, how many emails failed, when the last email was sent, how long it has been since the last email was sent, how long it has been since the email changed to disabled mode.

Syntax

show logging email statistics

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

clear logging email statistics

Use the **clear logging email statistics** command in Privileged EXEC mode to clear the email alerting statistics.

Syntax

clear logging email statistics

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

security

Use the **security** command in Mail Server Configuration mode to set the email alerting security protocol. This enables and disables the switch to use TLS authentication with the SMTP Server. If the administrator sets the TLS mode and, if the SMTP sever does not support TLS mode, then no email goes to the SMTP server.

Syntax

security {**tls** | **none**}

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is disabled.

Command Mode

Mail Server Configuration

User Guidelines

This command has no user guidelines.

mail-server ip-address | hostname

Use the **mail-server ip-address | hostname** command in Global Configuration mode to configure the SMTP server IP address and change the mode to Mail Server Configuration mode. The server address can be in the IPv4, IPv6, or DNS name format. Use the **no** form of this command to remove the configured SMTP server address.

Syntax

mail-server {ip-address *ip-address* | hostname *hostname*}

no mail-server {*ip-address* | *hostname*}

Parameter Description

Parameter	Description
ip-address	An IPv4 or IPv6 address.
hostname	The DNS name of an SMTP server.

Default Configuration

The default configuration for a mail server is shown in the table below.

Field	Default
Email Alert Mail Server Port	25
Email Alert Security Protocol	none
Email Alert Username	admin
Email Alert Password	admin

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

port (Mail Server Configuration Mode)

Use the **port** command in Mail Server Configuration mode to configure the TCP port to use for communication with the SMTP server. Port can be set to 465 or 25. Use the **no** form of the command to revert the SMTP port to the default port.

Syntax

port *port*

no port

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is 25.

Command Mode

Mail Server Configuration

User Guidelines

Port 25 is the standard SMTP port for cleartext messages. Port 465 is the standard port for messages sent using TLSv1. Messages are always sent in plain text mode.

username (Mail Server Configuration Mode)

Use the **username** command in Mail Server Configuration mode to configure the username required by the authentication. Use the **no** form of the command to revert the username to the default value.

Syntax

username *username*

no username

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value for username is **admin**.

Command Mode

Mail Server Configuration

User Guidelines

This command has no user guidelines.

password (Mail Server Configuration Mode)

Use the **password** command in Mail Server Configuration mode to configure the password required to authenticate to the email server. Use the **no** form of the command to revert the password to the default value.

Syntax

password *password*

no password

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value for password is **admin**.

Command Mode

Mail Server Configuration

User Guidelines

This command has no user guidelines.

show mail-server

Use the **show mail-server** command in Privileged EXEC mode to display the configuration of all the mail servers or a particular mail server.

Syntax

show mail-server {*ip-address* | *hostname* | **all**}

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show mail-server all

Mail Servers configuration:

No of mail servers configured:2

Mail Serqy ver1 configuration:
SMTP server IP Address:             10.131.1.11
SMTP server Port:                   465
SMTP server security protocol:      tls
```

```
SMTP server authentication details:
Username:                   admin

Mail server2 configuration:
SMTP server IP Address:              10.131.1.31
SMTP server Port:                    465
SMTP server security protocol:       tls
SMTP server authentication details:
Username:                            admin

console#show mail-server ip-address 10.131.1.11

SMTP server IP Address:              10.131.1.11
SMTP server Port:                    465
SMTP server security protocol:       tls
SMTP server authentication details:
Username:                            admin
```

14

Ethernet Configuration Commands

PowerConnect switches support a variety of configuration options to optimize network operations. Features such as flow-control and jumbo frames are supported along with a variety of commands to display traffic statistics as well as limit the effects of network loops or other network issues.

Jumbo frame technology is employed in certain situations to reduce the task load on a server CPU and to transmit large amounts of data efficiently. Jumbo frames technology predominantly appears where certain applications would benefit from using a larger frame size, e.g. Network File System (NFS). The larger frame size eliminates some of the need for fragmentation, leading to greater throughput. The increase in throughput is particularly valuable on data center servers where the larger frame size increases efficiency of the system and allows processing of more requests. The PowerConnect jumbo frames feature extends the standard ethernet MTU (Max Frame Size) from 1518 (1522 with VLAN header) bytes to 9216 bytes. However, any device connecting to the same broadcast domain should support the same or larger MTU.

Flow control is a mechanism or protocol used to temporarily suspend transmission of data to a device to avoid overloading the device receive path. PowerConnect switching implements the flow control mechanism defined in IEEE 802.3 Annexes 31A and 31B (formerly IEEE 802.3x). PowerConnect switching is able to transmit a MAC Control frame containing the PAUSE opcode to halt transmission by the device receiving the PAUSE frame whenever internal congestion is detected by the switching fabric. Flow control is enabled by default for all ports.

Storm control allows for rate limiting of specific types of packets through the forwarding plane. The administrator can configure the absolute rate in packets-per-second for the Storm control threshold. Each classified packet type (broadcast, multicast, or unicast) can be enabled/disabled per port, and the threshold level at which Storm-Control is active is also configurable per-port and per-type (as a percentage of interface speed).

On a storm control enabled interface, if the ingress rate of that type of packet (L2 broadcast, multicast, or unicast) is greater than the configured threshold level (as a percentage of port speed or as an absolute packets-per-second rate), the switch forwarding-plane discards the excess traffic.

The speed and duplex commands control interface link speeds and auto-negotiation. If either speed or duplex is set to something other than auto, auto-negotiation is disabled on the interface. Auto-negotiation will link at the highest possible speed supported on the interface and prefers full duplex over half duplex.

Commands in this Chapter

This chapter explains the following commands:

clear counters	show interfaces configuration	speed
description	show interfaces counters	storm-control broadcast
duplex	show interfaces description	storm-control multicast
flowcontrol	show interfaces detail	storm-control unicast
interface	show statistics	switchport protected
interface range	show statistics switchport	switchport protected name
mtu	show storm-control	show switchport protected
show interfaces advertise	shutdown	

clear counters

Use the **clear counters** command in Privileged EXEC mode to clear statistics on an interface.

Syntax

clear counters [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **switchport** | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In the following example, the counters for port 1/0/1 are cleared.

```
console#clear counters gigabitethernet 1/0/1
```

description

Use the **description** command in Interface Configuration mode to add a description to an interface. To remove the description use the **no** form of this command.

Syntax

description *string*

no description

- *string* — Comment or a description of the port attached to this interface. (Range: 1 to 64 characters)

Default Configuration

By default, the interface does not have a description.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example adds a description to the Ethernet port 5.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/5)# description RD_SW#3
```

duplex

Use the **duplex** command in Interface Configuration mode to configure the duplex operation of a given Ethernet interface. To restore the default, use the **no** form of this command.

Syntax

duplex {**auto** | **half** | **full**}

no duplex

Parameter Description

Parameter	Description
auto	Auto negotiation is enabled for the port.
half	Force half-duplex operation.
full	Force full-duplex operation.

Default Configuration

Auto is enabled by default.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

When duplex is configured to auto, auto negotiation is enabled for the port. This configuration cannot be done on SFP module ports as they operate only in full duplex mode.

Example

The following example configures the duplex operation of gigabit Ethernet port 1/0/5 to force full duplex operation.

```
console(config)# interface gigabitethernet 1/0/5
console(config-if)# duplex full
```

flowcontrol

Use the **flowcontrol** command in Global Configuration mode to configure the flow control. To disable flow control, use the **no** form of this command.

Syntax

flowcontrol

no flowcontrol

Default Configuration

Flow Control is enabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

In the following example, flow control is enabled.

```
console(config)# flowcontrol
```

interface

Use this command to configure parameters for the gigabit Ethernet and ten-gigabit Ethernet ports, and for port-channels. While in Global Configuration mode, enter the **interface** command (with a specific interface). To exit to Global Configuration mode, enter **exit**. To return to Privileged EXEC mode, press Ctrl-Z or enter **end**.

NOTE: Additional forms of the interface command enable configuring VLANs, tunnels, the loopback interface, the out-of-band interface, and ranges of interfaces. See interface vlan, interface tunnel, interface loopback, and interface range.

Syntax

interface {**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

Interface Configuration

User Guidelines

It is possible to enter interface configuration mode from global configuration mode or from interface configuration mode.

Example

The following example enables gigabit port 2 on stack member 1 for configuration.

```
console(config)# interface gigabitethernet 1/0/2
console (config-if)#
```

interface range

Use the **interface range** command in Global Configuration mode to execute a command on multiple ports at the same time.

NOTE: An additional form of this command enables configuring a range of VLANs. See interface range vlan.

Syntax

interface range {*port-rang*e | *port-type* **all**}

Parameter	Description
port-range	A list of valid ports to configure. Separate non-consecutive ports with a comma and no spaces; use a hyphen to designate a range of ports. For more detailed information, see Operating on Multiple Objects (Range).
port-type	Shows all interfaces of the specified type.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration, Interface Range and Interface modes

User Guidelines

Commands under the interface range context are executed independently on each active interface in the range. If the command returns an error on one of the active interfaces, it does not stop executing commands on other active interfaces.

Example

The following example shows how gigabitethernet ports 5/0/18 to 5/0/20 and 3/0/1 to 3/0/24 are ranged to receive the same command.

```
console(config)# interface range gigabitethernet
5/0/18-20,3/0/1-24

console(config-if-range)#
```

The following example shows how all gigabitethernet ports can be configured at once.

```
console(config)# interface range gigabitethernet all

console(config-if-range)#
```

The following examples demonstrate various valid interface ranges:

```
console(config)#interface range gigabitEthernet 1/0/1-20
```

```
console(config)#interface range gi1/0/20-48
console(config)#interface range gi1/0/1,gi1/0/48
console(config)#interface range gi2/0/1-10,gi1/0/30
console(config)#interface range gi1/0/1-10,gi1/0/30-48
console(config)#interface range gi1/0/1,te1/1/1
console(config)#interface range gigabitEthernet
1/0/10,tengigabitEthernet1/1/2
```

mtu

Use the **mtu** command in Interface Configuration mode to enable jumbo frames on an interface by adjusting the maximum size of a packet. To return to the default setting, use the **no** form of this command.

Syntax

mtu *bytes*

no mtu

- *bytes* — Number of bytes (Range: 1518-9216)

Default Configuration

The default number of bytes is 1518 (1522 bytes of VLAN-tagged frames).

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

The value set allows an additional four bytes for the VLAN tag. The **mtu** command is not supported in Interface Range mode.

Example

The following example of the mtu command increases maximum packet size to 9216 bytes.

```
console(config-if-1/0/5)#mtu 9216
```

show interfaces advertise

Use the **show interfaces advertise** command in Privileged EXEC mode to display information about auto-negotiation advertisement.

Syntax

show interfaces advertise [{**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following examples display information about auto negotiation advertisement.

```
console#show interfaces advertise
Port  Type        Neg      Operational Link Advertisement
----  ----        ---      ------------------------------
1/0/2  1G-Copper   Enable   1000f, 100f, 100h, 10f, 10h
1/0/2  1G-Copper   Enable   1000f

console# show interfaces advertise gigabitethernet 1/0/1
Port: Gigabitethernet 1/0/1
Type: 1G-Copper
Link state: Up
Auto negotiation: enabled
10h 10f 100h 100f 1000f
```

```
Admin Local Link ------ ------ ------ ------ ------
Advertisement yes     yes    yes    yes     no
```

show interfaces configuration

Use the **show interfaces configuration** command in User EXEC mode to display the configuration for all configured interfaces.

Syntax

show interfaces configuration [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no use guidelines.

Example

The following example displays the configuration for all configured interfaces:

```
console>show interfaces configuration

Port   Type                            Duplex  Speed    Neg   Admin
                                                              State
-----  ------------------------------  ------  -------  ----  -----
1/0/1   Gigabit - Level                 Full    100      Auto  Up
1/0/2   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/3   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/4   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/5   Gigabit - Level                 N/A     Unknown  Auto  Up
```

```
1/0/6   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/7   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/8   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/9   Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/10  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/11  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/12  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/13  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/14  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/15  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/16  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/17  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/18  Gigabit - Level                 N/A     Unknown  Auto  Up
1/0/19  Gigabit - Level                 N/A     Unknown  Auto  Up
--More-- or (q)uit
```

The displayed port configuration information includes the following:

Field	Description
Port	The port number.
Port Type	The port designated IEEE shorthand identifier. For example 1000Base-T refers to 1000 Mbps baseband signaling including both Tx and Rx transmissions.
Duplex	Displays the port Duplex status.
Speed	Refers to the port speed.
Neg	Describes the Auto-negotiation status.
Admin State	Displays whether the port is enabled or disabled.

show interfaces counters

Use the **show interfaces counters** command in User EXEC mode to display traffic seen by the interface. Use the command in either User EXEC mode or Privileged EXEC mode to display Priority Flow Control (PFC) traffic seen by the interface, including Received PFC Frames and Transmitted PFC Frames for a given ethernet or port-channel interface.

Syntax

show interfaces counters [**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode and Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays traffic seen by the physical interface:

```
console>show interfaces counters
Port  InOctets    InUcastPkts
----  ----------  ---------
1/0/1  183892      1289
3/0/1  123899      1788

Port  OutOctets   OutUcastPkts
----  ----------  ---------
1/0/1  9188        9
```

```
2/0/1  0           0
3/0/1  8789        27


Ch    InOctets    InUcastPkts
----  ----------  ---------
1     27889       928

Ch    OutOctets   OutUcastPkts
----  ----------  ---------
1     23739       882
```

The following example displays counters for Ethernet port 1/0/1.

```
console#show interfaces counters gigabitethernet
1/0/1
Port  InOctets    InUcastPkts
----  ----------  ---------
1/0/1  183892      1289

Port  OutOctets    OutUcastPkts
----  ----------   ---------
1/0/1  9188         9

Alignment Errors: 17
FCS Errors: 8
Single Collision Frames: 0
Multiple Collision Frames: 0
```

```
Deferred Transmissions: 0
Late Collisions: 0
Excessive Collisions: 0
Oversize Packets: 0
Internal MAC Rx Errors: 0
Received Pause Frames: 0
Transmitted Pause Frames: 0
```

The following table describes the fields shown in the display:

Field	Description
InOctets	Counted received octets.
InUcastPkts	Counted received Unicast packets.
InMcastPkts	Counted received Multicast packets.
InBcastPkts	Counted received Broadcast packets.
OutOctets	Counted transmitted octets.
OutUcastPkts	Counted transmitted Unicast packets.
OutMcastPkts	Counted transmitted Multicast packets.
OutBcastPkts	Counted transmitted Broadcast packets.
Alignment Errors	A count of frames received that are not an integral number of octets in length and do not pass the FCS check.
FCS Errors	Counted frames received that are an integral number of octets in length but do not pass the FCS check.
Single Collision Frames	Counted frames that are involved in a single collision, and are subsequently transmitted successfully.
Multiple Collision Frames	A count of frames that are involved in a multiple collision, and are subsequently transmitted successfully
Deferred Transmissions	A count of frames for which the first transmission attempt is delayed because the medium is busy

Field	Description
Late Collisions	Counted times that a collision is detected later than one slot time into the transmission of a packet.
Excessive Collisions	Counted frames for which transmission fails due to excessive collisions.
Oversize Packets	Counted frames received that exceed the maximum permitted frame size.
Internal MAC Rx Errors	A count of frames for which reception fails due to an internal MAC sublayer receive error.
Received Pause Frames	A count of MAC Control frames received with an opcode indicating the PAUSE operation.
Transmitted Pause Frames	Counted MAC Control frames transmitted on this interface with an opcode indicating the PAUSE operation.

show interfaces description

Use the **show interfaces description** command in User EXEC mode to display the description for all configured interfaces.

Syntax

show interfaces description [**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the description for all interfaces.

```
console>show interfaces description
Port Description
---- ---------------------------------------------------
1/0/1 Port that should be used for management only
2/0/1
2/0/2

Ch    Description
----  -----------
1     Output
```

show interfaces detail

Use the **show interfaces detail** command in Privileged EXEC mode to display detailed status and configuration of the specified interface.

Syntax

show interfaces detail <interface-id>

Field	Description
interface-id	A physical interface or port channel identifier.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays detailed status and configuration of the specified interface.

```
console#show interfaces detail gi1/0/1


Port   Type                              Duplex  Speed
Neg   Admin  Link

State  State
-----  -------------------------------  ------  ------
-  ----  -----  -----
Gi1/0/1Gigabit - Level                N/A     Unknown
Auto  Up     Down



Port  Description
------  ---------------------------------------------
-------------------------
Gi1/0/1


Flow Control:Enabled
Port: Gi1/0/1
VLAN Membership mode:Access Mode

Operating parameters:
PVID: 1
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged
Default Priority: 0
GVRP status:Disabled
Protected:Disabled
```

```
Port Gi1/0/1 is member in:

VLAN    Name                                Egress rule
Type
----   ---------------------------------- -----------
--------
1       default                             Untagged
Default

Static configuration:
PVID: 1
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged

Port Gi1/0/1 is statically configured to:

VLAN    Name                                  Egress rule
----    ---------------------------------- -----------

Forbidden VLANS:
VLAN    Name
----    ---------------------------------



Port Gi1/0/1 Enabled
State: Disabled                                  Role:
Disabled
```

```
Port id: 128.1                                          Port
Cost: 0

Port Fast:  No (Configured: no )                        Root
Protection: No

Designated bridge Priority: 32768
Address: 001E.C9AA.AF51

Designated port id: 128.1
Designated path cost: 40000

CST Regional Root: 80:00:00:1E:C9:AA:AF:51              CST
Port Cost: 0

BPDU: sent 121, received 316356
```

show interfaces status

Use the **show interfaces status** command in Privileged EXEC mode to display the status for all configured interfaces.

Syntax

show interfaces status

The displayed port status information includes the following:

Field	Description
Port	The port or port channel number. **Oob** means Out-of-Band Management Interface.
Name	The port name.
Duplex	Displays the port Duplex status.
Speed	Refers to the port speed.
Neg	Describes the Auto-negotiation status.
Link State	Displays the Link Aggregation status, either **Up** or **Down**.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the status for all configured interfaces.

```
console#show interfaces status

Port      Name            Duplex  Speed     Neg    Link   Flow Control
                                                    State  Status
-------   --------------  ------  -------   ----   -----  ------------
Gi1/0/1                   N/A     Unknown   Auto   Down   Inactive
Gi1/0/2                   N/A     Unknown   Auto   Down   Inactive
Gi1/0/3   ADM-10.0.12.13  N/A     Unknown   Auto   Down   Inactive
```

show statistics

Use the **show statistics** command in Privileged EXEC mode to display detailed statistics for a specific port or for the entire switch.

Syntax

show statistics {**gigabitethernet** *unit/slot/port* | **switchport** | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}

Parameter Description

Parameter	Description
unit/slot/port	A valid interface. See Interface Naming Conventions for interface representation.
switchport	Displays statistics for the entire switch.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Examples

The following example shows statistics for port 1/0/1.

```
console#show statistics gigabitethernet 1/0/1

Total Packets Received (Octets)..... 779533115
Packets Received 64 Octets..... 48950
Packets Received 65-127 Octets..... 482426
Packets Received 128-255 Octets..... 101084
Packets Received 256-511 Octets..... 163671
Packets Received 512-1023 Octets..... 4824
Packets Received 1024-1518 Octets..... 479543
Packets Received > 1522 Octets..... 0
Packets RX and TX 64 Octets..... 94516
Packets RX and TX 65-127 Octets..... 483312
Packets RX and TX 128-255 Octets..... 101329
Packets RX and TX 256-511 Octets..... 163696
Packets RX and TX 512-1023 Octets..... 4982
Packets RX and TX 1024-1518 Octets..... 479845
Packets RX and TX 1519-1522 Octets..... 0
Packets RX and TX 1523-2047 Octets..... 0
Packets RX and TX 2048-4095 Octets..... 0
Packets RX and TX 4096-9216 Octets..... 0
Total Packets Received Without Errors..... 1280498
Unicast Packets Received..... 1155457
```

```
Multicast Packets Received..................... 48339
--More-- or (q)uit
Broadcast Packets Received..................... 76702
Total Packets Received with MAC Errors......... 0
Jabbers Received............................... 0
Fragments/Undersize Received................... 0
Alignment Errors............................... 0
FCS Errors..................................... 0
Overruns....................................... 0
Total Received Packets Not Forwarded........... 91
Local Traffic Frames........................... 0
802.3x Pause Frames Received................... 0
Unacceptable Frame Type........................ 91
Multicast Tree Viable Discards................. 0
Reserved Address Discards...................... 0
Broadcast Storm Recovery....................... 0
CFI Discards................................... 0
Upstream Threshold............................. 0
Total Packets Transmitted (Octets)............. 3604988
Packets Transmitted 64 Octets.................. 45566
Packets Transmitted 65-127 Octets.............. 886
Packets Transmitted 128-255 Octets............. 245
--More-- or (q)uit
Packets Transmitted 256-511 Octets............. 25
Packets Transmitted 512-1023 Octets............ 158
Packets Transmitted 1024-1518 Octets........... 302
Max Frame Size................................. 1518
Total Packets Transmitted Successfully......... 47182
Unicast Packets Transmitted.................... 2746
```

```
Multicast Packets Transmitted..... 44432
Broadcast Packets Transmitted..... 4
Total Transmit Errors..... 0
FCS Errors..... 0
Tx Oversized..... 0
Underrun Errors..... 0
Total Transmit Packets Discarded..... 0
Single Collision Frames..... 0
Multiple Collision Frames..... 0
Excessive Collision Frames..... 0
Port Membership Discards..... 0
802.3x Pause Frames Transmitted..... 0
GVRP PDUs received..... 0
--More-- or (q)uit
GVRP PDUs Transmitted..... 0
GVRP Failed Registrations..... 0
BPDU: sent 44432, received 0
EAPOL Frames Transmitted..... 0
EAPOL Start Frames Received..... 0
Time Since Counters Last Cleared..... 1 day 0 hr
41 min 44 sec
```

The following example shows statistics for the entire switch.

```
console#show statistics gigabitethernet switchport

Total Packets Received (Octets)..... 16877295
Unicast Packets Received..... 1608
Multicast Packets Received..... 48339
Broadcast Packets Received..... 69535
```

```
Receive Packets Discarded..... 0
Octets Transmitted..... 6451988
Packets Transmitted Without Errors..... 91652
Unicast Packets Transmitted..... 2746
Multicast Packets Transmitted..... 88892
Broadcast Packets Transmitted..... 14
Transmit Packets Discarded..... 0
--More-- or (q)uit
Most Address Entries Ever Used..... 141
Address Entries Currently in Use..... 124
Maximum VLAN Entries..... 1024
Most VLAN Entries Ever Used..... 6
Static VLAN Entries..... 6
Dynamic VLAN Entries..... 0
VLAN Deletes..... 0
Time Since Counters Last Cleared..... 1 day 0 hr
42 min 13 sec
console#
```

The following example shows statistics for the entire switch.

```
console#show statistics switchport

Total Packets Received (Octets)..... 0
Packets Received Without Error..... 0
Unicast Packets Received..... 0
Multicast Packets Received..... 0
Broadcast Packets Received..... 0
Receive Packets Discarded..... 0
```

```
Octets Transmitted..............................  0
Packets Transmitted Without Errors..............  0
Unicast Packets Transmitted.....................  0
Multicast Packets Transmitted...................  0
Broadcast Packets Transmitted...................  0
Transmit Packets Discarded......................  0

Most Address Entries Ever Used..................  3
Address Entries Currently in Use................  3

Maximum VLAN Entries........................... 1024
Most VLAN Entries Ever Used.....................  2
Static VLAN Entries.............................  2
Dynamic VLAN Entries............................  0
VLAN Deletes....................................  0
Time Since Counters Last Cleared... 0 day 18 hr 1 min 59 sec
```

show statistics switchport

Use the **show statistics** command in Privileged EXEC mode to display detailed statistics for a specific port or for the entire switch.

Syntax

show statistics {*interface-id* | **switchport**}

Parameter Description

Parameter	Description
interface-id	Interface id. See Interface Naming Conventions for interface representation.
switchport	Displays statistics for the entire switch.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

It is possible to enter interface configuration mode from global configuration mode or from interface configuration mode.

Example

The following example shows statistics for the entire switch.

```
console#show statistics switchport


Total Packets Received (Octets)..... 0
Packets Received Without Error..... 0
Unicast Packets Received..... 0
Multicast Packets Received..... 0
Broadcast Packets Received..... 0
Receive Packets Discarded..... 0

Octets Transmitted..... 0
Packets Transmitted Without Errors..... 0
Unicast Packets Transmitted..... 0
Multicast Packets Transmitted..... 0
Broadcast Packets Transmitted..... 0
Transmit Packets Discarded..... 0
```

```
Most Address Entries Ever Used..... 3
Address Entries Currently in Use..... 3

Maximum VLAN Entries..... 1024
Most VLAN Entries Ever Used..... 2
Static VLAN Entries..... 2
Dynamic VLAN Entries..... 0
VLAN Deletes..... 0
Time Since Counters Last Cleared..... 0 day
18 hr 1 min 59 sec
```

show storm-control

Use the **show storm-control** command in Privileged EXEC mode to display the configuration of storm control.

Syntax

show storm-control [**all** | {**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following example shows storm control configurations for all valid Ethernet ports. The second example shows flow control mode status.

```
console#show storm-control all

       Bcast   Bcast   Mcast   Mcast   Ucast   Ucast
Intf   Mode    Level   Mode    Level   Mode    Level
------ ------- ------- ------- ------- ------- -------
1/0/1   Disable 5       Disable 5       Disable 5
1/0/2   Disable 5       Disable 5       Disable 5
1/0/3   Disable 5       Disable 5       Disable 5
1/0/4   Disable 5       Disable 5       Disable 5
console#show storm-control
802.3x Flow Control Mode..................... Disable
```

shutdown

Use the **shutdown** command in Interface Configuration mode to disable an interface. To restart a disabled interface, use the **no** form of this command.

Syntax

shutdown

no shutdown

Default Configuration

The interface is enabled.

Command Mode

Interface Configuration (Ethernet, Port-Channel, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Examples

The following example disables gigabit Ethernet port 1/0/5.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/5)# shutdown
```

The following example re-enables gigabit ethernet port 1/0/5.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/5)# no shutdown
```

speed

Use the **speed** command in Interface Configuration mode to configure the speed of a given Ethernet interface when not using auto-negotiation. To restore the default, use the **no** form of this command.

Syntax

speed {10 | 100 | 1000 | 10000 | **auto** [10 | 100 | 1000 | 10000]}

no speed

Parameter Description

Parameter	Description
10	Configures the port to 10 Mbps operation.
100	Configures the port to 100 Mbps operation.
1000	Configures the port to 1000 Mbps operation.
10000	Configures the port to 10 Gbps operation.
auto	The port automatically detects the speed it should run based on the port at the other end of the link. If you use the 10, 100, or 1000 keywords with the auto keyword, the port only negotiates at the specified speeds.

Default Configuration

Auto is enabled by default.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

When auto is used with a set of speeds, only those speeds are used by the port for the negotiation capabilities. Alternatively, if no speed arguments are configured, then all the speed capabilities are considered. SFP transceivers support auto-negotiation mode only.

Example

The following example configures the speed operation of Ethernet port 1/0/5 to force 100-Mbps operation.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if)#speed 100
```

storm-control broadcast

Use the **storm-control broadcast** command in Interface Configuration mode to enable broadcast storm recovery mode for a specific interface. If the mode is enabled, broadcast storm recovery is active, and if the rate of L2 broadcast traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of broadcast traffic will be limited to the configured threshold.

Syntax

storm-control broadcast [**level** | *rate*]

no storm-control broadcast

- level— The configured rate as a percentage of link-speed.
- *rate* — The configured rate in kilobits per second (kbps). (Range: 0-100)

Default Configuration

The default value is 5.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-1/0/1)#storm-control broadcast
level 5
```

storm-control multicast

Use the **storm-control multicast** command in Interface Configuration mode to enable multicast storm recovery mode for an interface. If the mode is enabled, multicast storm recovery is active, and if the rate of L2 multicast traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of multicast traffic will be limited to the configured threshold.

When you use the no **storm-control multicast** command to "disable" storm-control after having set the level or rate to a non-default value, that value is still set but is not active until you re-enable storm-control.

Syntax

storm-control multicast [**level** | *rate*]

no storm-control multicast

- level— The configured rate as a percentage of link-speed.
- *rate* — The configured rate in kilobits per second (kbps). (Range: 0-100)

Default Configuration

The default value is 5.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-1/0/1)#storm-control multicast
level 5
```

storm-control unicast

Use the **storm-control unicast** command in Interface Configuration mode to enable unknown unicast storm control for an interface. If the mode is enabled, unicast storm recovery is active, and if the rate of unknown L2 unicast (destination lookup failure) traffic ingressing on an interface increases beyond the configured threshold, the traffic will be dropped. Therefore, the rate of unknown unicast traffic will be limited to the configured threshold.

When you use the no **storm-control multicast** command to "disable" storm-control after having set the level or rate to a non-default value, that value is still set but is not active until you re-enable storm-control.

Syntax

storm-control unicast [**level** | *rate*]

no storm-control unicast

- level— The configured rate as a percentage of link-speed.
- *rate* — The configured rate in kilobits per second (kbps). (Range: 0-100)

Default Configuration

The default value is 5.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-1/0/1)#storm-control unicast level
5
```

switchport protected

Use the **switchport protected** command in Interface Configuration mode to configure a protected port. The *groupid* parameter identifies the set of protected ports to which this interface is assigned. You can only configure an interface as protected in one group. You are required to remove an interface from one group before adding it to another group.

Port protection occurs within a single switch. Protected port configuration does not affect traffic between ports on two different switches. No traffic forwarding is possible between two protected ports. Ports in a protected group will not forward traffic to other ports in the group.

Syntax

switchport protected *groupid*

no switchport protected

- *groupid*–Identifies which group this port will be protected in. (Range: 0-2)

Default Configuration

No protected switchports are defined.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures Ethernet port 1/0/1 as a member of protected group 1.

```
console(config)#interface gigabitethernet 1/0/1
```

```
console(config-if-1/0/1)#switchport protected 1
```

switchport protected name

Use the **switchport protected name** command in Global Configuration mode to adds the port to the protected group 1 and also sets the group name to "protected".

Syntax

switchport protected *groupid* **name** *name*

no switchport protected *groupid* **name**

- *groupid* — Identifies which group the port is to be protected in. (Range: 0–2)
- *name* — Name of the group. (Range: 0-32 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example assigns the name "protected" to group 1.

```
console(config-if-1/0/1)#switchport protected 1 name
protected
```

show switchport protected

Use the **show switchport protected** command in Privileged EXEC mode to display the status of all the interfaces, including protected and unprotected interfaces.

Syntax

show switchport protected *groupid*

- *groupid* — Identifies which group the port is to be protected in. (Range: 0–2)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example identifies test as the protected group.

```
console#show switchport protected 0

Name..................................... test
```

15

Ethernet CFM Commands

Connectivity Fault Management (CFM) is the OAM Protocol provision for end-to-end service layer OAM in carrier Ethernet networks. CFM provides mechanisms to support the operator in performing connectivity checks, fault detection, fault verification and isolation, and fault notification per service in the network domain of interest. Unlike Ethernet OAM defined in IEEE 802.3ah, where the faults are detected and notified on a single point-to-point IEEE Std. 802.3 LAN, this specification deals with the fault diagnosis at service layer across networks comprising multiple LANs, including LANs other than 802.3 media.

PowerConnect CFM supports the following functionality:

- Path discovery (linktrace message)
- Fault detection (continuity check message)
- Fault verification and isolation (loopback and linktrace messages)
- Fault notification (alarm indication signal or SNMP trap)

Commands in this Chapter

This chapter explains the following commands:

ethernet cfm domain	ping ethernet cfm
service	traceroute ethernet cfm
ethernet cfm cc level	show ethernet cfm errors
ethernet cfm mep level	show ethernet cfm domain
ethernet cfm mep enable	show ethernet cfm maintenance-points local
ethernet cfm mep active	show ethernet cfm maintenance-points remote

ethernet cfm mep archive-hold-time	show ethernet cfm statistics
ethernet cfm mip level	debug cfm

ethernet cfm domain

Use the **ethernet cfm domain** command in Global Configuration mode to enter into maintenance domain config mode for an existing domain. Use the optional level parameter to create a domain and enter into maintenance domain config mode. In maintenance domain config mode, maintenance associations are created and per-maintenance domain services can be configured. Use the **no** form of the command to delete a maintenance domain.

Syntax

ethernet cfm domain *domain-name* [**level** *0-7*]

Parameter Description

Parameter	Description	Range	Default	Access
Maintenance domain ID	Unique identifier maintenance domain	0-7 for id	None	Read-write
Maintenance domain name	Name of the maintenance domain	Alphanumeric string of up to 43 characters	None	Read-write

Default Configuration

No CFM domains are pre-configured.

Command Mode

Global Configuration mode

User Guidelines

Each domain must have a unique name and level, for example, one cannot create a domain qwerty at level 2 if domain qwerty already exists at level 1. Likewise, one cannot create a domain dvorak at level 2 if a domain of any name exists at level 2.

Example

In this example, a domain vin is created at level 1.

```
console(config)#ethernet cfm domain vin level 1
console(config-cfm-mdomain)#
```

service

Use the **service** command in maintenance domain config mode to associate a VLAN with a maintenance domain. Use the **no** form of the command to remove the association.

Syntax

service *service-name* **vlan** *vlanid*

Parameter Description

Parameter	Description	Range	Default	Access
service	Unique service identifier	alphanumeric string	None	Read-write
Maintenance association VLAN ID	VLAN ID representing a service instance that is monitored by this maintenance association.	1-4093	0	Read-write

Default Configuration

No VLANs are associated with a maintenance domain by default.

Command Mode

Maintenance domain config mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-cfm-mdomain)#service serv1 vlan 10
```

ethernet cfm cc level

Use the **ethernet cfm cc level** command in Global Configuration mode to initiate sending continuity checks (CCMs) at the specified interval and level on a VLAN monitored by an existing domain. Use the **no** form of the command to cease send CCMs.

Syntax

ethernet cfm cc level *0-7* **vlan** *vlan-list* **interval** *secs*

Parameter Description

Parameter	Description	Range	Default	Access
Maintenance association VLAN ID	VLAN ID representing a service instance that is monitored by this maintenance association.	1-4093	0	Read-write
CCM Interval	Time interval between successive transmissions of CCM.	1, 10, 60, and 600 seconds	1 second	Read-write

Default Configuration

CCMs are not sent by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

console(config)#ethernet cfm cc level 1 vlan 15 interval 10

ethernet cfm mep level

Use the **ethernet cfm mep level** command in Interface Configuration mode to create a Maintenance End Point (MEP) on an interface at the specified level and direction. MEPs are configured per Maintenance Association per Maintenance Domain. Use the **no** form of the command to delete a MEP.

Syntax

ethernet cfm mep level *0-7* **direction** *up/down* **mpid** *1-8191* **vlan** *1-4093*

Parameter Description

Parameter	Description
level	Maintenance association level
direction	**Up** indicates the MEP is facing towards Bridge Relay Entity. **Down** indicates the MEP is facing towards the LAN.
mpid	Maintenance entity identifier
vlan	VLAN on which the MEP operates.

Default Configuration

No MEPs are preconfigured.

Command Mode

Interface Configuration

User Guidelines

This command has no user guidelines.

Example

The following example creates a maintenance endpoint at level 1 with mpid 1010 on vlan 10.

```
console(config-if-Gi1/0/3)#ethernet cfm mep level 1
direction up mpid 1010 vlan 10
```

ethernet cfm mep enable

Use the **ethernet cfm mep enable** command in Interface Configuration mode to enable a MEP at the specified level and direction. Use the **no** form of the command to disable the MEP.

Syntax

ethernet cfm mep enable level *0-7* **vlan** *1-4093* mpid *1-8191*

Parameter Description

Parameter	Description
level	Maintenance association level
mpid	Maintenance entity identifier
vlan	VLAN on which the MEP operates

Default Configuration

No MEPs are preconfigured.

Command Mode

Interface Configuration

User Guidelines

The maintenance domain must exist for it to be enabled.

Example

The following example enables a maintenance endpoint at level 1 with mpid 1010 on vlan 10.

```
console(config-if-Gi1/0/3)#ethernet cfm mep enable
level 1 vlan 10 mpid 1010
```

ethernet cfm mep active

Use the **ethernet cfm mep active** command in Interface Configuration mode to activate a MEP at the specified level and direction. Use the **no** form of the command to deactivate the MEP.

Syntax

ethernet cfm mep active level *0-7* **vlan** *1-4093* mpid *1-8191*

Parameter Description

Parameter	Description
level	Maintenance association level
mpid	Maintenance entity identifier
vlan	VLAN on which the MEP operates

Default Configuration

No MEPs are preconfigured.

Command Mode

Interface Configuration

User Guidelines

This command has no user guidelines.

ethernet cfm mep archive-hold-time

Use the **ethernet cfm mep archive-hold-time** command in Interface Configuration mode to maintain internal information on a missing MEP. Use the **no** form of the command to return the interval to the default value.

Syntax

ethernet cfm mep archive-hold-time *hold-time*

Parameter Description

Parameter	Description
hold-time	The time in seconds to maintain the data for a missing MEP before removing the data. The default value is 600 seconds.

Default Configuration

No MEPs are preconfigured.

Command Mode

Interface Configuration

User Guidelines

The hold time should generally be less than the CCM message interval.

Example

The following example sets the hold time for maintaining internal information regarding a missing MEP.

```
console(config)#ethernet cfm mep archive-hold-time
1200
```

ethernet cfm mip level

Use the **ethernet cfm mip level** command in Interface Configuration mode to create a Maintenance Intermediate Point (MIP) at the specified level. The MEPs are configured per Maintenance Domain per interface. Use the **no** form of the command to delete a MIP.

Syntax

ethernet cfm mip level *0-7*

Parameter Description

Parameter	Description
level	Maintenance association level

Default Configuration

No MIPs are preconfigured.

Command Mode

Interface Configuration

User Guidelines

This command has no user guidelines.

Example

console(config-if-gi1/0/1)# ethernet cfm mip level <7>

ping ethernet cfm

Use the **ping ethernet cfm** command in Privileged EXEC mode to generate a loopback message (LBM) from the configured MEP.

Syntax

ping ethernet cfm {**mac** *mac-addr*| **remote-mpid** *1-8191*} {**domain** *domain name* | **level** *0-7*} **vlan** *vlan-id* **mpid** *1-8191* [**count** *1-255*]

Parameter Description

Parameter	Description
level	Maintenance association level

Parameter	Description
mac-addr	The destination MAC address for which the connectivity needs to be verified. Either MEP ID or the MAC address option can be used.
remote-mpid	The MEP ID for which connectivity is to be verified; i.e. the destination MEP ID.
domain	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).
vlan-id	A VLAN associated with the maintenance domain. Range: 1-4094.
mpid	The MEP ID from which the loopback message needs to be transmitted.
count	The number of LBMs to be transmitted. The default number is 1.

Default Configuration

By default, this command will transmit one loopback message with a timeout of five seconds.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console #ping ethernet cfm mac 00:11:22:33:44:55 level
1 vlan 10 mpid 1 count 10
```

traceroute ethernet cfm

Use the **traceroute ethernet** command in Privileged EXEC mode to generate a link trace message (LTM) from the configured MEP.

Syntax

traceroute ethernet cfm {mac ***mac-addr*****| remote-mpid** ***1-8191*****} {domain** ***domain name*** **| level** ***0-7*** **} vlan** ***vlan-id*** **mpid** ***1-8191*** **[ttl** ***1-255*****]**

Parameter Description

Parameter	Description
level	Maintenance association level
mac-addr	The destination MAC address for which the route needs to be traced. Either MEP ID or the MAC address option can be used.
remote-mpid	The MEP ID for which connectivity needs to be verified; i.e. the destination MEP ID.
domain	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).
vlan-id	A VLAN associated with the maintenance domain. Range: 1-4094.
mpid	The MEP ID from which the link trace message is to be transmitted.
ttl	Number of hops over which the LTM is expected to be transmitted. The default is 64.

Default Configuration

By default, the traceroute command will send loopback trace messages with a TTL of 64.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console # linktrace src-mep 200 target-mep 400 ttl 64
```

show ethernet cfm errors

Use the **show ethernet cfm errors** command in Privileged EXEC mode to display the cfm errors.

Syntax

show ethernet cfm errors {domain *domain-id* | level *0-7*}

Parameter Description

Parameter	Description
domain	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).
level	Maintenance association level

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show ethernet cfm errors

----- ---- ---- --------- ------------ ------------ ----------- ----------
Level SVID MPID DefRDICcm DefMACStatus DefRemoteCCM DefErrorCCM DefXconCCM
----- ---- ---- --------- ------------ ------------ ----------- ----------
```

show ethernet cfm domain

Use the **show ethernet cfm domain** command in Privileged EXEC mode to display the configured parameters in a maintenance domain.

Syntax

show ethernet cfm domain {brief | *domain-id*}

Parameter Description

Parameter	Description
domain	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console # show Ethernet cfm domain domain1


Domain Name    : domain1
Level          : 1
Total Services : 1
---- ---------------------------------- ------------------
VLAN ServiceName                        CC-Interval (secs)
---- ---------------------------------- ------------------
10   serv1                              1
```

show ethernet cfm maintenance-points local

Use the **show ethernet cfm maintenance-points local** command in Privileged EXEC mode to display the configured local maintenance points.

Syntax

show ethernet cfm maintenance-points local {level *0-7* | interface *interface-id* | domain *domain-name*}

Parameter Description

Parameter	Description
domain	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).
level	Maintenance association level
interface-id	Show all MPs associated with the interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
show ethernet cfm maintenance-points local level 1
---- ----- ---- ---- ------ ----- -------- ------ ----------- ---------
MPID Level Type VLAN  Port  Dire-    CC    MEP-   Operational    MAC
                           ction Transmit Active   Status
---- ----- ---- ---- ------ ----- -------- ------ ----------- ---------
1    1     MEP  10   1/0/1  UP    Enabled  True       00:02:bc:02:02:02

----- ---- ------ -----------------
Level Type  Port        MAC
----- ---- ------ -----------------
```

show ethernet cfm maintenance-points remote

Use the **show ethernet cfm maintenance-points remote** command in Privileged EXEC mode to display the configured remote maintenance points.

Syntax

show ethernet cfm maintenance-points remote {level *0-7* | domain *domain-name* | detail [mac *mac-address* | mep *MEPId*] [domain *domain-name* | level *0-7*] [vlan *vlan-id*]}

Parameter Description

Parameter	Description
domain	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).
level	Maintenance association level
mac-address	The destination MAC address for which the information is desired.
vlan-id	A VLAN associated with the maintenance domain. Range: 1-4094.
mpid	The MEP ID from which the link trace message is to be transmitted.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console# show ethernet cfm maintenance-points remove level 1

------ ------- ----- ----------------- ---- ----------------- -----------
MEP Id RMEP Id Level        MAC        VLAN Expiry Timer(sec) Service Id
------ ------- ----- ----------------- ---- ----------------- -----------
1      2       1     00:11:22:33:44:55 10   25                serv1
```

show ethernet cfm statistics

Use the **show ethernet cfm maintenance-points remote** command in Privileged EXEC mode to display the CFM statistics.

Syntax

show ethernet cfm statistics [domain *domain-name* | level *0-7*]

Parameter Description

Parameter	Description
domain-name	Name of the maintenance domain (an alphanumeric string of up to 43 characters in length).
level	Maintenance association level

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
show Ethernet cfm statistics [domain <domain-name> | level <0-7>]

Console# show ethernet cfm statistics

-----------------------------------------------------------------
Statistics for 'Domain: domain1, Level: 1, Vlan: 11, MEP Id: 1'
-----------------------------------------------------------------
Out-of-sequence CCM's received        : 0
CCM's transmitted                     : 259
In-order Loopback Replies received    : 5
```

```
Out-of-order Loopback Replies received: 0
Bad MSDU Loopback Replies received    : 0
Loopback Replies transmitted          : 5
Unexpected LTR's received             : 0

-----------------------------------------------------------------
Statistics for 'Domain: domain1, Level: 1, Vlan: 11, MEP Id: 2'
-----------------------------------------------------------------
Out-of-sequence CCM's received        : 0
CCM's transmitted                     : 1
In-order Loopback Replies received    : 5
Out-of-order Loopback Replies received: 5
Bad MSDU Loopback Replies received    : 0
Loopback Replies transmitted          : 0
Unexpected LTR's received             : 0

-----------------------------------------------------------------
Statistics for 'Domain: domain1, Level: 1, Vlan: 11, MEP Id: 3'
-----------------------------------------------------------------
Out-of-sequence CCM's received        : 0
CCM's transmitted                     : 1
In-order Loopback Replies received    : 0
Out-of-order Loopback Replies received: 0
Bad MSDU Loopback Replies received    : 0
Loopback Replies transmitted          : 5
Unexpected LTR's received             : 0
```

debug cfm

Use the **debug cfm** command in Privileged EXEC mode to enable CFM debugging. Use the **no** form of the command to disable debugging.

Syntax

```
debug cfm  { event | {pdu { all | ccm | ltm | lbm | } {tx | rx} }}
```

Parameter Description

Parameter	Description
event	CFM events
pdu	CFM PDUs
ccm	Continuity check messages
ltm	Link trace messages
lbm	Loopback messages
tx	Transmit only
rx	Receive only
all	Everything

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
Console# show ethernet cfm statistics

-----------------------------------------------------------------
Statistics for 'Domain: domain1, Level: 1, Vlan: 11, MEP Id: 1'
-----------------------------------------------------------------
Out-of-sequence CCM's received        : 0
CCM's transmitted                     : 259
In-order Loopback Replies received    : 5
Out-of-order Loopback Replies received: 0
Bad MSDU Loopback Replies received    : 0
Loopback Replies transmitted          : 5
```

```
Unexpected LTR's received             : 0

-----------------------------------------------------------------
Statistics for 'Domain: domain1, Level: 1, Vlan: 11, MEP Id: 2'
-----------------------------------------------------------------
Out-of-sequence CCM's received        : 0
CCM's transmitted                     : 1
In-order Loopback Replies received    : 5
Out-of-order Loopback Replies received: 5
Bad MSDU Loopback Replies received    : 0
Loopback Replies transmitted          : 0
Unexpected LTR's received             : 0

-----------------------------------------------------------------
Statistics for 'Domain: domain1, Level: 1, Vlan: 11, MEP Id: 3'
-----------------------------------------------------------------
Out-of-sequence CCM's received        : 0
CCM's transmitted                     : 1
In-order Loopback Replies received    : 0
Out-of-order Loopback Replies received: 0
Bad MSDU Loopback Replies received    : 0
Loopback Replies transmitted          : 5
Unexpected LTR's received             : 0
```

16

GVRP Commands

GARP VLAN Registration Protocol (GVRP) is used to propagate VLAN membership information throughout the network. GVRP is based on the Generic Attribute Registration Protocol (GARP), which defines a method of propagating a defined attribute (that is, VLAN membership) throughout the network. GVRP allows both end stations and the networking device to issue and revoke declarations relating to membership in VLANs. End stations that participate in GVRP register VLAN membership using GARP Protocol Data Unit (GPDU) messages. Networking devices that implement the GVRP protocol and enable GVRP then process the GPDUs. The VLAN registration is made in the context of the port that receives the GPDU. The networking device propagates this VLAN membership on all of its other ports in the active topology. Thus, the end station VLAN ID is propagated throughout the network. GVRP is an application defined in the IEEE 802.1p standard that allows for the control of 802.1Q VLANs.

Commands in this Chapter

This chapter explains the following commands:

clear gvrp statistics	gvrp vlan-creation-forbid
garp timer	show gvrp configuration
gvrp enable (global)	show gvrp error-statistics
gvrp enable (interface)	show gvrp statistics
gvrp registration-forbid	

clear gvrp statistics

Use the **clear gvrp statistics** command in Privileged EXEC mode to clear all the GVRP statistics information.

Syntax

clear gvrp statistics [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example clears all the GVRP statistics information on port 1/0/8.

```
console# clear gvrp statistics gigabitethernet 1/0/8
```

garp timer

Use the **garp timer** command in Interface Configuration mode to adjust the GARP application join, leave, and leaveall GARP timer values. To reset the timer to default values, use the **no** form of this command.

Syntax

garp timer {**join** | **leave** | **leaveall**} *timer_value*

no garp timer

- **join** — Indicates the time in centiseconds that PDUs are transmitted.
- **leave** — Indicates the time in centiseconds that the device waits before leaving its GARP state.
- **leaveall** — Used to confirm the port within the VLAN. The time is the interval between messages sent, measured in centiseconds.
- *timer_value* — Timer values in centiseconds. The range is 10-100 for **join**, 20-600 for **leave**, and 200-6000 for **leaveall**.

Default Configuration

The default timer values are as follows:

- Join timer — 20 centiseconds
- Leave timer — 60 centiseconds
- Leaveall timer — 1000 centiseconds

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The following *relationships* for the various timer values must be maintained:

- Leave time must be greater than or equal to three times the join time.
- Leaveall time must be greater than the leave time.

Set the same GARP timer values on all Layer 2-connected devices. If the GARP timers are set differently on Layer 2-connected devices, the GARP application will not operate successfully.

The *timer_value* setting must be a multiple of 10.

Example

The following example sets the leave timer for port 1/0/8 to 90 centiseconds.

```
console (config)# interface gigabitethernet 1/0/8
console (config-if-1/0/8)# garp timer leave 90
```

gvrp enable (global)

Use the **gvrp enable (global)** command in Global Configuration mode to enable GVRP globally on the switch. To disable GVRP globally on the switch, use the **no** form of this command.

Syntax

gvrp enable

no gvrp enable

Default Configuration

GVRP is globally disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example globally enables GVRP on the device.

```
console(config)#gvrp enable
```

gvrp enable (interface)

Use the **gvrp enable** command in Interface Configuration mode to enable GVRP on an interface. To disable GVRP on an interface, use the **no** form of this command.

Syntax

gvrp enable

no gvrp enable

Default Configuration

GVRP is disabled on all interfaces by default.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

An Access port cannot join dynamically to a VLAN because it is always a member of only one VLAN.

Membership in untagged VLAN would be propagated in a same way as a tagged VLAN. In such cases it is the administrator's responsibility to set the PVID to be the untagged VLAN VID.

Example

The following example enables GVRP on gigabit ethernet 1/0/8.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#gvrp enable
```

gvrp registration-forbid

Use the **gvrp registration-forbid** command in Interface Configuration mode to deregister all VLANs on a port and prevent any dynamic registration on the port. To allow dynamic registering for VLANs on a port, use the **no** form of this command.

Syntax

gvrp registration-forbid

no gvrp registration-forbid

Default Configuration

Dynamic registering and deregistering for each VLAN on the port is not forbidden.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how default dynamic registering and deregistering is forbidden for each VLAN on port 1/0/8.

```
console(config)#interface gigabitethernet 1/0/8
```

```
console(config-if-1/0/8)#gvrp registration-forbid
```

gvrp vlan-creation-forbid

Use the **gvrp vlan-creation-forbid** command in Interface Configuration mode to disable dynamic VLAN creation. To disable dynamic VLAN creation, use the **no** form of this command.

Syntax

gvrp vlan-creation-forbid

no gvrp vlan-creation-forbid

Default Configuration

By default, dynamic VLAN creation is enabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example disables dynamic VLAN creation on port 1/0/8.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#gvrp vlan-creation-forbid
```

show gvrp configuration

Use the **show gvrp configuration** command in Privileged EXEC mode to display GVRP configuration information. Timer values are displayed. Other data shows whether GVRP is enabled and which ports are running GVRP.

Syntax

show gvrp configuration [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to display GVRP configuration information:

```
console# show gvrp configuration
Global GVRP Mode: Disabled
Join         Leave       LeaveAll      Port      VLAN
Interface     Timer       Timer        Timer     GVRP Mode   Create Register
             (centisecs) (centisecs) (centisecs)             Forbid Forbid
-----------  ----------  ----------  ----------  ---------- ------ ------
1/0/1         20          60          1000         Disabled
1/0/2         20          60          1000         Disabled
1/0/3         20          60          1000         Disabled
1/0/4         20          60          1000         Disabled
1/0/5         20          60          1000         Disabled
1/0/6         20          60          1000         Disabled
1/0/7         20          60          1000         Disabled
1/0/8         20          60          1000         Disabled
1/0/9         20          60          1000         Disabled
1/0/10        20          60          1000         Disabled
1/0/11        20          60          1000         Disabled
1/0/12        20          60          1000         Disabled
1/0/13        20          60          1000         Disabled
1/0/14        20          60          1000         Disabled
```

show gvrp error-statistics

Use the **show gvrp error-statistics** command in User EXEC mode to display GVRP error statistics.

Syntax

show gvrp error-statistics [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays GVRP error statistics information.

```
console>show gvrp error-statistics

GVRP error statistics:
----------------
Legend:

INVPROT: Invalid Protocol Id  INVATYP: Invalid Attribute Type
INVALEN: Invalid Attribute Length INVAVAL: Invalid Attribute Value
INVEVENT: Invalid Event

Port INVPROT    INVATYP     INVAVAL    INVALEN    INVEVENT
---- -------    -------     -------    -------    --------
1/0/1    0          0           0          0          0
1/0/2    0          0           0          0          0
```

```
1/0/3    0          0          0          0          0
1/0/4    0          0          0          0          0
```

show gvrp statistics

Use the **show gvrp** statistics command in User EXEC mode to display GVRP statistics.

Syntax

show gvrp statistics [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

This example shows output of the **show gvrp statistics** command.

```
console>show gvrp statistics

GVRP statistics:
-----------------------------
Legend:

rJE  : Join Empty Received             rJIn : Join In Received
rEmp : Empty Received                  rLIn : Leave In Received
rLE  : Leave Empty Received            rLA  : Leave All Received
sJE  : Join Empty Sent                 JIn  : Join In Sent
sEmp : Empty Sent                      sLIn : Leave In Sent
sLE  : Leave Empty Sent                sLA  : Leave All Sent
```

Port	rJE	rJIn	rEmp	rLIn	rLE	rLA	sJE	sJIn	sEmp	sLIn	sLE	sLA
1/0/1	0	0	0	0	0	0	0	0	0	0	0	0
1/0/2	0	0	0	0	0	0	0	0	0	0	0	0
1/0/3	0	0	0	0	0	0	0	0	0	0	0	0
1/0/4	0	0	0	0	0	0	0	0	0	0	0	0
1/0/5	0	0	0	0	0	0	0	0	0	0	0	0
1/0/6	0	0	0	0	0	0	0	0	0	0	0	0
1/0/7	0	0	0	0	0	0	0	0	0	0	0	0
1/0/8	0	0	0	0	0	0	0	0	0	0	0	0

17

IGMP Snooping Commands

Snooping of Internet Group Management Protocol (IGMP) messages is a feature that allows PowerConnect switches to forward multicast traffic intelligently on the switch. Multicast IP traffic is traffic that is destined to a host group. Host groups are identified by class D IP addresses, which range from 224.0.0.0 to 239.255.255.255. Based on the IGMP query and report messages, the switch forwards traffic only to the ports that request the multicast traffic. This prevents the switch from broadcasting the traffic to all ports and possibly affecting network performance.

IGMP snooping switches build forwarding lists by monitoring for, and in some cases intercepting, IGMP messages. Although the software processing the IGMP messages could maintain state information based on the full IP group addresses, the forwarding tables in PowerConnect are mapped to link layer addresses.

The Multicast Forwarding Database (MFDB) manages the forwarding address table for Layer 2 multicast protocols, such as IGMP Snooping.

The IGMP Snooping code in the CPU ages out IGMP entries in the MFDB. If a report for a particular group on a particular interface is not received within a certain time interval (query interval), the IGMP Snooping code deletes that interface from the group. The value for query interval time is configurable using management.

If an IGMP Leave Group message is received on an interface, the IGMP Snooping code sends a query on that interface and waits a specified length of time (maximum response time). If no response is received within that time, that interface is removed from the group. The value for maximum response time is configurable using management.

In addition to building and maintaining lists of multicast group memberships, the snooping switch also maintains a list of multicast routers. When forwarding multicast packets, they should be forwarded on ports that have joined using IGMP and also on ports on which multicast routers are attached. The reason for this is that in IGMP there is only one active query mechanism. This means that all other routers on the network are suppressed and thus not detectable by the switch. If a query is not received on an

interface within a specified length of time (multicast router present expiration time), that interface is removed from the list of interfaces with multicast routers attached. The multicast router present expiration time is configurable using management. The default value for the multicast router expiration time is zero, which indicates an infinite timeout (that is, no expiration).

Commands in this Chapter

This chapter explains the following commands:

ip igmp snooping (global)	show ip igmp snooping interface
ip igmp snooping (interface)	show ip igmp snooping mrouter
ip igmp snooping host-time-out	ip igmp snooping (VLAN)
ip igmp snooping leave-time-out	ip igmp snooping fast-leave
ip igmp snooping mrouter-time-out	ip igmp snooping groupmembership-interval
show ip igmp snooping	ip igmp snooping maxresponse
show ip igmp snooping groups	ip igmp snooping mcrtrexpiretime

ip igmp snooping (global)

Use the **ip igmp snooping** command in Global Configuration mode to globally enable Internet Group Management Protocol (IGMP) snooping. Use the **no** form of this command to disable IGMP snooping globally.

Syntax

ip igmp snooping

no ip igmp snooping

Default Configuration

IGMP snooping is disabled.

Command Mode

Global Configuration mode

User Guidelines

IGMP snooping is enabled on static VLANs only and is not enabled on Private VLANs or their community VLANs.

Example

The following example globally enables IGMP snooping.

```
console(config)# ip igmp snooping
```

ip igmp snooping (interface)

Use the **ip igmp snooping** command in Interface Configuration mode to enable Internet Group Management Protocol (IGMP) snooping on a specific interface. To disable IGMP snooping on an Ethernet interface, use the **no** form of this command.

Syntax

ip igmp snooping

no ip igmp snooping

Default Configuration

IGMP snooping is disabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

IGMP snooping can be enabled on Ethernet interfaces.

Example

The following example enables IGMP snooping.

```
console(config-if-1/0/1)#ip igmp snooping
```

ip igmp snooping host-time-out

Use the **ip igmp snooping host-time-out** command in Interface Configuration mode to configure the host-time-out. If an IGMP report for a Multicast group is not received for a host time-out period from a specific port, this port is deleted from the member list of that Multicast group. To reset to the default host time-out, use the **no** form of this command.

Syntax

ip igmp snooping host-time-out *time-out*

no ip igmp snooping host-time-out

- *time-out* — Host timeout in seconds. (Range: 2- 3600)

Default Configuration

The default host-time-out is 260 seconds.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The timeout should be more than sum of response time and twice the query interval.

Example

The following example configures the host timeout to 300 seconds.

```
console(config-if-1/0/1)#ip igmp snooping host-time-
out 300
```

ip igmp snooping leave-time-out

Use the **ip igmp snooping leave-time-out** command in Interface Configuration mode to configure the leave-time-out. If an IGMP report for a Multicast group is not received within the leave-time-out period after an

IGMP leave was received from a specific port, the current port is deleted from the member list of that Multicast group. To configure the default leave-time-out, use the **no** form of this command.

Syntax

ip igmp snooping leave-time-out [*time-out* | **immediate-leave**]

no ip igmp snooping leave-time-out

- *time-out* — Specifies the leave-time-out in seconds. (Range: 1-25)
- **immediate-leave** — Specifies that the port should be removed immediately from the members list after receiving IGMP Leave.

Default Configuration

The default leave-time-out configuration is 10 seconds.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The leave timeout should be set greater than the maximum time that a host is allowed to respond to an IGMP Query.

Use **immediate leave** only where there is only one host connected to a port.

Example

The following example configures the host leave-time-out to 15 seconds.

```
console(config-if-1/0/1)#ip igmp snooping leave-time-out 15
```

ip igmp snooping mrouter-time-out

Use the **ip igmp snooping mrouter-time-out** command in Interface Configuration mode to configure the mrouter-time-out. This command is used for setting the aging-out time after Multicast router ports are automatically learned. To reset to the default mrouter-time-out, use the **no** form of this command.

Syntax

ip igmp snooping mrouter-time-out *time-out*

no ip igmp snooping mrouter-time-out

- *time-out* — mrouter timeout in seconds for IGMP. (Range: 1–3600)

Default Configuration

The default value is 300 seconds.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the mrouter timeout to 200 seconds.

```
console(config-if-1/0/1)#ip igmp snooping mrouter-
time-out 200
```

show ip igmp snooping

Use the **show ip igmp snooping** command in Privileged EXEC mode to display the IGMP snooping configuration.

Syntax

show ip igmp snooping [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
vlan-id	Specifies a VLAN ID value (available only in Privileged EXEC mode).

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command has no user guidelines.

show ip igmp snooping groups

Use the **show ip igmp snooping groups** command in User EXEC mode to display the Multicast groups learned by IGMP snooping.

Syntax

show ip igmp snooping groups [**vlan** *vlan-id*] [**address** *ip-multicast-address*]

- *vlan_id* — Specifies a VLAN ID value.
- *ip-multicast-address* — Specifies an IP Multicast address.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The example shows Multicast groups learned by IGMP snooping for all VLANs.

```
console>show ip igmp snooping groups

Vlan     IP Address                Ports
```

```
----    -----------                 -------
1     224-239.130 | 2.2.3           1/0/1, 2/0/2
19    224-239.130 | 2.2.8           1/0/9-1/0/11

IGMP Reporters that are forbidden statically:
-----------------------------------------
Vlan   IP Address                Ports
----   -----------------   -------------------
1      224-239.130 | 2.2.3         1/0/19
```

show ip igmp snooping interface

Use the **show ip igmp snooping interface** command in Privileged EXEC mode to display the IGMP snooping configuration.

Syntax

show ip igmp snooping interface *interface* {**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The example displays IGMP snooping information.

```
console#show ip igmp snooping interface 1/0/1
Slot/Port..................................... 1/0/1
```

```
IGMP Snooping Admin Mode..................... Disabled
Fast Leave Mode.............................. Disabled
Group Membership Interval.................... 260
Max Response Time............................ 10
Multicast Router Present Expiration Time.... 300
```

show ip igmp snooping mrouter

Use the **show ip igmp snooping mrouter** command in Privileged EXEC mode to display information on dynamically learned Multicast router interfaces.

Syntax

show ip igmp snooping mrouter

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example shows IGMP snooping mrouter information.

```
console#show ip igmp snooping mrouter

Port.....................................1/0/1
```

ip igmp snooping (VLAN)

Use the **ip igmp snooping** command in VLAN Configuration mode to enable IGMP snooping on a particular interface or on all interfaces participating in a VLAN. To disable IGMP snooping use the **no** form of this command.

Syntax

ip igmp snooping *vlan-id*

no ip igmp snooping

Default Configuration

IGMP snooping is disabled on VLAN interfaces by default.

Command Mode

VLAN Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables IGMP snooping on VLAN 2.

```
console#vlan database
console(config-vlan)#ip igmp snooping 2
```

ip igmp snooping fast-leave

This command enables or disables IGMP Snooping fast-leave mode on a selected VLAN. Enabling fast-leave allows the switch to immediately remove the layer 2 LAN interface from its forwarding table entry upon receiving an IGMP leave message for that multicast group without first sending out MAC-based general queries to the interface. The **no** form of this command disables IGMP Snooping fast-leave mode on a VLAN.

You should enable fast-leave admin mode only on VLANs where only one host is connected to each layer 2 LAN port. This setting prevents the inadvertent dropping of the other hosts that were connected to the same layer 2 LAN port but were still interested in receiving multicast traffic directed to that group. Also, fast-leave processing is supported only with IGMP version 2 hosts.

Syntax

ip igmp snooping fast-leave *vlan-id*

no ip igmp snooping fast-leave

- *vlan id* — Number assigned to the VLAN.

Default Configuration

IGMP snooping fast-leave mode is disabled on VLANs by default.

Command Mode

VLAN Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables IGMP snooping fast-leave mode on VLAN 2.

```
console(config-vlan)#ip igmp snooping fast-leave 2
```

ip igmp snooping groupmembership-interval

This command sets the IGMP Group Membership Interval time on a VLAN. The Group Membership Interval time is the amount of time in seconds that a switch waits for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the IGMPv3 Maximum Response time value. The range is 2 to 3600 seconds. The **no** form of this command sets the IGMPv3 Group Membership Interval time to the default value.

Syntax

ip igmp snooping groupmembership-interval *vlan-id seconds*

no ip igmp snooping groupmembership-interval

- *vlan-id* — Number assigned to the VLAN
- seconds — IGMP group membership interval time in seconds. (Range: 2–3600)

Default Configuration

The default group membership interval time is 260 seconds.

Command Mode

VLAN Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures an IGMP snooping group membership interval of 520 seconds.

```
console(config-vlan)#ip igmp snooping
groupmembership-interval 2 520
```

ip igmp snooping maxresponse

This command sets the IGMP Maximum Response time on a particular VLAN. The Maximum Response time is the amount of time in seconds that a switch will wait after sending a query on an interface because it did not receive a report for a particular group in that interface. This value must be less than the IGMP Query Interval time value. The range is 1 to 3174 seconds. The **no** form of this command sets the maximum response time on the VLAN to the default value.

Syntax

ip igmp snooping maxresponse *vlan-id seconds*

no ip igmp snooping maxresponse *vlan-id*

- *vlan-id* — Number assigned to the VLAN.
- *seconds* — IGMP Maximum response time in seconds. (Range: 1-3174)

Default Configuration

The default maximum response time is 10 seconds.

Command Mode

VLAN Configuration mode

User Guidelines

When using IGMP Snooping Querier, this parameter should be less than the value for the IGMP Snooping Querier query interval.

Example

The following example sets the maximum response time to 60 seconds on VLAN 2.

```
console(config-vlan)#ip igmp snooping maxresponse 2
60
```

ip igmp snooping mcrtrexpiretime

This command sets the Multicast Router Present Expiration time. The time is set on a particular VLAN. This is the amount of time in seconds that a switch waits for a query to be received on an interface before the interface is removed from the list of interfaces with multicast routers attached. The range is 1–2147483647 seconds. A value of 0 indicates an infinite time-out (no expiration). The **no** form of this command sets the Multicast Router Present Expiration time to 0. The time is set for a particular VLAN.

Syntax

ip igmp snooping mcrtexpiretime *vlan-id seconds*

no ip igmp mcrtexpiretime *vlan-id*

- *vlan id* — Number assigned to the VLAN
- *seconds* — Multicast router present expiration time. (Range: 1–3600)

Default Configuration

The default multicast router present expiration time is 300 seconds.

Command Mode

VLAN Configuration mode

User Guidelines

The mcrexpiretime should be less than the group membership interval.

Example

The following example sets the multicast router present expiration time on VLAN 2 to 60 seconds.

```
console(config-vlan)#ip igmp mcrtexpiretime 2 60
```

18

IGMP Snooping Querier Commands

The IGMP/MLD Snooping Querier is an extension to the IGMP/MLD Snooping feature. IGMP/MLD Snooping Querier allows the switch to simulate an IGMP/MLD router in a Layer 2-only network, thus removing the need to have an IGMP/MLD Router to collect and refresh the multicast group membership information. The querier function simulates a small subset of the IGMP/MLD router functionality.

In a network with IP multicast routing, an IP multicast router acts as the IGMP/MLD querier. However, if it is required that the IP-multicast traffic in a VLAN be switched, the PowerConnect can be configured as an IGMP/MLD querier. When IGMP/MLD Snooping Querier is enabled, the Querier sends out periodic IGMP/MLD General Queries that trigger the Multicast listeners/member to send their joins so as to receive the Multicast data traffic. IGMP/MLD Snooping listens to these reports to establish the appropriate L2 forwarding table entries.

The PowerConnect supports version IGMP V1 and 2 for snooping IGMP queries.

Commands in this Chapter

This chapter explains the following commands:

ip igmp snooping querier	ip igmp snooping querier timer expiry
ip igmp snooping querier election participate	ip igmp snooping querier version
ip igmp snooping querier query-interval	show ip igmp snooping querier

ip igmp snooping querier

This command enables or disables IGMP Snooping Querier on the system (Global Configuration mode) or on a VLAN. Using this command, you can specify the IP address that the snooping querier switch should use as the

source address when generating periodic queries. The **no** form of this command disables IGMP Snooping Querier on the system. Use the optional **address** parameter to set or reset the querier address.

If a VLAN has IGMP Snooping Querier enabled, and IGMP Snooping is operationally disabled on it, IGMP Snooping Querier functionality is disabled on that VLAN. IGMP Snooping Querier functionality is re-enabled if IGMP Snooping is operational on the VLAN.

The IGMP Snooping Querier application sends periodic general queries on the VLAN to solicit membership reports.

Syntax

ip igmp snooping querier [**vlan** *vlan-id*] [**address** *ip-address*]

no ip igmp snooping querier [**vlan** *vlan-id*] [**address**]

- *vlan-id* — A valid VLAN number.
- *ip-address* — An IPv4 address used for the source address.

Default Configuration

The IGMP snooping querier feature is globally disabled on the switch. When enabled, the IGMP snooping querier disables itself if it detects IGMP traffic from a multicast-enabled router.

Command Mode

Global Configuration mode

User Guidelines

When using the command in Global Configuration mode to configure a snooping querier source address, the IPv4 address is the global querier address. When using the command in VLAN Configuration mode to configure a snooping querier source address, the IPv4 address is the querier address for the VLAN. If there are no global or VLAN querier addresses configured, then use the management IP address as the IGMP snooping querier source address. Using all zeros for the querier IP address removes it. The VLAN IP address takes precedence over the global IP address.

Example

The following example enables IGMP snooping querier in VLAN Configuration mode.

```
console(config-vlan)#ip igmp snooping querier 1
address 10.19.67.1
```

ip igmp snooping querier election participate

This command enables the Snooping Querier to participate in the Querier Election process when it discovers the presence of another Querier in the VLAN. When this mode is enabled, if the Snooping Querier finds that the other Querier source address is more than the Snooping Querier address, it stops sending periodic queries. If the Snooping Querier wins the election, then it continues sending periodic queries. The **no** form of this command sets the snooping querier not to participate in the querier election but to go into a non-querier mode as soon in as it discovers the presence of another querier in the same VLAN.

Syntax

ip igmp snooping querier election participate *vlan-id*

no ip igmp snooping querier election participate *vlan-id*

Default Configuration

The snooping querier is configured to not participate in the querier election by default.

Command Mode

VLAN Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the snooping querier to participate in the querier election.

```
console#vlan database
console(config-vlan)#ip igmp snooping querier
election participate
```

ip igmp snooping querier query-interval

This command sets the IGMP Querier Query Interval time, which is the amount of time in seconds that the switch waits before sending another periodic query. The **no** form of this command sets the IGMP Querier Query Interval time to its default value.

Syntax

ip igmp snooping querier query-interval *interval-count*

no ip igmp snooping querier query-interval

- *interval–count* — Amount of time in seconds that the switch waits before sending another general query. (Range: 1-1800)

Default Configuration

The query interval default is 60 seconds.

Command Mode

Global Configuration mode

User Guidelines

The value of this parameter should be larger than the IGMP Snooping Max Response Time.

Example

The following example sets the query interval to 1800:

```
ip igmp snooping querier query_interval 1800
```

ip igmp snooping querier timer expiry

This command sets the IGMP Querier timer expiration period which is the time period that the switch remains in Non-Querier mode after it has discovered that there is a Multicast Querier in the network. The **no** form of this command sets the IGMP Querier timer expiration period to its default value.

Syntax

ip igmp snooping querier timer expiry *seconds*

no ip igmp snooping querier timer expiry

- *seconds* — The time in seconds that the switch remains in Non-Querier mode after it has discovered that there is a multicast querier in the network. The range is 60–300 seconds.

Default Configuration

The query interval default is 60 seconds.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the querier timer expiry time to 100 seconds.

```
ip igmp snooping querier timer expiry 100
```

ip igmp snooping querier version

This command sets the IGMP version of the query that the snooping switch is going to send periodically. The **no** form of this command sets the IGMP Querier Version to its default value.

Syntax

ip igmp snooping querier version *version*

no ip igmp snooping querier version

- *version* — IGMP version. (Range: 1–2)

Default Configuration

The querier version default is 2.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the IGMP version of the querier to 1.

```
ip igmp snooping querier version 1
```

show ip igmp snooping querier

This command displays IGMP Snooping Querier information. Configured information is displayed whether or not IGMP Snooping Querier is enabled. If a querier is active in the network and IGMP snooping querier is enabled, the querier's IP address is shown in the Last Querier Address field.

Syntax

show ip igmp snooping querier [**detail** | **vlan** *vlan_id*]

Syntax Description

Parameter	Description
vlan_id	Specifies a VLAN ID value.

When the optional argument *vlan_id* is not used, the command shows the following information.

Parameter	Description
Admin Mode	Indicates whether or not IGMP Snooping Querier is active on the switch.
Admin Version	Indicates the version of IGMP that will be used while sending out the queries.
Source IP Address	Shows the IP address that is used in the IPv4 header when sending out IGMP queries. It can be configured using the appropriate command.
Query Interval	Shows the amount of time in seconds that a Snooping Querier waits before sending out the periodic general query.
Querier Timeout	Displays the amount of time to wait in the Non-Querier operational state before moving to a Querier state.

When you specify a value for *vlan_id*, the following information appears.

Parameter	Description
VLAN Admin Mode	Indicates whether IGMP Snooping Querier is active on the VLAN.
VLAN Operational State	Indicates whether IGMP Snooping Querier is in the Querier or Non-Querier state. When the switch is in Querier state it sends out periodic general queries. When in Non-Querier state it waits for moving to Querier state and does not send out any queries.
VLAN Operational Max Response Time	Indicates the time to wait before removing a Leave from a host upon receiving a Leave request. This value is calculated dynamically from the Queries received from the network. If the Snooping Switch is in Querier state, then it is equal to the configured value.
Querier Election Participate	Indicates whether the IGMP Snooping Querier participates in querier election if it discovers the presence of a querier in the VLAN.
Last Querier Address	Indicates the IP address of the most recent Querier from which a Query was received.
Last Querier Version	Indicates the IGMP version of the most recent Querier from which a Query was received on this VLAN.

Parameter	Description
Elected Querier	Indicates the IP address of the Querier that has been designated as the Querier based on its source IP address. This field will be 0.0.0.0 when Querier Election Participate mode is disabled.

When the optional argument detail is used, the command shows the global information and the information for all Querier enabled VLANs.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged Exec modes

User Guidelines

This command has no user guidelines.

Example

The following example shows querier information for VLAN 2.

```
console#show ip igmp snooping querier vlan 2


Vlan 2 :   IGMP Snooping querier status
-------------------------------------------
IGMP Snooping Querier Vlan Mode.......... Enable
Querier Election Participate Mode........ Disable
Querier Vlan Address..................... 0.0.0.0
Operational State........................ Non-Querier
Last Querier Address..................... 2.2.2.2
Operational version...................... 3
Operational Max Resp Time.............. 11
```

19

IP Addressing Commands

Interfaces on the PowerConnect switches support a variety of capabilities to support management of the switch. In addition to performing switching and routing of network traffic, PowerConnect switches act as a host for management of the switch. Commands in this category allow the network operator to configure the local host address, utilize the embedded DHCP client to obtain an address, resolve names to addresses using DNS servers, and detect address conflicts on the local subnet.

There are two management interface types on PowerConnect switches. In-band interfaces allow management of the switch through the network switching/routing interfaces. Out-of-band management is always through the dedicated service port. In-band management interfaces can employ a variety of protection mechanisms including VLAN assignment and Management ACLs. The out-of-band port does not support such protection mechanisms and, therefore, it is recommended that the service port only be connected to a physically segregated management network.

Commands in this Chapter

This chapter explains the following commands:

clear host	ip host
clear ip address-conflict-detect	ip name-server
–	ipv6 address (Interface Config)
ip address (Out-of-Band)	ipv6 address dhcp
ip address-conflict-detect run	ipv6 enable (Interface Config)
ip address dhcp (Interface Config)	show hosts
ip default-gateway	show ip address-conflict
ip domain-lookup	show ip helper-address
ip domain-name	–

clear host

Use the **clear host** command in Privileged EXEC mode to delete entries from the host name-to-address cache.

Syntax

clear host {*name* | *}

- *name* — Host name to be deleted from the host name-to-address cache. (Range: 1-255 characters)
- * — Deletes all entries in the host name-to-address cache.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example deletes all entries from the host name-to-address cache.

```
console#clear host *
```

clear ip address-conflict-detect

Use the **clear ip address-conflict-detect** command in Privileged EXEC mode to clear the address conflict detection status in the switch.

Syntax

clear ip address-conflict-detect

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#
console#configure
console(config)#clear ip address-conflict-detect
```

ip address (Out-of-Band)

Use the **ip address** command in Interface Configuration mode to set an IP address for the service port. Use the **no** form of this command to return the ip address configuration to its default value.

Syntax

ip address {*ip-address* {*mask* | *prefix-length*} | dhcp}

no ip address

Parameter Description

Parameter	Description
ip-address	Specifies a valid IP address.
mask	Specifies a valid subnet (network) mask IP address.
prefix-length	The number of bits that comprise the IP address prefix. The prefix length must be preceded by a forward slash (/). (Range: 1-30 bits)

Parameter	Description
dhcp	Obtain the service port address via DHCPv4.

Default Configuration

The out-of-band interface (service port) obtains an IP address via DHCP by default.

Command Mode

Interface (Out-of-Band) Configuration mode

User Guidelines

When setting the netmask/prefix length on an IPv4 address, a space is required between the address and the mask or prefix length. Setting an IP address on the out-of-band port enables switch management over the service port.

Example

The following examples configure the service port with IP address 131.108.1.27 and subnet mask 255.255.255.0 and the same IP address with prefix length of 24 bits.

```
console(config)#interface out-of-band

console(config-if)#ip address 131.108.1.27
255.255.255.0

console(config-if)#ip address 131.108.1.27 /24
```

ip address-conflict-detect run

Use the **ip address-conflict-detect run** command in Global Configuration mode to trigger the switch to run active address conflict detection by sending gratuitous ARP packets for IPv4 addresses on the switch.

Syntax

ip address–conflict–detect run

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console#
console#configure
console(config)#ip address-conflict-detect run
```

ip address dhcp (Interface Config)

Use the **ip address dhcp** command in Interface (VLAN) Configuration mode to enable the DHCPv4 client on an interface.

Syntax

ip address dhcp

no ip address dhcp

Parameter Description

This command does not require a parameter description.

Default Configuration

DHCPv4 is disabled by default on routing interfaces.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only applies to routing interfaces. When DHCP is enabled on a routing interface, the system automatically deletes all manually configured IPv4 addresses on the interface.

- The command **no ip address dhcp** removes the interface's primary address (Manual/DHCP) including the secondary addresses, if configured, and sets the Interface method to **None**.
- The command **no ip address** removes the interface's primary address only if configured through DHCP and sets the interface method to **None**. It does not remove a manually configured address.

In addition to leasing an IP address and subnet mask, the DHCP client may learn the following parameters from a DHCP server:

- The IPv4 address of a default gateway. If the device learns different default gateways on different interfaces, the system uses the first default gateway learned. The system installs a default route in the routing table, with the default gateway's address as the next hop address. This default route has a preference of 254.
- The IPv4 address of a DNS server. The DNS client stores each DNS server address in its server list.
- A domain name. The DNS client stores each domain name in its domain name list.

Examples

To enable DHCPv4 on vlan 2:

```
console#config
console(config)#interface vlan 2
console(config-if-vlan2)#ip address dhcp
```

ip default-gateway

Use the **ip default-gateway** command in Global Configuration mode to configure a default gateway (router).

Syntax

ip default-gateway *ip-address*

no ip default-gateway *ip-address*

Parameter Description

Parameter	Description
ip-address	Valid IPv4 address of an attached router.

Default Configuration

No default gateway is defined.

Command Mode

Global Configuration mode

User Guidelines

When the system does not have a more specific route to a packet's destination, it sends the packet to the default gateway. The system installs a default IPv4 route with the gateway address as the next hop address. The route preference is 253. A default gateway configured with this command is more preferred than a default gateway learned from a DHCP server, which has a route preference of 254. It is less preferred than a static route configured via the ip route command, which has a route preference of 1. Use the show ip route command to display the active default gateway.

Only one default gateway can be configured. If you invoke this command multiple times, each command replaces the previous value.

Example

The following example sets the default-gateway to `10.1.1.1`.

```
console#config
console(config)#ip default-gateway 10.1.1.1.
```

ip domain-lookup

Use the **ip domain-lookup** command in Global Configuration mode to enable IP Domain Naming System (DNS)-based host name-to-address translation. To disable the DNS, use the **no** form of this command.

Syntax

ip domain-lookup

no ip domain-lookup

Default Configuration

DNS name resolution is enabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables the IP Domain Naming System (DNS)-based host name-to-address translation.

```
console(config)#ip domain-lookup
```

ip domain-name

Use the **ip domain-name** command in Global Configuration mode to define a default domain name used to complete unqualified host names. To delete the default domain name, use the **no** form of this command.

Syntax

ip domain-name *name*

no ip domain-name

- *name* — Default domain name used to complete an unqualified host name. Do not include the initial period that separates the unqualified host name from the domain name (Range: 1-255 characters).

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines a default domain name of dell.com.

```
console(config)#ip domain-name dell.com
```

ip host

Use the **ip host** command in Global Configuration mode to define static host name-to-address mapping in the host cache. To delete the name-to-address mapping, use the **no** form of this command.

Syntax

ip host *name address*

no ip host *name*

- *name* — Host name.
- *address* — IP address of the host.

Default Configuration

No host is defined.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines a static host name-to-address mapping in the host cache.

```
console(config)#ip host accounting.dell.com
176.10.23.1
```

ip name-server

Use the **ip name-server** command in Global Configuration mode to define available IPv4 or IPv6 name servers. To delete a name server, use the **no** form of this command.

Syntax

ip name-server *server-address1* [*server-address2 … server-address8*]

no ip name-server [*server-address1 … server-address8*]

- *server-address*—Valid IPv4 or IPv6 addresses of the name server. (Range: 1–255 characters)

Default Configuration

No name server IP addresses are specified.

Command Mode

Global Configuration mode

User Guidelines

Server preference is determined by entry order.

Up to eight servers can be defined in one command or by using multiple commands. Use the show hosts command on page 499 to display the configured name servers.

Example

The following example sets the available name server.

```
console(config)#ip name-server 176.16.1.18
```

ipv6 address (Interface Config)

Use the **ipv6 address** command to set the IPv6 address of the management interface. Use the **no** form of this command to reset the IPv6 address to the default.

Syntax

ipv6 address { *prefix/prefix-length* [**eui64**] | **autoconfig** | **dhcp** }

no ipv6 address

- *prefix*—Consists of the bits of the address to be configured.
- *prefix-length*—Designates how many of the high-order contiguous bits of the address make up the prefix.
- **eui64**—The optional eui-64 field designates that IPv6 processing on the interfaces is enabled using an EUI-64 interface ID in the low order 64 bits of the address. If this option is used, the value of prefix_length must be 64 bits.
- **autoconfig**—Use this keyword to set the IPv6 address auto configuration mode.
- **dhcp**—Use this keyword to obtain an IPv6 address via DHCP.

Default Configuration

There is no IPv6 address configured by default.

Command Mode

Interface Configuration mode (VLAN, loopback, port-channel)

User Guidelines

When setting the prefix length on an IPv6 address, no space can be present between the address and the mask.

Example

Configure ipv6 routing on vlan 10 and obtain an address via DHCP. Assumes vlan 10 already exists.

```
console(config)#ip routing
console(config)#interface vlan 10
console(config-if-vlan10)#ipv6 enable
console(config-if-vlan10)#ipv6 address dhcp

Configure a default gateway on vlan 10

console(config)#no ipv6 address autoconfig

console(config)#no ipv6 address 2003::6/64

console(config)#no ipv6 address 2001::/64 eui64

console(config)#no ipv6 address
```

ipv6 address (OOB Port)

Use the **ipv6 address** command in Interface (out-of-band) Config mode to set the IPv6 prefix on the out-of-band port. If the prefix is specified, the address will be configured using the prefix and length A link local address in EUI-64 format may also be assigned.

The autoconfig parameter specifies that a link local address in the EUI-64 format is assigned to the interface.

The DHCP parameter indicates that the port should obtain its address va DHCP.

Use the **no** form of the command to remove a specific address or to return the address assignment to its default value. Using the **no** form of the command with no parameters removes all IPv6 prefixes from the interface.

Syntax

ipv6 address { *prefix/prefix-length* [**eui64**] | **autoconfig** | **dhcp** }

no ipv6 address { *prefix/prefix-length* [**eui64**] | **autoconfig** | **dhcp** }

Parameter Description

Parameter	Description
prefix	An IPv6 prefix in global format address format.
eui64	Formulate the prefix in EUI-64 format.
autoconfig	Perform IPv6 auto-configuration.
dhcp	Obtain the prefix via DHCP.

Default Configuration

No address is assigned to the out-of-band interface by default.

Command Mode

Interface (out-of-band) Configuration mode

User Guidelines

When DHCPv6 is enabled on the Out-of-Band interface, the system automatically deletes all manually configured IPv6 addresses on the interface.

DHCPv6 can be enabled on the Out-of-Band interface only when IPv6 auto configuration or DHCPv6 is not enabled on any of the in-band management interfaces.

IPv6 auto configuration mode can be enabled in the Out-of-Band interface only when IPv6 auto configuration or DHCPv6 is not enabled on any of the in-band management interfaces.

ipv6 address dhcp

Use the **ipv6 address dhcp** command in Interface (VLAN) Configuration mode to enable the DHCPv6 client on an IPv6 interface.

Syntax

ipv6 address dhcp

no ipv6 address dhcp

Parameter Description

This command does not require a parameter description.

Default Configuration

DHCPv6 is disabled by default on routing interfaces.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only applies to VLAN routing interfaces. When DHCPv6 is enabled on a VLAN routing interface, the system automatically deletes all manually configured IPv6 addresses on the interface.

Use the **no ipv6 address dhcp** command to release a leased address and to disable DHCPv6 on an interface. The command **no ipv6 address** does not disable the DHCPv6 client on the interface.

This command will fail if DHCPv6 server has been configured on the interface.

Examples

In the following example, DHCPv6 is enabled on interface vlan2.

```
console#config
console(config)#interface vlan2
console(config-if-vlan2)#ipv6 address dhcp
```

ipv6 enable (Interface Config)

Use the **ipv6 enable** command to enable IPv6 on a routing interface. Use the "no" form of this command to reset the IPv6 configuration to the defaults.

Syntax

ipv6 enable

no ipv6 enable

Default Configuration

IPv6 is not enabled by default.

Command Mode

Interface Configuration mode (VLAN, loopback)

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#no ipv6 enable
```

ipv6 enable (OOB Config)

Use the **ipv6 enable** command in Interface (out-of-band) Config mode to enable IPv6 operation on the out-of-band interface. Prefixes configured by the ipv6 adddress command are not configured until the interface is enabled.

Syntax

ipv6 enable

no ipv6 enable

Default Configuration

By default, IPv6 is not enabled on the out-of-band port.

Command Mode

Interface (out-of-band) Configuration mode

User Guidelines

There are no user guidelines for this command.

ipv6 gateway (OOB Config)

Use the **ipv6 gateway** command in Interface (out-of-band) Config mode to configure the address of the IPv6 gateway. The gateway is used as a default route for packets addressed to network devices not present on the local subnet. Use the **no** form of the command to remove the gateway configuration.

Syntax

ipv6 gateway ipv6-address

no ipv6 gateway

Parameter Description

Parameter	Description
ipv6-address	An IPv6 address (not a prefix).

Default Configuration

By default, no IPv6 gateway is configured.

Command Mode

Interface (out-of-band) Configuration mode

User Guidelines

There are no user guidelines for this command.

show hosts

Use the **show hosts** command in User EXEC mode to display the default domain name, a list of name server hosts, and the static and cached list of host names and addresses. The command itself shows hosts [hostname].

- Host name. (Range: 1–255 characters). The command allows spaces in the host name when specified in double quotes. For example, console(config)#snmp-server host "host name"

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays information about IP hosts.

```
console>show hosts
Host name:
Default domain: gm.com, sales.gm.com, usa.sales.gm.com
Name/address lookup is enabled
Name servers (Preference order): 176.16.1.18 176.16.1.19
Configured host name-to-address mapping:
Host                          Addresses
--------------------------    ----------------------------
accounting.gm.com             176.16.8.8
Cache:             TTL (Hours)
Host               Total       Elapsed      Type         Addresses
----------------   -----       -------      -------      -------------
www.stanford.edu   72          3            IP           171.64.14.203
```

show ip address-conflict

Use the **show ip address-conflict** command in User EXEC or Privileged EXEC mode to display the status information corresponding to the last detected address conflict.

Syntax

show ip address-conflict

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

The command provides the following information.

Term	Description
Address Conflict Detection Status	Whether the switch has detected an address conflict on any IP address. Set to **Conflict Detected** if detected, **No Conflict Detected** otherwise.
Last Conflicting IP Address	The IP address that was last detected as conflicting on any interface.
Last Conflicting MAC Address	The MAC Address of the conflicting host that was last detected on any interface.
Time Since Conflict Detected	The time in days, hours, minutes, and seconds since the last address conflict was detected.

Example

```
console#show ip address-conflict
```

```
Address Conflict Detection Status...Conflict Detected
Last Conflicting IP Address.........10.131.12.56
Last Conflicting MAC Address........00:01:02:04:5A:BC
Time Since Conflict Detected........5 days 2 hrs 6 mins 46 secs

console#show ip address-conflict

Address Conflict Detection Status..No Conflict Detected
```

show ip helper-address

Use the **show ip helper-address** command in Privileged EXEC mode to display IP helper addresses configuration.

Syntax

show ip helper-address [*intf-address*]

- *intf-address* — IP address of a routing interface. (Range: Any valid IP address)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip helper-address

IP helper is enabled

Interface               UDP Port    Discard  Hit Count     Server
Address
```

```
------------------- ---------- --------- --------- -----------
------
vlan 25                    domain         No          0 192.168.40.2
vlan 25                      dhcp         No          0 192.168.40.2
vlan 30                      dhcp        Yes          0
vlan 30                       162         No          0 192.168.23.1
Any                          dhcp         No          0 192.168.40.1
```

show ipv6 dhcp interface out-of-band statistics

Use the **show ipv6 dhcp interface out-of-band statistics** command in Privileged EXEC mode to display IPv6 DHCP statistics for the out-of-band interface.

Syntax

show ipv6 dhcp interface out-of-band statistics

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show ipv6 dhcp interface out-of-band
statistics


DHCPv6 Client Statistics

-------------------------

DHCPv6 Advertisement Packets Received..... 0

DHCPv6 Reply Packets Received.............. 0
```

```
Received DHCPv6 Advertisement Packets Discard.. 0
Received DHCPv6 Reply Packets Discarded........ 0
DHCPv6 Malformed Packets Received.............. 0
Total DHCPv6 Packets Received.................. 0
DHCPv6 Solicit Packets Transmitted............. 8
DHCPv6 Request Packets Transmitted............. 0
DHCPv6 Renew Packets Transmitted............... 0
DHCPv6 Rebind Packets Transmitted.............. 0
DHCPv6 Release Packets Transmitted............. 0
Total DHCPv6 Packets Transmitted............... 8
```

show ipv6 interface out-of-band

Use the **show ipv6 interface out-of-band** command in Privileged EXEC mode to show the ipv6 out-of-band port configuration.

Syntax

show ipv6 interface out-of-band

Parameter Description

Parameter	Description
ipv6-address	An IPv6 address (not a prefix).

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console(config-if)#do show ipv6 interface out-of-band

IPv6 Administrative Mode..... Enabled
IPv6 Prefix is..... FE80::21E:C9FF:FEAA:AD79/64
                                    ::/128
IPv6 Default Router..... FE80::A912:FEC2:A145:FEAD
Configured IPv6 Protocol..... None
IPv6 AutoConfig Mode..... Enabled
Burned In MAC Address..... 001E.C9AA.AD79
```

20

IPv6 Access List Commands

Access to a switch or router can be made more secure through the use of Access Control Lists (ACLs) to control the type of traffic allowed into or out of specific ports. An ACL consists of a series of rules, each of which describes the type of traffic to be processed and the actions to take for packets that meet the classification criteria. Rules within an ACL are evaluated sequentially until a match is found, if any. Every ACL is terminated by an implicit deny all rule, which covers any packet not matching a preceding explicit rule. ACLs can help to ensure that only authorized users have access to specific resources while blocking out any unwarranted attempts to reach network resources.

ACLs may be used to restrict contents of routing updates, decide which types of traffic are forwarded or blocked and, above all, provide security for the network. ACLs are normally used in firewall routers that are positioned between the internal network and an external network, such as the Internet. They can also be used on a router positioned between two parts of the network to control the traffic entering or exiting a specific part of the internal network.

The PowerConnect ACL feature allows classification of packets based upon Layer 2 through Layer 4 header information. An Ethernet IPv6 packet is distinguished from an IPv4 packet by its unique Ethertype value; thus all IPv6 classifiers include the Ethertype field.

Multiple ACLs per interface are supported. The ACLs can be combination of Layer 2 and/or Layer 3/4 ACLs. ACL assignment is appropriate for both physical ports and LAGs. ACLs can also be time based.

Commands in this Chapter

This chapter explains the following commands:

{deny | permit} (IPv6 ACL)	ipv6 traffic-filter
ipv6 access-list	show ipv6 access-lists
ipv6 access-list rename	

{deny | permit} (IPv6 ACL)

This command creates a new rule for the current IPv6 access list. Each rule is appended to the list of configured rules for the list.

A rule may either deny or permit traffic according to the specified classification fields. At a minimum, either the **every** keyword or the protocol, source address, and destination address values must be specified. The source and destination IPv6 address fields may be specified using the keyword **any** to indicate a match on any value in that field. The remaining command parameters are all optional, but the most frequently used parameters appear in the same relative order as shown in the command format.

The assign-queue parameter allows specification of a particular hardware queue for handling traffic that matches this rule. The assign-queue parameter is valid only for a permit rule.

The command is enhanced to accept the optional **time-range** parameter. The **time-range** parameter allows imposing a time limitation on the IPv6 ACL rule as defined by the parameter *time-range-name*. If a time range with the specified name does not exist, and the IPv6 ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied immediately. If a time range with the specified name exists, and the IPv6 ACL containing this ACL rule is applied to an interface or bound to a VLAN, then the ACL rule is applied when the time-range with a specified name becomes active. The ACL rule is removed when the time-range with a specified name becomes inactive.

Syntax

{**deny** | **permit**} {**every** | {{**icmpv6** | **ipv6** | **tcp** | **udp** | *protocolnumber*} {**any** | *sourceipv6prefix*/prefixlength} [**eq** {*portnumber* | *portkey*}] {**any** | *destinationipv6prefix/prefixlength*}] [**eq** {*portnumber* | *portkey*}] [**flow-label** *flow-label-value*] [**dscp** *dscp-value*]} [**assign-queue** *queue-id*] [**log**] [{**mirror** | **redirect**} *interface-id*] [**time-range** *time-range-name*]

Parameter Description

Parameter	Description
deny | permit	Specifies whether the IP ACL rule permits or denies an action.

Parameter	Description
every	Allows all protocols.
icmpv6 | ipv6 | tcp | udp | protocolnumber	Protocol to match, specified as keywords icmp, igmp, ipv6, tcp, udp or as a standard protocol number from 1–255.
any | sourceipv6 prefix/ prefixlength	any matches any source IP address. Or, you can specify a source IPv6 addressed expressed as a prefix/prefixlength.
eq {portnumber | portkey}	eq matches a port number being used as a match criteria. The first reference provides the source match criteria and the second provides destination match criteria. The portnumber variable must be in the range 0–65535. Or you can specify one of the values as the portkey: domain, echo, efts, ftpdata, http, smtp, snmp, telnet, tftp, and www.
any | destinationipv6 prefix/ prefixlength	any matches any source IP address. Or, you can specify a source IPv6 addressed expressed as a prefix/prefixlength.
flow label flow-label-value	The value to match in the Flow Label field of the IPv6 header (Range 0–1048575).
dscp dscp-value	Specifies the TOS for an IPv6 ACL rule depending on a match of DSCP values using the parameter dscp.
assign-queue queue-id	Specifies particular hardware queue for handling traffic that matches the rule. (Range: 0-6)
log	Specifies that this rule is to be logged.
mirror interface	Allows the traffic matching this rule to be copied to the specified interface.
redirect interface	This parameter allows the traffic matching this rule to be forwarded to the specified interface.
time-range-name	Use the time-range parameter to impose a time limitation on the IPv6 ACL rule as defined by the parameter time-range-name.

Default Configuration

This command has no default configuration.

Command Mode

IPv6-Access-List Configuration mode

User Guidelines

Users are permitted to add rules, but if a packet does not match any user-specified rules, the packet is dropped by the implicit “deny all” rule.

The 'no' form of this command is not supported, since the rules within an IPv6 ACL cannot be deleted individually. Rather, the entire IPv6 ACL must be deleted and re specified.

Example

The following example creates rules in an IPv6 ACL named "STOP_HTTP" to discard any HTTP traffic from the 2001:DB8::/32 network, but allow all other traffic from that network:

```
console(config)#ipv6 access-list STOP_HTTP

console(Config-ipv6-acl)#deny ipv6 2001:DB8::/32 any
eq http

console(Config-ipv6-acl)#permit ipv6 2001:DB8::/32
any

console(Config-ipv6-acl)#
```

ipv6 access-list

The **ipv6 access-list** command creates an IPv6 Access Control List (ACL) consisting of classification fields defined for the IP header of an IPv6 frame. The *name* parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the IPv6 access list.

If an IPv6 ACL with this name already exists, this command enters Ipv6-Access-List config mode to update the existing IPv6 ACL.

Use the **no** form of the command to delete an IPv6 ACL from the system.

Syntax

ipv6 access-list *name*

no ipv6 access-list *name*

- *name* — Alphanumeric string of 1 to 31 characters uniquely identifying the IPv6 access list.

Default Configuration

There is no default configuration for this command.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command

Example

The following example creates an IPv6 ACL named "DELL_IP6" and enters the IPv6-Access-List Config mode:

```
console(config)#ipv6 access-list DELL_IP6
console(Config-ipv6-acl)#
```

ipv6 access-list rename

The **ipv6 access-list rename** command changes the name of an IPv6 Access Control List (ACL). This command fails if an IPv6 ACL with the new name already exists.

Syntax

ipv6 access-list rename *name newname*

- *name* — the name of an existing IPv6 ACL.
- *newname* — alphanumeric string from 1 to 31 characters uniquely identifying the IPv6 access list.

Default Configuration

There is no default configuration for this command.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(Config)#ipv6 access-list rename DELL_IP6
DELL_IP6_NEW_NAME
```

ipv6 traffic-filter

The **ipv6 traffic-filter** command either attaches a specific IPv6 Access Control List (ACL) to an interface or associates it with a VLAN ID in a given direction.

An optional sequence number may be specified to indicate the order of this access list relative to other IPv6 access lists already assigned to this interface and direction. A lower number indicates higher precedence order. If a sequence number is already in use for this interface and direction, the specified IPv6 access list replaces the currently attached IPv6 access list using that sequence number. If the sequence number is not specified for this command, a sequence number that is one greater than the highest sequence number currently in use for this interface and direction is used.

Use the "no" form of the command to remove an IPv6 ACL from the interface(s) in a given direction.

Syntax

ipv6 traffic-filter *name direction* [**sequence** *seq-num*]

no ipv6 traffic-filter *name direction*

- **name** — Alphanumeric string of 1 to 31 characters uniquely identifying the IPv6 access list.
- *direction* — Direction of the ACL. (Range: **in** or **out**)

- **sequence** *seq-num* — Order of access list relative to other access lists already assigned to this interface and direction. (Range: 1–4294967295)

Default Configuration

This command has no default configuration.

Command Modes

Global Configuration mode

Interface Configuration (Ethernet, Port-channel, VLAN) mode

User Guidelines

This command specified in 'Interface Config' mode only affects a single interface, whereas the 'Global Config' mode setting is applied to all interfaces.

Example

The following example attaches an IPv6 access control list to an interface.

```
console(config-if-1/0/1)#ipv6 traffic-filter DELL_IP6
in
```

show ipv6 access-lists

Use the **show ipv6 access-lists** command in User EXEC and Privileged EXEC mode to display an IPv6 access list and all of the rules that are defined for the IPv6 ACL. Use the [*name*] parameter to identify a specific IPv6 ACL to display.

Syntax

show ipv6 access-lists [*name*]

Parameter Description

Parameter	Description
name	The name used to identify the IPv6 ACL.
Time Range Name	Displays the name of the time-range if the IPv6 ACL rule has referenced a time range.

Parameter	Description
Rule Status	Status (Active/Inactive) of the IPv6 ACL rule.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

The following example displays configuration information for the IPv6 ACLs.

```
console#show ipv6 access-lists

Current number of all ACLs: 1  Maximum number of all ACLs: 100

    IPv6 ACL Name               Rules Direction      Interface(s)
VLAN(s)
------------------------------- ----- --------- -------------------- -------
------
STOP_HTTP                       2     inbound   1/0/1

console#show ipv6 access-lists STOP_HTTP

ACL Name: STOP_HTTP

Inbound Interface(s): 1/0/1

Rule Number: 1
Action..................................... deny
Protocol................................... 255(ipv6)
Source IP Address.......................... 2001:DB8::/32
Destination L4 Port Keyword................ 80(www/http)

Rule Number: 2
```

```
Action..................................... permit
Protocol................................... 255(ipv6)
Source IP Address.......................... 2001:DB8::/32
```

The command output provides the following information:

Field	Description
Rule Number	The ordered rule number identifier defined within the IPv6 ACL.
Action	Displays the action associated with each rule. The possible values are Permit or Deny.
Match All	Indicates whether this access list applies to every packet. Possible values are True or False.
Protocol	This displays the protocol to filter for this rule.
Source IP Address	This displays the source IP address for this rule.
Source L4 Port Keyword	This field displays the source port for this rule.
Destination IP Address	This displays the destination IP address for this rule.
Destination L4 Port Keyword	This field displays the destination port for this rule.
IP DSCP	This field indicates the value specified for IP DSCP.
Flow Label	This field indicates the value specified for IPv6 Flow Label.
Log	Displays when you enable logging for the rule.
Assign Queue	Displays the queue identifier to which packets matching this rule are assigned.
Mirror Interface	Displays the interface to which packets matching this rule are copied.
Redirect Interface	Displays the interface to which packets matching this rule are forwarded.

21

IPv6 MLD Snooping Commands

In IPv6, Multicast Listener Discover (MLD) snooping performs functions similar to IGMP snooping in IPv4. With MLD snooping, IPv6 multicast data is selectively forwarded to a list of ports that want to receive the data, instead of being flooded to all ports in a VLAN. This list is constructed by snooping IPv6 multicast control packets.

MLD is a protocol used by IPv6 multicast routers to discover the presence of multicast listeners (nodes wishing to receive IPv6 multicast packets) on its directly-attached links and to discover which multicast packets are of interest to neighboring nodes. MLD is derived from IGMP. MLD version 1 (MLDv1) is equivalent to IGMPv2. MLD version 2 (MLDv2) is equivalent to IGMPv3. MLD is a subprotocol of Internet Control Message Protocol version 6 (ICMPv6), and MLD messages are a subset of ICMPv6 messages, identified in IPv6 packets by a preceding Next Header value of 58.

PowerConnect switches can snoop on both MLDv1 and MLDv2 protocol packets and bridge IPv6 multicast data based on destination IPv6 Multicast MAC Addresses. The switch can be configured to perform MLD Snooping and IGMP Snooping simultaneously. The PowerConnect implementation is compliant to RFC 4541.

Commands in this Chapter

This chapter explains the following commands:

ipv6 mld snooping immediate-leave	ipv6 mld snooping (Interface)
ipv6 mld snooping groupmembership-interval	ipv6 mld snooping (VLAN)
ipv6 mld snooping maxresponse	show ipv6 mld snooping
ipv6 mld snooping mcrtexpiretime	show ipv6 mld snooping groups
ipv6 mld snooping (Global)	

ipv6 mld snooping immediate-leave

The **ipv6 mld snooping immediate-leave** command enables or disables MLD Snooping snooping immediate-leave admin mode on a selected interface or VLAN. Enabling fast-leave allows the switch to immediately remove the layer 2 LAN interface from its forwarding table entry upon receiving an MLD done message for that multicast group without first sending out MAC-based general queries to the interface. You should enable fast-leave admin mode only on VLANs where only one host is connected to each layer 2 LAN port. This prevents the inadvertent dropping of the other hosts that were connected to the same layer 2 LAN port but were still interested in receiving multicast traffic directed to that group. Also, fast-leave processing is supported only with MLD version 1 hosts.

Syntax

ipv6 mld snooping immediate-leave [**vlan-id**]

no ipv6 mld snooping immediate-leave [**vlan-id**]

- **vlan_id** — Specifies a VLAN ID value in VLAN Database mode.

Default Configuration

MLD Snooping fast-leave mode is disabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode.

VLAN Database Mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-vlan)#ipv6 mld snooping immediate-
leave 4
```

ipv6 mld snooping groupmembership-interval

The **ipv6 mld snooping groupmembership-interval** command sets the MLD Group Membership Interval time on a VLAN or interface. The Group Membership Interval time is the amount of time in seconds that a switch waits for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the MLDv2 Maximum Response time value. The range is 2 to 3600 seconds.

Syntax

ipv6 mld snooping groupmembership-interval [**vlan-id**] [**seconds**]

no ipv6 mld snooping groupmembership-interval [**vlan-id**]

- **vlan_id** — Specifies a VLAN ID value in VLAN Database mode.
- **seconds** — MLD group membership interval time in seconds. (Range: 2-3600)

Default Configuration

The default group membership interval time is 260 seconds.

Command Mode

Interface Configuration mode.

VLAN Database mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-4/0/1)#ipv6 mld snooping
groupmembership-interval 300
```

ipv6 mld snooping maxresponse

The **ipv6 mld snooping maxresponse** command sets the MLD Maximum Response time for an interface or VLAN. The Maximum Response time is the amount of time in seconds that a switch will wait after sending a query on an

interface because it did not receive a report for a particular group in that interface. This value must be less than the MLD Query Interval time value. The range is 1 to 3599 seconds.

Syntax

ipv6 mld snooping maxresponse [**vlan-id**] [**seconds**]

no ipv6 mld snooping maxresponse [**vlan-id**]

- **vlan_id** — Specifies a VLAN ID value in VLAN Database mode.
- **seconds** — MLD maximum response time in seconds. (Range: 1–3599)

Default Configuration

The default maximum response time is 10 seconds.

Command Mode

Interface Configuration mode.

VLAN Database mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-4/0/1)#ipv6 mld snooping
maxresponse 33
```

ipv6 mld snooping mcrtexpiretime

The **ipv6 mld snooping mcrtexpiretime** command sets the Multicast Router Present Expiration time. The time is set for a particular interface or VLAN. This is the amount of time in seconds that a switch waits for a query to be received on an interface before the interface is removed from the list of interfaces with multicast routers attached. The range is 1 to 3600 seconds.

Syntax

ipv6 mld snooping mcrtexpiretime [*vlan-id*] [*seconds*]

no ipv6 mld snooping mcrtexpiretime [*vlan-id*]

- *vlan_id* — Specifies a VLAN ID value in VLAN Database mode.
- *seconds* — multicast router present expiration time in seconds. (Range: 1–3600)

Default Configuration

The default multicast router present expiration time is 300 seconds.

Command Mode

Interface Configuration mode.

VLAN Database mode.

User Guidelines

This command has no user guidelines

Example

```
console(config-if-4/0/1)#ipv6 mld snooping
mcrtrexpiretime 60
```

ipv6 mld snooping (Global)

The **ipv6 mld snooping (Global)** command enables MLD Snooping on the system (Global Config Mode).

Syntax

ipv6 mld snooping

no ipv6 mld snooping

Default Configuration

MLD Snooping is disabled.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 mld snooping
```

ipv6 mld snooping (Interface)

The **ipv6 mld snooping (Interface)** command enables MLD Snooping on an interface. If an interface has MLD Snooping enabled and it becomes a member of a port-channel (LAG), MLD Snooping functionality is disabled on that interface. MLD Snooping functionality is re-enabled if the interface is removed from a port-channel (LAG).

Syntax

ipv6 mld snooping

no ipv6 mld snooping

Default Configuration

MLD Snooping is disabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-4/0/1)#ipv6 mld snooping
```

ipv6 mld snooping (VLAN)

The **ipv6 mld snooping (VLAN)** command enables MLD Snooping on a particular VLAN and enables MLD snooping on all interfaces participating in a VLAN.

Syntax

ipv6 mld snooping *vlan-id*

no ipv6 mld snooping *vlan-id*

- *vlan-id* — Specifies a VLAN ID value.

Default Configuration

MLD Snooping is disabled.

Command Mode

VLAN Database mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-vlan)#ipv6 mld snooping 1
```

show ipv6 mld snooping

The **show ipv6 mld snooping** command displays MLD Snooping information. Configured information is displayed whether or not MLD Snooping is enabled.

Syntax

show ipv6 mld snooping [**interface** {{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}} | **vlan** *vlan-id*}]

Default Configuration

This command has no default configuration

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

With no optional arguments, the command displays the following information:

- Admin Mode — Indicates whether or not MLD Snooping is active on the switch.
- Interfaces Enabled for MLD Snooping — Interfaces on which MLD Snooping is enabled.
- MLD Control Frame Count — This displays the number of MLD control frames that are processed by the CPU.

- VLANs Enabled for MLD Snooping — VLANs on which MLD Snooping is enabled.

When you specify an interface or VLAN, the following information displays:

- MLD Snooping Admin Mode — Indicates whether MLD Snooping is active on the interface or VLAN.
- Fast Leave Mode — Indicates whether MLD Snooping Fast-leave is active on the VLAN.
- Group Membership Interval — Shows the amount of time in seconds that a switch will wait for a report from a particular group on a particular interface, which is participating in the VLAN, before deleting the interface from the entry. This value may be configured.
- Max Response Time — Displays the amount of time the switch waits after it sends a query on an interface, participating in the VLAN, because it did not receive a report for a particular group on that interface. This value may be configured.
- Multicast Router Present Expiration Time — Displays the amount of time to wait before removing an interface that is participating in the VLAN from the list of interfaces with multicast routers attached. The interface is removed if a query is not received. This value may be configured.

show ipv6 mld snooping groups

The **show ipv6 mld snooping groups** command displays the MLD Snooping entries in the MFDB table.

Syntax

show ipv6 mld snooping groups [{**vlan** *vlan-id* | **address** *ipv6-multicast-address*}]

- *vlan_id* — Specifies a VLAN ID value.
- *ipv6-multicast-address* — Specifies an IPv6 Multicast address.

Default configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

```
console#show ipv6 mld snooping groups

Vlan        Ipv6 Address          Type                    Ports
----  ----------------------  -------  --------------------------
1     3333.0000.0003          Dynamic  1/0/1,1/0/3
2     3333.0000.0004          Dynamic  1/0/1,1/0/3
2     3333.0000.0005          Dynamic  1/0/1,1/0/3

MLD Reporters that are forbidden statically:

-------------------------------------------

Vlan        Ipv6 Address                     Ports
----  ----------------------  ----------------------------------

console#show ipv6 mld snooping groups vlan 2

Vlan        Ipv6 Address          Type                    Ports
----  ----------------------  -------  --------------------------
2     3333.0000.0004          Dynamic  1/0/1,1/0/3
2     3333.0000.0005          Dynamic  1/0/1,1/0/3
```

```
MLD Reporters that are forbidden statically:

-------------------------------------------

Vlan        Ipv6 Address                    Ports
----  ----------------------  ------------------------------------
```

22

IPv6 MLD Snooping Querier Commands

IGMP/MLD Snooping Querier is an extension of the IGMP/MLD Snooping feature. IGMP/MLD Snooping Querier allows the switch to simulate an IGMP/MLD router in a Layer 2-only network, thus removing the need to have an IGMP/MLD Router to collect the multicast group membership information. The querier function simulates a small subset of the IGMP/MLD router functionality.

In a network with IP multicast routing, the IP multicast router acts as the IGMP/MLD querier. However, if it is required that the IP-multicast traffic in a VLAN be switched, the switch can be configured as an IGMP/MLD querier. When IGMP/MLD Snooping Querier is enabled, the Querier sends out periodic IGMP/MLD General Queries that trigger the Multicast listeners/member to send their joins so as to receive the Multicast data traffic. IGMP/MLD Snooping listens to these reports to establish the appropriate forwarding table entries.

PowerConnect switches support IGMP V1 and 2 for snooping IGMP queries.

Commands in this Chapter

This chapter explains the following commands:

ipv6 mld snooping querier	ipv6 mld snooping querier query-interval
ipv6 mld snooping querier (VLAN mode)	ipv6 mld snooping querier timer expiry
ipv6 mld snooping querier address	show ipv6 mld snooping querier
ipv6 mld snooping querier election participate	

ipv6 mld snooping querier

Use the **ipv6 mld snooping querier** command to enable MLD Snooping Querier on the system. Use the "no" form of this command to disable MLD Snooping Querier.

Syntax

ipv6 mld snooping querier

no ipv6 mld snooping querier

Default Configuration

MLD Snooping Querier is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 mld snooping querier
```

ipv6 mld snooping querier (VLAN mode)

Use the **ipv6 mld snooping querier** command in VLAN mode to enable MLD Snooping Querier on a VLAN. Use the "no" form of this command to disable MLD Snooping Querier on a VLAN.

Syntax

ipv6 mld snooping querier *vlan-id*

no ipv6 mld snooping querier *vlan-id*

- *vlan-id* — A valid VLAN ID. (Range: 1–4093)

Default Configuration

MLD Snooping Querier is disabled by default on all VLANs.

Command Mode

VLAN Database mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-vlan)#ipv6 mld snooping querier 10
```

ipv6 mld snooping querier address

Use the **ipv6 mld snooping querier address** command to set the global MLD Snooping Querier address. Use the "no" form of this command to reset the global MLD Snooping Querier address to the default.

Syntax

ipv6 mld snooping querier address *prefix*[*/prefix-length*]

no ipv6 mld snooping querier address

- *prefix* — The bits of the address to be configured.
- *prefix-length* — Designates how many of the high-order contiguous bits of the address make up the prefix.

Default Configuration

There is no global MLD Snooping Querier address configured by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 mld snooping querier address
Fe80::5
```

ipv6 mld snooping querier election participate

Use the **ipv6 mld snooping querier election participate** command to enable the Snooping Querier to participate in the Querier Election process when it discovers the presence of another Querier in the VLAN. When this mode is enabled, if the Snooping Querier finds that the other Querier's source address is higher than the Snooping Querier's address, it stops sending periodic queries. If the Snooping Querier wins the election then it will continue sending periodic queries. Use the "no" form of this command to disable election participation on a VLAN.

Syntax

ipv6 mld snooping querier election participate *vlan-id*

no ipv6 mld snooping querier election participate *vlan-id*

- *vlan-id* — A valid VLAN ID. (Range: 1 - 4093)

Default Configuration

Election participation is disabled by default.

Command Mode

VLAN Database mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-vlan)#ipv6 mld snooping querier
election participate 10
```

ipv6 mld snooping querier query-interval

Use the **ipv6 mld snooping querier query-interval** command to set the MLD Querier Query Interval time. It is the amount of time in seconds that the switch waits before sending another general query. Use the "no" form of this command to reset the Query Interval to the default.

Syntax

ipv6 mld snooping querier query-interval *interval*

ipv6 mld snooping querier query-interval

- *interval* — Amount of time that the switch waits before sending another general query. (Range: 1–1800 seconds)

Default Configuration

The default query interval is 60 seconds.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command

Example

```
console(config)#ipv6 mld snooping querier 120
```

ipv6 mld snooping querier timer expiry

Use the **ipv6 mld snooping querier timer expiry** command to set the MLD Querier timer expiration period. It is the time period that the switch remains in Non-Querier mode once it has discovered that there is a Multicast Querier in the network. Use the "no" form of this command to reset the timer expiration period to the default.

Syntax

ipv6 mld snooping querier timer expiry *timer*

ipv6 mld snooping querier timer expiry

- *timer* — The time that the switch remains in Non-Querier mode after it has discovered that there is a multicast querier in the network. (Range: 60–300 seconds)

Default Configuration

The default timer expiration period is 60 seconds.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 mld snooping querier timer
expiry 222
```

show ipv6 mld snooping querier

Use the **show ipv6 mld snooping querier** command to display MLD Snooping Querier information. Configured information is displayed whether or not MLD Snooping Querier is enabled.

Syntax

show ipv6 mld snooping querier [**detail** | **vlan** *vlan-id*]

- *vlan-id* — A valid VLAN ID. (Range: 1 - 4093)

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

When the optional argument vlan vlan-id is not used, the command shows the following information:

Parameter	Description

MLD Snooping Querier Mode	Indicates whether or not MLD Snooping Querier is active on the switch.
Querier Address	Shows the IP Address which will be used in the IPv6 header while sending out MLD queries.
MLD Version	Indicates the version of MLD that will be used while sending out the queries. This is defaulted to MLD v1 and it can not be changed.
Querier Query Interval	Shows the amount of time that a Snooping Querier waits before sending out a periodic general query.
Querier Expiry Interval	Displays the amount of time to wait in the Non-Querier operational state before moving to a Querier state.

When the optional argument vlan vlan-id is used, the following additional information appears:

Parameter	Description
MLD Snooping Querier VLAN Mode	Indicates whether MLD Snooping Querier is active on the VLAN.
Querier Election Participate Mode	Indicates whether the MLD Snooping Querier participates in querier election if it discovers the presence of a querier in the VLAN.
Querier VLAN Address	Shows the IP Address which will be used in the IPv6 header while sending out MLD queries.
Operational State	Indicates whether MLD Snooping Querier is in "Querier" or "Non-Querier" state. When the switch is in Querier state it will send out periodic general queries. When in Non-Querier state it will wait for moving to Querier state and does not send out any queries.
Operational Version	Indicates the version of MLD that will be used while sending out the queries. This is defaulted to MLD v1 and it can not be changed.

When the optional argument detail is used, the command shows the global information and the information for all Querier enabled VLANs as well as the following information:

Last Querier Address	Indicates the IP address of the most recent Querier from which a Query was received.
MLD Version	Indicates the version of MLD.

23

IP Source Guard Commands

IP Source Guard (IPSG) is a security feature that filters IP packets based on source ID. The source ID may either be source IP address or a {source IP address, source MAC address} pair. The network administrator configures whether enforcement includes the source MAC address. The network administrator can configure static authorized source IDs. The DHCP Snooping binding database and static IPSG entries identify authorized source IDs. IPSG may be enabled on physical and LAG ports. IPSG is disabled by default.

If the network administrator enables IPSG on a port where DHCP snooping is disabled or where DHCP snooping is enabled but the port is trusted, all IP traffic received on that port is dropped depending upon the admin-configured IPSG entries. IPSG cannot be enabled on a port-based routing interface.

IPSG uses two enforcement mechanisms: the L2FDB to enforce the source MAC address and ingress VLAN and an ingress classifier to enforce the source IP address or {source IP, source MAC} pair.

Commands in this Chapter

This chapter explains the following commands:

ip verify source	show ip verify interface
ip verify source port-security	show ip verify source interface
ip verify binding	show ip source binding

ip verify source

Use the **ip verify source** command in Interface Configuration mode to enable filtering of IP packets matching the source IP address.

Syntax

ip verify source

Default Configuration

By default, IPSG is disabled on all interfaces.

Command Mode

Interface Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-Gi1/0/1)#ip verify source
```

ip verify source port-security

Use the **ip verify source port-security** command in Interface Configuration mode to enable filtering of IP packets matching the source IP address and the source MAC address.

Syntax

ip verify source port-security

Default Configuration

By default, IPSG is disabled on all interfaces.

Command Mode

Interface Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-1/0/1)#ip verify source port-
security
```

ip verify binding

Use the **ip verify binding** command in Global Configuration mode to configure static bindings. Use the no form of the command to remove the IPSG entry.

Syntax

ip verify binding *macaddr* **vlan** *ipaddr* **interface**

Default Configuration

By default, there will not be any static bindings configured.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config)#ip verify binding 00:11:22:33:44:55
vlan 1  1.2.3.4 interface gigabitethernet 1/0/2
```

show ip verify interface

Use the **show ip verify interface** command in Privileged EXEC mode to display the IPSG interface configuration.

Syntax

show ip verify interface

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip verify interface gigabitethernet 1/0/1
```

show ip verify source interface

Use the **show ip verify source interface** command in Privileged EXEC mode to display the bindings configured on a particular interface.

Syntax

show ip verify source interface

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip verify source interface gigabitethernet 1/0/1
```

show ip source binding

Use the **show ip source binding** command in Privileged EXEC mode to display all bindings (static and dynamic).

Syntax

show ip source binding

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip source binding
```

24

iSCSI Optimization Commands

iSCSI Optimization provides a means of performing configuration specific to storage traffic and optionally giving traffic between iSCSI initiator and target systems special Quality of Service (QoS) treatment.

iSCSI Optimization is best applied to mixed-traffic networks where iSCSI packets constitutes a portion of overall traffic. In these cases, the assignment of iSCSI packets to non-default CoS queues can provide flows with lower latency and avoid queue resource contention.

If iSCSI frames comprise most of the traffic passing through the switch, the system provides optimal throughput when all traffic is assigned to the default queue. An example of this situation is a Storage Area Network (SAN) where the switch is dedicated to interconnecting iSCSI Targets with Initiators. Using the default queue for this homogenous traffic provides the best performance in traffic burst handling and the most accurate 802.3x Flow Control Pause Frame generation. In these cases, the application of QoS treatment other than the default policy may result in less overall throughput or more packet loss.

By default, iSCSI optimization is enabled and iSCSI QoS treatment is disabled.

LLDP is used to detect the presence of EqualLogic storage arrays. When iSCSI optimization is enabled, and LLDP detects an EQL array on a port, that port configuration is changed to enable portfast and disable unicast storm control. Configuration changes appear in the running config and are not removed by disabling the feature or disconnecting the EQl array.

QoS treatment is accomplished by monitoring traffic to detect packets used by iSCSI stations to establish iSCSI sessions and connections. Data from these exchanges is used to create classification rules that assign the traffic between the stations to a configured traffic class. Packets in the flow are queued and scheduled for egress on the destination port based on these rules.

In addition, if configured, the packets can be updated with IEEE 802.1p or IP-DSCP values. This is done by enabling **remark**. Remarking packets with priority data provides special QoS treatment as the packets continue through the network.

iSCSI Optimization borrows ACL lists from the global system pool. ACL lists allocated by iSCSI Optimization reduce the total number of ACLs available for use by the network operator. Enabling iSCSI Optimization uses one ACL list to monitor for iSCSI sessions. Each monitored iSCSI session utilizes two rules from additional ACL lists up to a maximum of two ACL lists. This means that the maximum number of ACL lists allocated by iSCSI is three.

Commands in this Chapter

This chapter explains the following commands:

iscsi aging time	iscsi target port
iscsi cos	show iscsi
iscsi enable	show iscsi sessions

iscsi aging time

The **iscsi aging time** command sets the time out value for iSCSI sessions. To reset the aging time to the default value, use the **no** form of this command.

Syntax

iscsi aging time *time*

no iscsi aging time

- *time* — The number of minutes a session must not be active prior to it's removal. (Range: 1 43,200)

Default Configuration

The default aging time is 10 minutes.

Command Mode

Global Configuration mode.

User Guidelines

Changing the aging time has the following behavior:

- When aging time is increased, current sessions will be timed out according to the new value.
- When aging time is decreased, any sessions that have been dormant for a time exceeding the new setting will be immediately deleted from the table. All other sessions will continue to be monitored against the new time out value.

Example

The following example sets the aging time for iSCSI sessions to 100 minutes.

```
console(config)#iscsi aging time 100
```

iscsi cos

The iscsi cos vpt command is supported on the PC8024/PC8024F.

Use the **iscsi cos** command in Global Configuration mode to set the quality of service profile that will be applied to iSCSI flows. To return the VPT/DSCP setting to the default value, use the **no** form of this command. VPT/DSCP values can be configured independently from the application of QoS treatment.

Syntax

iscsi cos {enable | disable | **vpt** *vpt* | **dscp** *dscp*} [**remark**]

no iscsi cos

Parameter Description

Parameter	Description
enable	Enables application of preferential QoS treatment to iSCSI frames.
disable	Disables application of preferential QoS treatment to iSCSI frames.
vpt/dscp	The VLAN Priority Tag or DSCP value to assign received iSCSI session packets.

Parameter	Description
remark	Mark the iSCSI frames with the configured DSCP when egressing the switch.

Default Configuration

By default, frames are not remarked. The default vpt setting for iSCSI is 4, which the default classofservice dot1p mapping assigns to queue 2.

Command Mode

Global Configuration mode.

User Guidelines

The remark option only applies to DSCP values. Remarking is not available for vpt values.

By default, iSCSI flows are assigned to the highest VPT/DSCP value that is mapped to the highest queue not used for stack management or the voice VLAN. Make sure you configure the relevant Class of Service parameters for the queue in order to complete the setting.

Configuring the VPT/DSCP value sets the QoS profile which selects the egress queue to which the frame is mapped. The default setting for egress queues scheduling is Weighted Round Robin (WRR).

You may alter the QoS setting by configuring the relevant ports to work in other scheduling and queue management modes via the Class of Service settings. These choices may include strict priority for the queue used for iSCSI traffic. The downside of strict priority is that, in certain circumstances (under heavy high priority traffic), other lower priority traffic may get starved. In WRR the queue to which the flow is assigned to can be set to get the required percentage.

If an EqualLogic array is detected when QoS is enabled, two additional TCP ports receive preferential QoS treatment (TCP ports 25555 and 9876). This QoS policy is applied globally.

Example

The following example configures iSCSI packets to receive CoS treatment using DiffServ Code Point AF 41 and configures remarking of transmitted iSCSI packets.

```
console(config)#iscsi cos dscp 10 remark
```

iscsi enable

The **iscsi enable** command globally enables iSCSI optimization. To disable iSCSI optimization, use the **no** form of this command.

Syntax

iscsi enable

no iscsi enable

Default Configuration

iSCSI is enabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command modifies the running config to enable flow control on all interfaces.

Monitoring for EqualLogic Storage arrays via LLDP is also enabled by this command. Upon detection of an EQL array, the specific interface involved will have spanning-tree portfast enabled and unicast storm control disabled. These changes appear in the running config. Disabling iSCSI Optimization does not disable flow control, portfast or storm control configuration applied as a result of enabling iSCSI Optimization.

Enabling iSCSI will enable the sending of the DCBX Application Priority TLV to a port with the following parameters when the following conditions are met:

- DCBX is enabled
- CoS Queuing is enabled on the port using VPT

The Application Priority TLV sent will contain the following information in addition to any other information contained in the TLV:

AE Selector = 1

AE Protocol = 3260

AE Priority = priority configured for iSCSI PFC (the VPT value above)

Example

In the following example, iSCSI is globally enabled.

```
console(config)#iscsi enable
```

iscsi target port

Use the **iscsi target port** command in Global Configuration mode to configure iSCSI port(s), target addresses and names. To delete iSCSI port(s) or target ports, use the **no** form of this command.

Syntax

iscsi target port *tcp-port-1* [*tcp-port-2.... tcp-port-16* [**address** *ip-address*] [**name** *targetname*]

no iscsi target port *tcp-port-1* [*tcp-port-2.... tcp-port-16* [**address** *ip-address*]

Parameter Description

Parameter	Description
tcp-port	TCP port number or list of TCP port numbers on which iSCSI target(s) listen to requests. Up to 16 TCP ports can be defined in the system in one command or by using multiple commands.
ip-address	IP address of the iSCSI target. When the **no** form is used, and the tcp port to be deleted is one bound to a specific IP address, the address field must be present.

Parameter	Description
targetname	iSCSI name of the iSCSI target. The name can be statically configured; however, it can be obtained from iSNS or from sendTargets response. The initiator MUST present both its iSCSI Initiator Name and the iSCSI Target Name to which it wishes to connect in the first login request of a new session or connection. The target name can consist of any printable character except for an exclamation point or a double quote as the first character. A question mark may not appear anywhere in the target name. The name can contain embedded blanks if enclosed in double quotes.

Default Configuration

iSCSI well-known ports 3260 and 860 are configured by default but can be removed as any other configured target.

Command Mode

Global Configuration mode.

User Guidelines

- When working with private iSCSI ports (not IANA assigned iSCSI ports 3260/860), it is recommended to specify the target IP address as well, so the switch will only snoop frames with which the TCP destination port is one of the configured TCP ports, AND their destination IP is the target's IP address. This way the CPU is not be falsely loaded by non-iSCSI flows (if by chance other applications also choose to use these {un-reserved} ports).
- When a port is already defined and not bound to an IP address, and you want to bind the port to an IP address, first remove the port by using the **no** form of the command and then add it again, this time together with the relevant IP address.
- Target names are only for display when using the show iscsi command. These names are not used to match (or for doing any sanity check) with the iSCSI session information acquired by snooping.
- A maximum of 16 TCP ports can be configured either bound to IP or not.

Example

The following example configures TCP Port 49154 to target IP address 172.16.1.20.

```
console(config)#iscsi target port 49154 address
172.16.1.20
```

show iscsi

Use the **show iscsi** command in Privileged EXEC mode to display the iSCSI configuration.

Syntax

show iscsi

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the iSCSI configuration.

```
console#show iscsi
iSCSI enabled
iSCSI CoS enabled
iSCSI vpt is 5

Session aging time: 10 min
Maximum number of sessions is 192
-----------------------------------------------
iSCSI Targets and TCP Ports:
```

```
-----------------------------------------------

TCP Port    Target IP Address    Name
860          -                     -
3260         -                     -

30001       172.16.1.1         iqn.1993-11.com.disk-
vendor:diskarrays.sn.45678.tape:sys1.xyz

30033       172.16.1.10

-----------------------------------------------
iSCSI Static Rule Table

-----------------------------------------------

Index TCP Port IP Address IP Address Mask

TCP Port    Target IP Address     Name
```

show iscsi sessions

Use the **show iscsi sessions** command in Privileged EXEC mode to display the iSCSI status.

Syntax

show iscsi sessions [**detailed**]

- **detailed** — Displayed list has additional data when this option is used.

Default Configuration

If not specified, sessions are displayed in short mode (not detailed).

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following examples show summary and detailed information about the iSCSI sessions.

```
console#show iscsi sessions
Target: iqn.1993-11.com.disk-
vendor:diskarrays.sn.45678
-----------------------------------------------------
Initiator: iqn.1992-04.com.os-vendor.plan9:cdrom.12
ISID: 11
Initiator: iqn.1995-05.com.os-vendor.plan9:cdrom.10
ISID: 222
-----------------------------------------------------
Target: iqn.103-1.com.storage-vendor:sn.43338.
storage.tape:sys1.xyz
Session 3:
Initiator: iqn.1992-04.com.os-vendor.plan9:cdrom.12
Session 4:
Initiator: iqn.1995-05.com.os-vendor.plan9:cdrom.10

Console# show iscsi sessions detailed
Target: iqn.1993-11.com.disk-
vendor:diskarrays.sn.45678
-----------------------------------------------------
Session 1:
Initiator: iqn.1992-04.com.os
vendor.plan9:cdrom.12.storage:sys1.xyz
-----------------------------------------------------
Time started: 17-Jul-2008 10:04:50
Time for aging out: 10 min
ISID: 11
```

```
Initiator Initiator Target Target
IP address TCP port IP address IP port
172.16.1.3 49154 172.16.1.20 30001
172.16.1.4 49155 172.16.1.21 30001
172.16.1.5 49156 172.16.1.22 30001
Session 2:
-------------------------------------------------
Initiator: iqn.1995-05.com.os-vendor.plan9:cdrom.10
Time started: 17-Aug-2008  21:04:50
Time for aging out: 2 min
ISID: 22
Initiator Initiator Target Target
IP address TCP port IP address IP port
172.16.1.30 49200 172.16.1.20 30001
172.16.1.30 49201 172.16.1.21 30001
```

25

Link Dependency Commands

Link dependency allows the link status of a group of interfaces to be made dependent on the link status of other interfaces. The effect is that the link status of a group that depends on another interface either mirrors or inverts the link status of the depended-on interface.

Commands in this Chapter

This chapter explains the following commands:

action	add port-channel
link-dependency group	depends-on
add gigabitethernet	show link-dependency
add tengigabitethernet	

action

Use the **action** command in Link Dependency mode to indicate if the link-dependency group should mirror or invert the status of the depended-on interfaces.

Syntax

action {down|up}

Parameter Description

Parameter	Description
down	Mirror the depended on interface(s) status.
up	Invert the depended on interface(s) status.

Default Configuration

The default configuration for a group is down, i.e. the group members will mirror the depended-on link status by going down when all depended-on interfaces are down.

Command Mode

Link Dependency mode

User Guidelines

The **action up** command will cause the group members to be up when no depended-on interfaces are up.

Example

```
console(config-depend-1)#action up
```

link-dependency group

Use the **link-dependency group** command to enter the link-dependency mode to configure a link-dependency group

Syntax

link-dependency group *GroupId*

no link-dependency group *GroupId*

- *GroupId* — Link dependency group identifier. (Range: 1–72)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

The preference of a group is to remain in the up state. A group will be in the up state if any depends-on interface is up and will be in the down state only if all depends-on interfaces are down.

Example

```
console(config)#link-dependency group 1
console(config-linkDep-group-1)#
```

add gigabitethernet

Use this command to add member gigabit Ethernet port(s) to the dependency list.

Syntax

add gigabitethernet *intf-list*

- *intf-list* — List of Ethernet interfaces in unit/slot/port format. Separate nonconsecutive ports with a comma and no spaces. Use a hyphen to designate the range of ports. (Range: Valid Ethernet interface list or range)

Default Configuration

This command has no default configuration.

Command Mode

Link Dependency mode

User Guidelines

No specific guidelines

Example

```
console(config-depend-1)#add gigabitethernet 1/0/1
```

add tengigabitethernet

Use this command to add member ten gigabit Ethernet port(s) to the dependency list.

Syntax

add tengigabitethernet *intf-list*

- *intf-list* — List of Ethernet interfaces in unit/slot/port format. Separate nonconsecutive ports with a comma and no spaces. Use a hyphen to designate the range of ports. (Range: Valid Ethernet interface list or range)

Default Configuration

This command has no default configuration.

Command Mode

Link Dependency mode

User Guidelines

No specific guidelines

Example

```
console(config-depend-1)#add tengigabitethernet 1/0/1
```

add port-channel

Use this command to add member port channels to the dependency list.

Syntax

add port-channel *intf-list*

no add port-channel *port channel list*

- *intf-list* — List of port-channel numbers. Separate nonconsecutive port-channels with a comma and no spaces. Use a hyphen to designate the range of port-channels. (Range: Valid port-channel list or range)
- *port-channel-list* — List of port-channel interfaces. Separate nonconsecutive ports with a comma and no spaces. Use a hyphen to designate the range of ports. (Range: Valid port-channel interface list or range)

Default Configuration

This command has no default configuration.

Command Mode

Link Dependency mode

User Guidelines

No specific guidelines

Example

```
console(config-depend-1)#add port-channel 10-12
```

depends-on

Use this command command to add the dependent Ethernet ports or port channels list. Use the **no depends-on** command to remove the dependent Ethernet ports or port-channels list.

Syntax

depends-on {**gigabitethernet** | **port-channel** | **tengigabitethernet**} *intf-list*

no depends-on {**gigabitethernet** | **port-channel** | **tengigabitethernet**} *intf-list*

- *intf-list* — List of ports in unit/slot/port format or port-channel numbers. Separate nonconsecutive items with a comma and no spaces. Use a hyphen to designate the range of ports or port-channel numbers. (Range: Valid Ethernet interface or port-channel list or range)

Default Configuration

This command has no default configuration.

Command Mode

Link Dependency mode

User Guidelines

Circular dependencies are not allowed, i.e. interfaces added to the group may not also appear in the depends-on list.

Examples

```
console(config-linkDep-group-1)#depends-on
gigabitethernet 1/0/10
```

```
console(config-linkDep-group-1)#depends-on port-
channel 6
```

show link-dependency

Use the **show link-dependency** command to show the link dependencies configured for a particular group. If no group is specified, then all the configured link-dependency groups are displayed.

Syntax

show link-dependency [***group*** *GroupId*] [detail]

Parameter Description

Parameter	Description
GroupID	Link dependency group identifier. (Range: Valid Group Id, 1–16)
detail	Show detailed information about the state of members and the dependent ports.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

No specific guidelines

Example

The following command shows link dependencies for all groups.

```
console#show link-dependency
GroupId  Member Ports     Ports Depended On Link Action Group State
-------  --------------  ------------------  ----------  ----------
1        Gi4/0/2-3,Gi4/0/5 Gi4/0/10-12        Link Up     Up/Down
```

The following command shows link dependencies for group 1 only.

```
console#show link-dependency group 1
GroupId  Member Ports     Ports Depended On Link Action Group State
-------  --------------  ------------------  ----------  ----------
1        Gi4/0/2-3,Gi4/0/5 Gi4/0/10-12       Link Up     Up/Down
```

The following command shows detailed information for group 1.

```
console#show link-dependency group 1 detail
GroupId: 1
Link Action: Link UpGroup
State: Up
Ports Depended On State:
Link Up:   Gi4/0/10
Link Down: Gi4/0/11-12
Member Ports State:
Link Up:   Gi4/0/2-3
Link Down: Gi4/0/5
```

26

LLDP Commands

The IEEE 802.1AB standard defines the Link Layer Discovery Protocol (LLDP). This protocol allows stations residing on an 802 LAN to advertise major capabilities, physical descriptions, and management information to physically adjacent devices, allowing a network management system (NMS) to access and display this information.

The standard is designed to be extensible, providing for the optional exchange of organizational specific information and data related to other IEEE standards. The base implementation supports only the required basic management set of type length values (TLVs).

LLDP is a one-way protocol; there are no request/response sequences. Information is advertised by stations implementing the transmit function. The information is received and processed by stations implementing the receive function. Devices are not required to implement both transmit and receive functions and each function can be enabled or disabled separately by the network manager. PowerConnect supports both the transmit and receive functions in order to support device discovery.

The LLDP component transmit and receive functions can be enabled/disabled separately per physical port. By default, both transmit and receive functions are disabled on all ports. The application starts each transmit and receive state machine appropriately based on the configured status and operational state of the port.

The transmit function is configurable with respect to packet construction and timing parameters. The required Chassis ID, Port ID, and Time to Live (TTL) TLVs are always included in the Link Layer Discovery Protocol Data Unit (LLDPDU). However, inclusion of the optional TLVs in the management set is configurable by the administrator. By default, they are not included. The transmit function extracts the local system information and builds the LLDPDU based on the specified configuration for the port. In addition, the administrator has control over timing parameters affecting the TTL of LLDPDUs and the interval in which they are transmitted.

The receive function accepts incoming LLDPDU frames and stores information about the remote stations. Both local and remote data may be displayed by the user interface and retrieved using SNMP as defined in the LLDP MIB definitions. The component maintains one remote entry per physical network connection.

The LLDP component manages a number of statistical parameters representing the operation of each transmit and receive function on a per-port basis. These statistics may be displayed by the user interface and retrieved using SNMP as defined in the MIB definitions.

Commands in this Chapter

This chapter explains the following commands:

clear lldp remote-data	lldp receive	–
clear lldp statistics	lldp timers	–
–	lldp transmit	–
–	lldp transmit-mgmt	–
–	lldp transmit-tlv	show lldp remote-device
–	show lldp	show lldp statistics
lldp notification	show lldp interface	–
lldp notification-interval	show lldp local-device	–

clear lldp remote-data

Use the **clear lldp remote-data** command in Privileged EXEC mode to delete all LLDP information from the remote data table.

Syntax

clear lldp remote-data

Default Configuration

By default, data is removed only on system reset.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to clear the LLDP remote data.

```
console#clear lldp remote-data
```

clear lldp statistics

Use the **clear lldp statistics** command in Privileged EXEC mode to reset all LLDP statistics.

Syntax

clear lldp statistics

Default Configuration

By default, the statistics are only cleared on a system reset.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to reset all LLDP statistics.

```
console#clear lldp statistics
```

lldp notification

Use the **lldp notification** command in Interface Configuration mode to enable remote data change notifications. To disable notifications, use the **no** form of this command.

Syntax

lldp notification

no lldp notification

Default Configuration

By default, notifications are disabled on all supported interfaces.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to enable remote data change notifications.

```
console(config-if-1/0/3)#lldp notification
```

lldp notification-interval

Use the **lldp notification-interval** command in Global Configuration mode to limit how frequently remote data change notifications are sent. To return the notification interval to the factory default, use the **no** form of this command.

Syntax

lldp notification-interval *interval*

no lldp notification-interval

- interval — The smallest interval in seconds at which to send remote data change notifications. (Range: 5–3600 seconds)

Default Configuration

The default value is 5 seconds.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to set the interval value to 10 seconds.

```
console(config)#lldp notification-interval 10
```

lldp receive

Use the **lldp receive** command in Interface Configuration mode to enable the LLDP receive capability. To disable reception of LLDPDUs, use the **no** form of this command.

Syntax

lldp receive

no lldp receive

Default Configuration

The default lldp receive mode is enabled.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to enable the LLDP receive capability.

```
console(config-if-1/0/3)#lldp receive
```

lldp timers

Use the **lldp timers** command in Global Configuration mode to set the timing parameters for local data transmission on ports enabled for LLDP. To return any or all parameters to factory default, use the **no** form of this command.

Syntax

lldp timers [**interval** *transmit-interval*] [**hold** *hold-multiplier*] [**reinit** *reinit-delay*]

no lldp timers [**interval**] [**hold**] [**reinit**]

- *transmit-interval* — The interval in seconds at which to transmit local data LLDPDUs. (Range: 5–32768 seconds)
- *hold-multiplier* — Multiplier on the transmit interval used to set the TTL in local data LLDPDUs. (Range: 2–10)
- *reinit-delay* — The delay in seconds before re-initialization. (Range: 1–10 seconds)

Default Configuration

The default transmit interval is 30 seconds.

The default hold-multiplier is 4.

The default delay before re-initialization is 2 seconds.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Examples

The following example displays how to configure LLDP to transmit local information every 1000 seconds.

```
console(config)#lldp timers interval 1000
```

The following example displays how to set the timing parameter at 1000 seconds with a hold multiplier of 8 and a 5 second delay before re-initialization.

```
console(config)#lldp timers interval 1000 hold 8
reinit 5
```

lldp transmit

Use the **lldp transmit** command in Interface Configuration mode to enable the LLDP advertise (transmit) capability. To disable local data transmission, use the **no** form of this command.

Syntax

lldp transmit

no lldp transmit

Default Configuration

LLDP is enabled on all supported interfaces.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how enable the transmission of local data.

```
console(config-if-1/0/3)#lldp transmit
```

lldp transmit-mgmt

Use the **lldp transmit-mgmt** command in Interface Configuration mode to include transmission of the local system management address information in the LLDPDUs. To cancel inclusion of the management information, use the **no** form of this command.

Syntax

lldp transmit-mgmt

no lldp transmit-mgmt

Default Configuration

By default, management address information is not included.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to include management information in the LLDPDU.

```
console(config-if-1/0/3)#lldp transmit-mgmt
```

lldp transmit-tlv

Use the **lldp transmit-tlv** command in Interface Configuration mode to specify which optional type-length-value settings (TLVs) in the 802.1AB basic management set will be transmitted in the LLDPDUs. To remove an optional TLV, use the **no** form of this command.

Syntax

lldp transmit-tlv [**sys-desc**][**sys-name**][**sys-cap**][**port-desc**]

no lldp transmit-tlv [**sys-desc**][**sys-name**][**sys-cap**][**port-desc**]

- **sys-name** — Transmits the system name TLV
- **sys-desc** — Transmits the system description TLV
- **sys-cap** — Transmits the system capabilities TLV
- **port desc** — Transmits the port description TLV

Default Configuration

By default, no optional TLVs are included.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to include the system description TLV in local data transmit.

```
console(config-if-1/0/3)#lldp transmit-tlv sys-desc
```

show lldp

Use the **show lldp** command in Privileged EXEC mode to display the current LLDP configuration summary.

Syntax

show lldp

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the current LLDP configuration summary.

```
console# show lldp
Global Configurations:
Transmit Interval: 30 seconds
Transmit TTL Value: 120 seconds
Reinit Delay: 2 seconds
Notification Interval: limited to every 5 seconds
console#show lldp
LLDP transmit and receive disabled on all interfaces
```

show lldp interface

Use the **show lldp interface** command in Privileged EXEC mode to display the current LLDP interface state.

Syntax

show lldp interface {**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port* | **all** }

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

This example show how the information is displayed when you use the command with the **all** parameter.

```
console#show lldp interface all

Interface Link Transmit Receive  Notify   TLVs    Mgmt

--------- ---- -------- -------- -------- ------- ----

1/0/1      Up   Enabled  Enabled  Enabled  0,1,2,3  Y

1/0/2      Down Enabled  Enabled  Disabled          Y

1/0/3      Down Disabled Disabled Disabled 1,2      N

TLV Codes: 0 – Port Description, 1 – System Name, 2 – System
Description, 3 –

System Capability

console# show lldp interface 1/0/1

Interface Link Transmit Receive  Notify   TLVs    Mgmt

--------- ---- -------- -------- -------- ------- ----

1/0/1      Up   Enabled  Enabled  Enabled  0,1,2,3  Y

TLV Codes: 0 – Port Description, 1 – System Name, 2 – System
Description, 3 – System Capability
```

show lldp local-device

Use the **show lldp local-device** command in Privileged EXEC mode to display the advertised LLDP local data. This command can display summary information or detail for each interface.

Syntax

show lldp local-device {**detail** *interface* | *interface* | **all**}

- **detail** — includes a detailed version of remote data.
- *interface* — Specifies a valid physical interface on the device. Specify either **gigabitethernet** *unit/slot/port* or **tengigabitethernet** *unit/slot/port*.
- **all** — Shows lldp local device information on all interfaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

These examples show advertised LLDP local data in two levels of detail.

```
console#show lldp local-device all
LLDP Local Device Summary
Interface   Port ID              Port Description
--------- -------------------- --------------------
1/0/1       00:62:48:00:00:02

console# show lldp local-device detail 1/0/1
LLDP Local Device Detail
Interface: 1/0/1
Chassis ID Subtype: MAC Address
Chassis ID: 00:62:48:00:00:00
Port ID Subtype: MAC Address
Port ID: 00:62:48:00:00:02
System Name:
System Description: Routing
Port Description:
System Capabilities Supported: bridge, router
```

```
System Capabilities Enabled: bridge
Management Address:
Type: IPv4
Address: 192.168.17.25
```

— —

— —

show lldp remote-device

Use the **lldp remote-device** command in Privileged EXEC mode to display the current LLDP remote data. This command can display summary information or detail for each interface.

Syntax

show lldp remote-device {**detail** *interface* | *interface* | **all**}

- detail — Includes detailed version of remote data.
- *interface* — Specifies a valid physical interface on the device. Substitute **gigabitethernet** *unit/slotport* or **tengigabitethernet** *unit/slotport*}

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

These examples show current LLDP remote data, including a detailed version.

```
console#show lldp remote-device
```

```
Local Remote
Interface Device              ID Port           ID TTL
--------- ----------------  -----------------  ----------
1/0/1      01:23:45:67:89:AB  01:23:45:67:89:AC 60 seconds
1/0/2      01:23:45:67:89:CD  01:23:45:67:89:CE 120 seconds
1/0/3      01:23:45:67:89:EF  01:23:45:67:89:FG 80 seconds

console# show lldp remote-device detail 1/0/1
Ethernet1/0/1,
Remote ID: 01:23:45:67:89:AB
System Name: system-1
System Description:
System Capabilities: Bridge
Port ID: 01:23:45:67:89:AC
Port Description: 1/0/4
Management Address: 192.168.112.1
TTL: 60 seconds
```

show lldp statistics

Use the **show lldp statistics** command in Privileged EXEC mode to display the current LLDP traffic statistics.

Syntax

show lldp statistics {*unit/slot/port* | **all** }

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following examples shows an example of the display of current LLDP traffic statistics.

```
console#show lldp statistics all

LLDP Device Statistics

Last Update.............................. 0 days 22:58:29

Total Inserts............................ 1

Total Deletes............................ 0

Total Drops.............................. 0

Total Ageouts............................ 1

          Tx    Rx                           TLV      TLV      TLV  TLV   TLV
Interface Total Total Discards Errors Ageout Discards Unknowns MED  802.1
802.3
--------- ----- ----- -------- ------ ------ -------- -------- ---- ----- --
---
1/0/11     29395 82562 0        0      1      0        0        0    1     4
```

The following table explains the fields in this example.

Fields	Description
Last Update	The value of system of time the last time a remote data entry was created, modified, or deleted.
Total Inserts	The number of times a complete set of information advertised by a remote device has been inserted into the table.
Total Deletes	The number of times a complete set of information advertised by a remote device has been deleted from the table.

Fields	Description
Total Drops	Number of times a complete set of information advertised by a remote device could not be inserted due to insufficient resources.
Total Ageouts	Number of times any remote data entry has been deleted due to time-to-live (TTL) expiration.
Transmit Total	Total number of LLDP frames transmitted on the indicated port.
Receive Total	Total number of valid LLDP frames received on the indicated port.
Discards	Number of LLDP frames received on the indicated port and discarded for any reason.
Errors	Number of non-valid LLDP frames received on the indicated port.
Ageouts	Number of times a remote data entry on the indicated port has been deleted due to TTL expiration.
TLV Discards	Number LLDP TLVs (Type, Length, Value sets) received on the indicated port and discarded for any reason by the LLDP agent.
TLV Unknowns	Number of LLDP TLVs received on the indicated port for a type not recognized by the LLDP agent.
TLV MED	Number of OUI specific MED (Media Endpoint Device) TLVs received.
TLV 802.1	Number of OUI specific 802.1 specific TLVs received.
TLV 802.3	Number of OUI specific 802.3 specific TLVs received.

27

Multicast VLAN Registration Commands

Multicast VLAN registration (MVR) is a method for consolidating multicast traffic from multiple VLANs onto a single VLAN. A typical usage scenario would be the distribution of a multicast group to a switch using a single VLAN where the switch has users in different VLANs subscribing to the multicast group. MVR enables the distribution of the multicast group from the single consolidated VLAN onto the multiple user VLANs.

MVR, like the IGMP Snooping protocol, allows a Layer 2 switch to snoop on the IGMP control protocol. Both protocols operate independently from each other. Both protocols may be enabled on the switch interfaces at the same time. In such a case, MVR is listening to the join and report messages only for groups configured statically. All other groups are managed by IGMP snooping.

There are two types of MVR ports: source and receiver.

- Source port is the port to which the multicast traffic is flowing using the multicast VLAN.
- Receiver port is the port where a listening host is connected to the switch. It can utilize any (or no) VLAN, except the multicast VLAN. This implies that the MVR switch will perform VLAN tag substitution from the multicast VLAN Source port to the VLAN tag used by the receiver port.

The Multicast VLAN is the VLAN that is configured in the specific network for MVR purposes. It must be manually specified by the operator for all multicast source ports in the network. It is this VLAN that is used to transfer multicast traffic over the network to avoid duplication of multicast streams for clients in different VLANs.

NOTE: MVR can only be enabled on physical interfaces, not on LAGs or VLANs.

Commands in this Chapter

This chapter explains the following commands:

mvr	mvr type
mvr group	mvr vlan group
mvr mode	show mvr
mvr querytime	show mvr members
mvr vlan	show mvr interface
mvr immediate	show mvr traffic

mvr

Use the **mvr** command in Global Config and Interface Config modes to enable MVR. Use the **no** form of this command to disable MVR.

Syntax

mvr

no mvr

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is **Disabled**.

Command Mode

Global Config, Interface Config

User Guidelines

MVR can only be configured on physical interfaces.

mvr group

Use the **mvr group** command in Global Config mode to add an MVR membership group. Use the no form of the command to remove an MVR membership group.

Syntax

mvr group *A.B.C.D* [*count*]

no mvr group *A.B.C.D* [*count*]

Parameter Description

Parameter	Description
A.B.C.D	Specify a multicast group.
count	Specifies the number of multicast groups to configure. Groups are configured contiguously by incrementing the first group specified.

Default Configuration

This command has no default configuration.

Command Mode

Global Config

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	None
Error Completion Message	• Not an IP multicast group address • Illegal IP multicast group address

Example

```
console(config)#mvr
```

```
console(config)#mvr group 239.0.1.0 100
console(config)#mvr vlan 10
```

mvr mode

Use the **mvr mode** command in Global Config mode to change the MVR mode type. Use the **no** form of the command to set the mode type to the default value.

Syntax

mvr mode {**compatible** | **dynamic**}

no mvr mode

Parameter Description

Parameter	Description
compatible	Do not allow membership joins on source ports.
dynamic	Send IGMP joins to the multicast source when IGMP joins are received on receiver ports.

Default Configuration

The default mode is compatible.

Command Mode

Global Config

User Guidelines

This command has no user guidelines.

mvr querytime

Use the **mvr querytime** command in Global Config mode to set the MVR query response time. Use the **no** form of the command to set the MVR query response time to the default value.

Syntax

mvr querytime *1–100*

no mvr querytime

Parameter Description

Parameter	Description
querytime	The query time is a maximum time to wait for an IGMP membership report on a receiver port before removing the port from the multicast group. The query time only applies to receiver ports. The query time is specified in tenths of a second.

Default Configuration

The default value is 5 tenths of a second.

Command Mode

Global Config

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	Defaulting MVR query response time.
Error Completion Message	None

Example

```
console(config)#interface Gi1/0/1
console(config-if-Gi1/0/1)#switchport access vlan 10
console(config-if-Gi1/0/1)#mvr
console(config-if-Gi1/0/1)#mvr type receiver
console(config-if-Gi1/0/1)#mvr mode dynamic
console(config-if-Gi1/0/1)#mvr querytime 10
```

mvr vlan

Use the **mvr vlan** command in Global Config mode to set the MVR multicast VLAN. Use the **no** form of the command to set the MVR multicast VLAN to the default value.

Syntax

mvr vlan *1–4094*

no mvr vlan

Parameter Description

Parameter	Description
vlan	The VLAN specifies the port on which multicast data is expected to be received. Source ports should belong to this VLAN.

Default Configuration

The default value is 1.

Command Mode

Global Config

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	MVR multicast VLAN ID is set to the default value which is equal to 1.
Error Completion Message	Receiver port in mVLAN, operation failed.

mvr immediate

Use the **mvr immediate** command in Interface Config mode to enable MVR Immediate Leave mode. Use the **no** form of this command to set the MVR multicast VLAN to the default value.

Syntax

mvr immediate

no mvr immediate

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is **Disabled**.

Command Mode

Interface Config

User Guidelines

Immediate leave should only be configured on ports with a single receiver. When immediate leave is enabled, a receiver port will leave a group on receipt of a leave message. Without immediate leave, upon receipt of a leave message, the port sends an IGMP query and waits for an IGMP membership report.

Example

```
console(config)#interface Gi1/0/1
console(config-if-Gi1/0/1)#switchport access vlan 10
console(config-if-Gi1/0/1)#mvr
console(config-if-Gi1/0/1)#mvr type receiver
console(config-if-Gi1/0/1)#mvr mode dynamic
console(config-if-Gi1/0/1)#mvr immediate
```

mvr type

Use the **mvr type** command in Interface Config mode to set the MVR port type. Use the **no** form of this command to set the MVR port type to **None**.

Syntax

mvr type { receiver | source }

no mvr type

Parameter Description

Parameter	Description
receiver	Configure the port as a receiver port. Receiver ports are ports over which multicast data will be sent but not received.
source	Configure the port as a source port. Source ports are ports over which multicast data is received or sent.

Default Configuration

The default value is **None**.

Command Mode

Interface Config

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	None
Error Completion Message	• Port is a Trunk port, operation failed. • Receiver port in mVLAN, operation failed.

Example

```
console(config)#mvr
console(config)#mvr group 239.1.1.1
console(config)#exit
console(config)#interface Gi1/0/1
console(config-if-Gi1/0/1)#switchport access vlan 10
console(config-if-Gi1/0/1)#mvr
console(config-if-Gi1/0/1)#mvr type receiver
```

```
console(config-if-Gi1/0/1)#interface Gi1/0/24
console(config-if-Gi1/0/24)#switchport mode trunk
console(config-if-Gi1/0/24)#switchport trunk native vlan 99
console(config-if-Gi1/0/24)#switchport trunk allowed vlan add 99
console(config-if-Gi1/0/24)#mvr
console(config-if-Gi1/0/24)#mvr type source
console(config-if-Gi1/0/24)#exit
```

mvr vlan group

Use the **mvr vlan group** command in Interface Config mode to participate in the specific MVR group. Use the **no** form of this command to remove the port participation from the specific MVR group.

Syntax

mvr vlan *mVLAN* **group** *A.B.C.D*

no mvr vlan *mVLAN* **group** *A.B.C.D*

Parameter Description

Parameter	Description
VLAN	The VLAN over which multicast data from the specified group is to be received.
A.B.C.D.	The multicast group for which multicast data is to be received over the specified VLAN.

Default Configuration

This command has no default configuration.

Command Mode

Interface Config

User Guidelines

This command statically configures a port to receive the specified multicast group on the specified VLAN. This command only applies to receiver ports in compatible mode. It also applies to source ports in dynamic mode. In dynamic mode, receiver ports can also join multicast groups using IGMP messages.

Example

```
console(config-if-Gi1/0/1)#interface Te1/1/1
console(config-if-Gi1/0/24)#switchport mode trunk
console(config-if-Gi1/0/24)#switchport trunk native vlan
2000
console(config-if-Gi1/0/24)#switchport trunk allowed vlan
add 2000
console(config-if-Gi1/0/24)#mvr
console(config-if-Gi1/0/24)#mvr type source
console(config-if-Gi1/0/24)#mvr vlan 2000 group 239.1.1.1
```

show mvr

Use the **show mvr** command in Privileged EXEC mode to display global MVR settings.

Syntax

show mvr

Parameter Description

The following table explains the output parameters.

Parameter	Description
MVR Running	MVR running state. It can be enabled or disabled.
MVR Multicast VLAN	Current MVR multicast VLAN. It can be in the range from 1 to 4094.

Parameter	Description
MVR Max Multicast Groups	The maximum number of multicast groups that is supported by MVR.
MVR Current Multicast groups	The current number of MVR groups allocated.
MVR Query Response Time	The current MVR query response time.
MVR Mode	The current MVR mode. It can be compatible or dynamic.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	None
Error Completion Message	MVR disabled

Example

```
console #show mvr
MVR Running.............................. TRUE
MVR multicast VLAN....................... 1200
MVR Max Multicast Groups................. 256
MVR Current multicast groups............. 1
MVR Global query response time........... 10 (tenths of sec)
MVR Mode................................. compatible
```

show mvr members

Use the **show mvr members** command in Privileged EXEC mode to display the MVR membership groups allocated.

Syntax

show mvr members [*A.B.C.D*]

Parameter Description

The parameter is a valid multicast address in IPv4 dotted notation. The following table explains the output parameters.

Parameter	Description
MVR Group IP	MVR group multicast IP address.
Status	The status of the specific MVR group. It can be active or inactive.
Members	The list of ports which participates in the specific MVR group.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	None
Error Completion Message	MVR disabled

Examples

```
console#show mvr members
```

```
MVR Group IP          Status              Members
------------------    --------------      --------------------
224.1.1.1             INACTIVE            1/0/1, 1/0/2, 1/0/3

console#show mvr members 224.1.1.1
MVR Group IP          Status              Members
------------------    --------------      --------------------
224.1.1.1             INACTIVE            1/0/1, 1/0/2, 1/0/3
```

show mvr interface

Use the **show mvr interface** command in Privileged EXEC mode to display the MVR enabled interfaces configuration.

Syntax

show mvr interface [*interface-id* [**members** [**vlan** *vid*]]]

Parameter Description

Parameter	Description
Interface-id	Identifies a specific interface.
VID	VLAN identifier.

The following table explains the output parameters.

Parameter	Description
Port	Interface number
Type	The MVR port type. It can be **None**, **Receiver**, or **Source** type.
Status	The interface status. It consists of two characteristics: 1 **active** or **inactive** indicating if port is forwarding. 2 **inVLAN** or **notInVLAN** indicating if the port is part of any VLAN

Parameter	Description
Immediate Leave	The state of immediate mode. It can be **enabled** or **disabled**.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	None
Error Completion Message	MVR disabled

Examples

```
console#show mvr interface
Port        Type              Status                 Immediate Leave
---------   ---------------   ---------------------  --------------
------
1/0/9       RECEIVER          ACTIVE/inVLAN          DISABLED

console#show mvr interface 1/0/9
Type: RECEIVER Status: ACTIVE   Immediate Leave: DISABLED

console#show mvr interface Fa1/0/23 members
235.0.0.1 STATIC  ACTIVE

console#show mvr interface Fa1/0/23 members vlan 12
235.0.0.1 STATIC  ACTIVE
235.1.1.1 STATIC  ACTIVE
```

show mvr traffic

Use the **show mvr traffic** command in Privileged EXEC mode to display global MVR statistics.

Syntax

show mvr traffic

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	None
Error Completion Message	MVR disabled

Examples

The following table explains the output parameters.

Parameter	Description
IGMP Query Received	Number of received IGMP Queries.
IGMP Report V1 Received	Number of received IGMP Reports V1.
IGMP Report V2 Received	Number of received IGMP Reports V2.
IGMP Leave Received	Number of received IGMP Leaves.
IGMP Query Transmitted	Number of transmitted IGMP Queries.

Parameter	Description
IGMP Report V1 Transmitted	Number of transmitted IGMP Reports V1.
IGMP Report V2 Transmitted	Number of transmitted IGMP Reports V2.
IGMP Leave Transmitted	Number of transmitted IGMP Leaves.
IGMP Packet Receive Failures	Number of failures on receiving the IGMP packets.
IGMP Packet Transmit Failures	Number of failures on transmitting the IGMP packets.

```
console#show mvr traffic

IGMP Query Received.......................... 2
IGMP Report V1 Received...................... 0
IGMP Report V2 Received...................... 3
IGMP Leave Received.......................... 0
IGMP Query Transmitted....................... 2
IGMP Report V1 Transmitted................... 0
IGMP Report V2 Transmitted................... 3
IGMP Leave Transmitted....................... 1
IGMP Packet Receive Failures................. 0
IGMP Packet Transmit Failures................ 0
```

28

Port Channel Commands

Care must be taken while enabling this type of configuration. If the Partner System is not 802.3AD compliant or the Link Aggregation Control protocol is not enabled, there may be network instability. Network instability occurs when one side assumes that the members in an aggregation are one single link, while the other side is oblivious to this aggregation and continues to treat the 'members' as individual links.

In the PowerConnect system, the Actor System waits for 3 seconds before aggregating manually. The 3 second wait time is specified by the protocol standard.

If a manual LAG member sees an LACPDU that contains information different from the currently configured default partner values, that particular member drops out of the LAG. This configured member does not aggregate with the LAG until all the other active members see the new information. When each of the other active members sees the new information, they continue to drop out of the LAG. When all the members have dropped out of the LAG, they form an aggregate with the new information.

Static LAGS

A static LAG is no different from a dynamically configured LAG. All the requirements for the member ports hold true (member ports must be physical, same speed, and so on). The only difference is this LAG has an additional parameter **static** which makes this LAG not require a partner system to be able to aggregate it's member ports.

A static LAG does not transmit or process received LACPDUs, that is, the member ports do not transmit LACPDUs and all the LACPDUs it may receive are dropped. A dropped counter is maintained to count the number of such PDUs.

Configured members are added to the LAG (active participation) immediately if the LAG is configured to be static. There is no wait time before we add the port to the LAG.

A LAG can be either static or dynamic not both. It cannot have some members participate in the protocol while other members not participate. Additionally, it is not possible to change a LAG from static to dynamic via the CLI. You must remove the member ports from the static LAG and then add them to the dynamic LAG.

VLANs and LAGs

When members are added to a LAG, they are removed from all existing VLAN membership. When members are removed from a LAG, the members rejoin the VLANs that they were previously members of as per the configuration file.

The LAG interface can be a member of a VLAN complying with IEEE 802.1Q.

LAG Thresholds

In many implementations, a LAG is declared as up if any one of its member ports is active. This enhancement provides configurability for the minimum number of member links to be active to declare a LAG up. Network administrators can also utilize this feature to automatically declare a LAG down when only some of the links have failed.

Port Channels

Trunking, which is also called Port Channels or Link Aggregation, is initiated and maintained by the periodic exchanges of Link Aggregation Control PDUs (LACPDUs). When LACP is enabled for a physical interface, LACPDUs must not be dropped for any reason. Conversely, when LACP is disabled for the physical interface LACPDUs must be dropped.

From a system perspective, a LAG is treated as a physical port. A LAG and a physical port use the same configuration parameters for administrative enable/disable, port priority, and path cost. When a physical port is configured as part of a LAG, it no longer participates in forwarding operations until the LAG becomes active.

A LAG failure of one or more of the links does not stop traffic in any manner. Upon failure, the flows mapped to a link are dynamically reassigned to the remaining links of the LAG. Similarly when links are added to a LAG, the conversations may need to be shifted to a new link.

The purpose of link aggregation is to increase bandwidth between two switches. It is achieved by aggregating multiple ports in one logical group. A common problem of port channels is the possibility of changing packets order in a particular TCP session. The resolution of this problem is correct selection of physical port within port channel for transmitting the packet to keep original packets order.

The hashing algorithm is configurable for each LAG. The types of LAG algorithms available may vary depending upon platform capabilities. Typically, an administrator is able to choose from hash algorithms utilizing the following attributes of a packet to determine the outgoing port:

- Source MAC, VLAN, EtherType, and incoming port associated with the packet.
- Source IP and Source TCP/UDP fields of the packet.
- Destination MAC, VLAN, EtherType, and incoming port associated with the packet.
- Source MAC, Destination MAC, VLAN, EtherType, and incoming port associated with the packet.
- Destination IP and Destination TCP/UDP Port fields of the packet.
- Source/Destination MAC, VLAN, EtherType, and incoming port associated with the packet.
- Source/Destination IP and source/destination TCP/UDP Port fields of the packet.

LAG Hashing

The purpose of link aggregation is to increase bandwidth between two switches. It is achieved by aggregating multiple ports in one logical group. A common problem of port channels is the possibility of changing packets order in a particular TCP session. The resolution of this problem is correct selection of a physical port within the port channel for transmitting the packet to keep original packets order.

The hashing algorithm is configurable for each LAG. Typically, an administrator is able to choose from hash algorithms utilizing the following attributes of a packet to determine the outgoing port:

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- Source IP and Source TCP/UDP fields of the packet.
- Destination MAC, VLAN, EtherType, and incoming port associated with the packet.
- Source MAC, Destination MAC, VLAN, EtherType, and incoming port associated with the packet.
- Destination IP and Destination TCP/UDP Port fields of the packet.
- Source/Destination MAC, VLAN, EtherType, and incoming port associated with the packet.
- Source/Destination IP and source/destination TCP/UDP Port fields of the packet.

Enhanced LAG Hashing

PowerConnect devices based on Broadcom XGS-IV silicon support configuration of hashing algorithms for each LAG interface. The hashing algorithm is used to distribute traffic load among the physical ports of the LAG while preserving the per-flow packet order.

One limitation with earlier LAG hashing techniques is that the packet attributes were fixed for all type of packets. Also, there was no MODULO-N operation involved, which can result in poor load balancing performance.

As part of Release 4.0, the LAG hashing support is extended to support an Enhanced hashing mode, which has the following advantages:

- MODULO-N operation based on the number of ports in the LAG.
- Packet attributes selection based on the packet type. For L2 packets, Source and Destination MAC address are used for hash computation. For IP packets, Source IP, Destination IP address, TCP/UDP ports are used.
- Non-Unicast traffic and Unicast traffic is hashed using a common hash algorithm.
- Excellent load balancing performance.

Manual Aggregation of LAGs

PowerConnect switching supports the manual addition and deletion of links to aggregates.

In the manual configuration of aggregates, the ports send their Actor Information (LACPDUs) to the partner system in order to find a suitable Partner to form an aggregation. When the Partner System neglects to respond using LACPDUs, the PowerConnect switching aggregates manually. The PowerConnect switching uses the currently configured default Partner Values for Partner Information.

Manual Aggregation of LAGs

PowerConnect switching supports the manual addition and deletion of links to aggregates.

Flexible Assignment of Ports to LAGs

Assignment of interfaces to dynamic LAGs is based upon a maximum of 144 interfaces assigned to dynamic LAGs, a maximum of 128 dynamic LAGs and a maximum of 8 interfaces per dynamic LAG. For example, 128 LAGs may be assigned 2 interfaces each or 18 LAGs may be assigned 8 interfaces each.

Commands in this Chapter

This chapter explains the following commands:

channel-group	lacp system-priority
interface port-channel	lacp timeout
interface range port-channel	–
hashing-mode	port-channel min-links
–	show interfaces port-channel
–	show lacp
lacp port-priority	show statistics port-channel
–	

channel-group

Use the **channel-group** command in Interface Configuration mode to associate a port with a port channel. To remove the channel-group configuration from the interface, use the **no** form of this command.

Syntax

channel-group *port-channel-number* **mode** {**on** | **active**}

no channel-group

- *port-channel-number* — Number of a valid port-channel with which to associate the current interface.
- **on** — Forces the port to join a channel without LACP (static LAG).
- **active** — Forces the port to join a channel with LACP (dynamic LAG).

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how port 1/0/5 is configured to port-channel 1 without LACP(static LAG).

```
console(config)# interface gigabitethernet 1/0/5

console(config-if-1/0/5)# channel-group 1 mode on
```

The following example shows how port 1/0/6 is configured to port-channel 1 with LACP(dynamic LAG).

```
console(config)# interface gigabitethernet 1/0/6

console(config-if-1/0/6)# channel-group 1 mode active
```

interface port-channel

Use the **interface port-channel** command in Global Configuration mode to configure a port-channel type and enter port-channel configuration mode.

Syntax

interface port-channel *port-channel-number*

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enters the context of port-channel 1.

```
console(config)# interface port-channel 1
console(config-if-po1)#
```

interface range port-channel

Use the **interface range port-channel** command in Global Configuration mode to execute a command on multiple port channels at the same time.

Syntax

interface range port-channel {*port-channel-range* | **all**}

- *port-channel-range* — List of port-channels to configure. Separate non-consecutive port-channels with a comma and no spaces. A hyphen designates a range of port-channels. (Range: valid port-channel)
- **all** — All the channel-ports.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

Commands in the interface range context are executed independently on each interface in the range. If the command returns an error on one of the interfaces, it stops the execution of the command on subsequent interfaces.

Example

The following example shows how port-channels 1, 2 and 8 are grouped to receive the same command.

```
console(config)# interface range port-channel 1-2,8
console(config-if)#
```

hashing-mode

Use the **hashing-mode** command to set the hashing algorithm on trunk ports. Use the **no hashing-mode** command to set the hashing algorithm on Trunk ports to the default (3).

Syntax

hashing-mode *mode*

- *mode* — Mode value in the range of 1 to 7.

Range: 1–7:

- 1 — Source MAC, VLAN, EtherType, source module, and port ID
- 2 — Destination MAC, VLAN, EtherType, source module, and port ID
- 3 — Source IP and source TCP/UDP port
- 4 — Destination IP and destination TCP/UDP port
- 5 — Source/destination MAC, VLAN, EtherType, and source MODID/port

- 6 — Source/destination IP and source/destination TCP/UDP port
- 7 — Enhanced hashing mode

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (port-channel)

User Guidelines

No specific guidelines.

Example

```
console(config)#interface port-channel l
console(config-if-po1)#hashing-mode 4
console(config-if-po1)#no hashing mode
```

lacp port-priority

Use the **lacp port-priority** command in Interface Configuration mode to configure the priority value for physical ports. To reset to default priority value, use the **no** form of this command.

Syntax

lacp port-priority *value*

no lacp port-priority

- *value* — Port priority value. (Range: 1–65535)

Default Configuration

The default port priority value is 1.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the priority value for port 1/0/8 to 247.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#lacp port-priority 247
```

lacp system-priority

Use the **lacp system-priority** command in Global Configuration mode to configure the Link Aggregation system priority. To reset to default, use the **no** form of this command.

Syntax

lacp system-priority *value*

no lacp system-priority

- *value* — Port priority value. (Range: 1–65535)

Default Configuration

The default system priority value is 1.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the system priority to 120.

```
console(config)#lacp system-priority 120
```

lacp timeout

Use the **lacp timeout** command in Interface Configuration mode to assign an administrative LACP timeout. To reset the default administrative LACP timeout, use the **no** form of this command.

Syntax

lacp timeout {**long** | **short**}

no lacp timeout

- **long** — Specifies a long timeout value.
- **short** — Specifies a short timeout value.

Default Configuration

The default port timeout value is **long**.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example assigns an administrative LACP timeout for port 1/0/8 to a long timeout value.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#lacp timeout long
```

port-channel min-links

Use the **port-channel min-links** command in Interface Configuration (port-channel) mode to set the minimum number of links that must be up in order for the port channel interface to be declared up. Use the **no** form of the command to return the configuration to the default value (1).

Syntax

port-channel min-links *1-8*

no port-channel min-links

Parameter Description

Parameter	Description
min-links	The minimum number of links that must be active before the link is declared up. Range 1-8. The default is 1.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (port-channel) mode

User Guidelines

This command has no user guidelines.

show interfaces port-channel

Use the **show interfaces port-channel** command to show port-channel information.

Syntax Description

show interfaces port-channel [*port-channel-number*]

- [*index*] — Number of the port channel to show. This parameter is optional. If the port channel number is not given, all the channel groups are displayed. (Range: Valid port-channel number, 1 to 48)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

No specific guidelines.

Example

```
console#show interfaces port-channel
Channel  Ports               ChType   Hash Algorithm Type min-Links
-------  ------------------  -------  ------------------- ---------
Po1      Inactive: Gi1/0/3   Dynamic  3                   1
Po2      No Configured Ports Static   3                   1
Hash Algorithm Type
1 - Source MAC, VLAN, Ethertype, source module and port ID
2 - Destination MAC, VLAN, Ethertype, source module and port ID
3 - Source IP and source TCP/UDP port
4 - Destination IP and destination TCP/UDP port
5 - Source/Destination MAC, VLAN, Ethertype, source MODID/port
6 - Source/Destination IP and source/destination TCP/UDP port
7 - Enhanced hasing mode
```

show lacp

Use this command in Privileged EXEC mode to display LACP information for Ethernet ports.

Syntax

show lacp {**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* [{**parameters** | **statistics**}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to display LACP Ethernet interface information.

```
console#show lacp gigabitethernet 1/0/1

Port 1/0/1 LACP parameters:

Actor
    system priority:                1
    system mac addr:                00:00:12:34:56:78
    port Admin key:                 30
    port Oper key:                  30
    port Oper priority:             1
    port Admin timeout:             LONG
    port Oper timeout:              LONG
    LACP Activity:                  ACTIVE
    Aggregation:                    AGGREGATABLE
    synchronization:                FALSE
    collecting:                     FALSE
    distributing:                   FALSE
    expired:                        FALSE
Partner
    system priority:                0
    system mac addr:                00:00:00:00:00:00
    port Admin key:                 0
    port Oper key:                  0
```

```
port Admin priority:            0
port Oper priority:             0
port Oper timeout:              LONG
LACP Activity:                  ASSIVE
Aggregation:                    AGGREGATABLE
synchronization:                FALSE
collecting:                     FALSE
distributing:                   FALSE
expired:                        FALSE
Port 1/0/1 LACP Statistics:
LACP PDUs sent:                 2
LACP PDUs received:             2
```

show statistics port-channel

Use the **show statistics port-channel** command in Privileged EXEC mode to display statistics about a specific port-channel.

Syntax

show statistics port-channel *port-channel-number*

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows statistics about port-channel 1.

```
console#show statistics port-channel 1
Total Packets Received (Octets)..... 0
Packets Received > 1522 Octets..... 0
Packets RX and TX 64 Octets..... 1064
Packets RX and TX 65-127 Octets..... 140
Packets RX and TX 128-255 Octets..... 201
Packets RX and TX 256-511 Octets..... 418
Packets RX and TX 512-1023 Octets..... 1
Packets RX and TX 1024-1518 Octets..... 0
Packets RX and TX 1519-1522 Octets..... 0
Packets RX and TX 1523-2047 Octets..... 0
Packets RX and TX 2048-4095 Octets..... 0
Packets RX and TX 4096-9216 Octets..... 0
Total Packets Received Without Errors..... 0
Unicast Packets Received..... 0
Multicast Packets Received..... 0
Broadcast Packets Received..... 0
Total Packets Received with MAC Errors..... 0
Jabbers Received..... 0
Fragments/Undersize Received..... 0
Alignment Errors..... 0
--More-- or (q)uit
FCS Errors..... 0
Overruns..... 0
```

```
Total Received Packets Not Forwarded..... 0
Local Traffic Frames..... 0
802.3x Pause Frames Received..... 0
Unacceptable Frame Type..... 0
Multicast Tree Viable Discards..... 0
Reserved Address Discards..... 0
Broadcast Storm Recovery..... 0
CFI Discards..... 0
Upstream Threshold..... 0
Total Packets Transmitted (Octets).....
263567
Max Frame Size..... 1518
Total Packets Transmitted Successfully..... 1824
Unicast Packets Transmitted..... 330
Multicast Packets Transmitted..... 737
Broadcast Packets Transmitted..... 757
Total Transmit Errors..... 0
FCS Errors..... 0
--More-- or (q)uit
Tx Oversized..... 0
Underrun Errors..... 0
Total Transmit Packets Discarded..... 0
Single Collision Frames..... 0
Multiple Collision Frames..... 0
Excessive Collision Frames..... 0
Port Membership Discards..... 0
```

```
802.3x Pause Frames Transmitted..... 0

GVRP PDUs received..... 0

GVRP PDUs Transmitted..... 0

GVRP Failed Registrations..... 0

Time Since Counters Last Cleared..... 0 day
0 hr 17 min 52 sec

console#
```

29

Port Monitor Commands

PowerConnect switches allow the user to monitor traffic with an external network analyzer. The external network analyzer can use any of the Ethernet ports as a probe port. The probe port transmits a mirror copy of the traffic being probed. Network traffic transmission is always disrupted whenever a configuration change is made for port monitoring. Therefore, whenever port monitoring is enabled, the probe port does not always forward traffic as a normal port. When diagnosing problems, an operator should always check the status of port monitoring.

The port monitoring feature allows the user to configure multiple sessions. One session consists of one destination port and multiple source ports. When a particular session is enabled, any traffic entering or leaving the source ports of that session is copied (mirrored) onto the corresponding destination port. A network traffic analyzer can be attached to destination ports to analyze the traffic patterns of source ports.

A session is operationally active only if both a destination port and at least one source port are configured. If neither is true, the session is inactive. A port configured as a destination port acts as a mirroring port when the session is operationally active. If it is not, the port acts as a normal port and participates in all normal operation with respect to transmitting traffic.

Any Ethernet or LAG port may be configured as a source port.

Caveats:

- Platforms may behave unpredictably if an attempt is made to mirror a port of greater speed than the probe port.
- Once configured, there is no network connectivity on the probe port. The probe port does not forward any traffic and does not receive any traffic. The probe tool attached to the probe port is generally unable to ping the networking device or ping through the networking device, and nobody is able to ping the probe tool.

Commands in this Chapter

This chapter explains the following commands:

monitor session

Use the **monitor session** command in Global Configuration mode to configure a probe port and a monitored port for monitor session (port monitoring). Use the src-interface parameter to specify the interface to monitor. Use rx to monitor only ingress packets, or use tx to monitor only egress packets. If you do not specify an {rx | tx} option, the destination port monitors both ingress and egress packets. Use the destination interface to specify the interface to receive the monitored traffic. Use the mode parameter to enabled the administrative mode of the session. If enabled, the probe port monitors all the traffic received and transmitted on the physical monitored port.

Use the **no** form of the command to remove the monitoring session.

Syntax

monitor session *session_number* {**source interface** *interface–id* [**rx** | **tx**] | **destination interface** *interface–id*}

no monitor session

- *session _number*— Session identification number.
- **interface–id** — Ethernet interface (Range: Any valid Ethernet Port), CPU interface. CPU interface is not supported as a destination interface.
- **rx** — Monitors received packets only. If no option specified, monitors both rx and tx.
- **tx** — Monitors transmitted packets only. If no option is specified, monitors both rx and tx.
- Use the **mode** keyword to enable the session monitoring.

Default Configuration

Monitor sessions are not enabled by default.

Command Mode

Global Configuration mode

User Guidelines

The source of a monitoring session must be configured before the destination can be configured.

Example

The following examples show a simple port level configuration that mirrors both transmitted and received packet from one port to another.

```
console(config)#monitor session 1 source interface
1/0/8

console(config)#monitor session 1 destination
interface 1/0/10

console(config)#monitor session 1 mode
```

show monitor session

Use the **show monitor session** command in Privileged EXEC mode to display status of port monitoring.

Syntax

show monitor session *session_number*

- *session_number*— Session identification number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following examples shows port monitoring status.

```
console#show monitor session 1
```

```
Session ID   Admin Mode   Probe Port   Mirrored Port   Type
----------   ----------   ----------   -------------   -----
1            Enable       1/0/10        1/0/8            Rx,Tx
```

30

QoS Commands

Quality of Service (QoS) technologies are intended to provide guaranteed timely delivery of specific application data to a particular destination. In contrast, standard IP-based networks are designed to provide best effort data delivery service. Best effort service implies that the network delivers the data in a timely fashion, although there is no guarantee. During times of congestion, packets may be delayed, sent sporadically, or dropped. For typical Internet applications, such as electronic mail and file transfer, a slight degradation in service is acceptable and, in many cases, unnoticeable.

Conversely, any degradation of service has undesirable effects on applications with strict timing requirements, such as voice or multimedia.

QoS is a means of providing consistent, predictable data delivery by distinguishing between packets that have strict timing requirements from those that are more tolerant of delay. Packets with strict timing requirements are given special treatment in a QoS-capable network. To accomplish this, all elements of the network must be QoS-capable. If one node is unable to meet the necessary timing requirements, this creates a deficiency in the network path and the performance of the entire packet flow is compromised.

Access Control Lists

The PowerConnect ACL feature allows classification of packets based upon Layer 2 through Layer 4 header information. An Ethernet IPv6 packet is distinguished from an IPv4 packet by its unique Ether-type value; thus, all IPv4 and IPv6 classifiers include the Ether-type field.

Multiple ACLs per interface are supported. The ACLs can be combination of Layer 2 and/or Layer 3/4 ACLs.

ACL assignment is appropriate for both physical ports and LAGs.

A user configures an ACL **permit** rule to force its matching traffic stream to a specific egress interface, bypassing any forwarding decision normally performed by the device. The interface can be a physical port or a LAG. The redirect interface rule action is independent of, but compatible with, the assign queue rule action.

ACLs can be configured to apply to a VLAN instead of an interface. Traffic tagged with a VLAN ID (either receive-tagged or tagged by ingress process such as PVID) is evaluated for a match regardless of the interface on which it is received.

Layer 2 ACLs

The Layer 2 ACL feature provides access list capability by allowing classification on the Layer 2 header of an Ethernet frame, including the 802.1Q VLAN tag(s). In addition, the rule action set is enhanced to designate which (egress) CoS queue should handle the traffic, and whether the traffic flow is to be redirected to a specific outgoing interface.

MAC access lists are identified by a user-specified name instead of a number.

Layer 3/4 IPv4 ACLs

The Layer 3/4 ACL feature supports IP access lists, both standard and extended. These lists check the Layer 3 portion of a packet, looking specifically at information contained in the IP header and, in certain cases, the TCP or UDP header. An Ethertype of 0x0800 is assumed in the case of IP access lists. Permit and deny actions are supported for each ACL rule.

Standard layer 3/4 ACLs can be classified based on the source IP address and netmask or other extended classification criteria.

Class of Service (CoS)

The PowerConnect CoS Queueing feature allows the user to directly configure device queueing and, therefore, provide the desired QoS behavior without the complexities of DiffServ. The CoS feature allows the user to determine the following queue behavior:

- Queue Mapping
  - Trusted Port Queue Mapping

  - Untrusted Port Default Priority
- Queue Configuration

This enables PowerConnect switches to support a wide variety of delay sensitive video and audio multicast applications.

CoS mapping tables, port default priority, and hardware queue parameters may be configured on LAG interfaces as well as physical port interfaces.

Queue Mapping

The priority of a packet arriving at an interface is used to steer the packet to the appropriate outbound CoS queue through a mapping table. Network packets arriving at an ingress port are directed to one of n queues in an egress port(s) based on the translation of packet priority to CoS queue. The CoS mapping tables define the queue used to handle each enumerated type of user priority designated in either the 802.1p, IP precedence, or IP DSCP contents of a packet. If none of these fields are trusted to contain a meaningful COS queue designation, the ingress port can be configured to use its default priority to specify the CoS queue.

CoS queue mappings use the concept of trusted and untrusted ports.

A trusted port is one that takes at face value a certain priority designation within arriving packets. Specifically, a port may be configured to trust one of the following packet fields:

- 802.1p User Priority
- IP Precedence
- IP DSCP

Packets arriving at the port ingress are inspected and their trusted field value is used to designate the COS queue that the packet is placed when forwarded to the appropriate egress port. A mapping table associates the trusted field value with the desired COS queue.

Alternatively, a port may be configured as untrusted, whereby it does not trust any incoming packet priority designation and uses the port default priority value instead. All packets arriving at the ingress of an untrusted port are directed to a specific COS queue on the appropriate egress port(s) in accordance with the configured default priority of the ingress port. This

process is also used for cases where a trusted port mapping is unable to be honored, such as when a nonIP packet arrives at a port configured to trust the IP precedence or IP DSCP value.

Commands in this Chapter

This chapter explains the following commands:

assign-queue	mark cos	match ip tos	show classofservice dot1p-mapping
class	mark ip-dscp	match protocol	show classofservice ip-dscp-mapping
class-map	mark ip-precedence	match source-address mac	show classofservice trust
class-map rename	match class-map	match srcip	show diffserv
classofservice dot1p-mapping	match cos	match srcip6	show diffserv service interface
classofservice ip-dscp-mapping	match destination-address mac	match srcl4port	show diffserv service interface port-channel
classofservice trust	match dstip	match vlan	show diffserv service brief
conform-color	match dstip6	mirror	show interfaces cos-queue
cos-queue min-bandwidth	match dstl4port	police-simple	show interfaces random-detect
cos-queue random-detect	match ethertype	policy-map	show policy-map
cos-queue strict	match ip6flowlbl	redirect	show policy-map interface
diffserv	match ip dscp	service-policy	show service-policy
drop	match ip precedence	show class-map	traffic-shape

assign-queue

Use the **assign-queue** command in Policy-Class-Map Configuration mode to modify the queue ID to which the associated traffic stream is assigned.

Syntax

assign-queue *queueid*

- *queueid* — Specifies a valid queue ID. (Range: integer from 0–6.)

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to change the queue ID to 4 for the associated traffic stream.

```
console(config-policy-classmap)#assign-queue 4
```

class

Use the **class** command in Policy-Map Class Configuration mode to create an instance of a class definition within the specified policy for the purpose of defining treatment of the traffic class through subsequent policy attribute statements.

Syntax

class *classname*

no class

- *classname* — Specifies the name of an existing DiffServ class. (Range: 1–31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Policy Map Configuration mode

User Guidelines

This command causes the specified policy to create a reference to the class definition. The command mode is changed to Policy-Class-Map Configuration when this command is executed successfully.

Example

The following example shows how to specify the DiffServ class name of "DELL."

```
console(config)#policy-map DELL1
console(config-classmap)#class DELL
```

class-map

Use the **class-map** command in Global Configuration mode to define a new DiffServ class of type *match-all*. To delete the existing class, use the **no** form of this command.

Syntax

class-map match-all *class-map-name* [{**ipv4 | ipv6**}]

no class-map match-all *class-map-name*

- *class-map-name* — a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying an existing DiffServ class.

Default Configuration

The class-map defaults to ipv4.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

The following example creates a class-map named "DELL" which requires all ACE's to be matched.

```
console(config)#class-map DELL
console(config-cmap)#
```

class-map rename

Use the **class-map rename** command in Global Configuration mode to change the name of a DiffServ class.

Syntax

class-map rename *classname newclassname*

- *classname* — The name of an existing DiffServ class. (Range: 1–31 characters)
- *newclassname* — A case-sensitive alphanumeric string. (Range: 1–31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to change the name of a DiffServ class from "DELL" to "DELL1."

```
console(config)#class-map rename DELL DELL1
```

```
console(config)#
```

classofservice dot1p-mapping

Use the **classofservice dot1p-mapping** command in Global Configuration mode to map an 802.1p priority to an internal traffic class. In Interface Configuration mode, the mapping is applied only to packets received on that interface. Use the **no** form of the command to remove mapping between an 802.1p priority and an internal traffic class.

Syntax

classofservice dot1p-mapping *802.1ppriority trafficclass*

no classofservice dot1p-mapping

- *802.1ppriority* — Specifies the user priority mapped to the specified traffic class for this switch. (Range: 0–7)
- *trafficclass* — Specifies the traffic class for this switch. (Range: 0–6)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration or Interface Configuration (Ethernet, Port-channel) mode

User Guidelines

None

Example

The following example configures mapping for user priority 1 and traffic class 2.

```
console(config)#classofservice dot1p-mapping 1 2
```

classofservice ip-dscp-mapping

Use the **classofservice ip-dscp-mapping** command in Global Configuration mode to map an IP DSCP value to an internal traffic class.

Syntax

classofservice ip-dscp-mapping *ipdscp trafficclass*

- *ipdscp* — Specifies the IP DSCP value to which you map the specified traffic class. (Range: 0–63 or an IP DSCP keyword – af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef)
- *trafficclass* — Specifies the traffic class for this value mapping. (Range: 0–6)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays mapping for IP DSCP 1 and traffic class 2.

```
console(config)#classofservice ip-dscp-mapping 1 2
```

classofservice trust

Use the **classofservice trust** command in either Global Configuration mode or Interface Configuration mode to set the class of service trust mode of an interface. To set the interface mode to untrusted, use the **no** form of this command.

Syntax

classofservice trust {dot1p | untrusted | ip-dscp}

no classofservice trust

- **dot1p** — Specifies that the mode be set to trust dot1p (802.1p) packet markings.
- **untrusted** — Sets the Class of Service Trust Mode for all interfaces to Untrusted.
- **ip-dscp** — Specifies that the mode be set to trust IP DSCP packet markings.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode or Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Examples

The following example displays how you set the class of service trust mode of an interface to trust dot1p (802.1p) packet markings when in Global Configuration mode.

```
console(config)#classofservice trust dot1p
```

The following example displays how you set the class of service trust mode of an interface to trust IP Precedence packet mark

```
console(config)#classofservice trust ip-precedence
```

conform-color

Use the **conform-color** command in Policy-Class-Map Configuration mode to specify second-level matching for traffic flow, the only possible actions are drop, setdscp-transmit, set-prec-transmit, or transmit. In this two-rate form

of the policy command, the conform action defaults to send, the exceed action defaults to drop, and the violate action defaults to drop. These actions can be set with this command.

Syntax

conform-color

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to specify the **conform-color** command.

```
console(config-policy-classmap)#conform-color
test_class (test_class is <class-map-name>
```

cos-queue min-bandwidth

Use the **cos-queue min-bandwidth** command in either Global Configuration mode or Interface Configuration mode to specify the minimum transmission bandwidth for each interface queue. To restore the default for each queue's minimum bandwidth value, use the **no** form of this command.

Syntax

cos-queue min-bandwidth *bw-0 bw-1 … bw-n*

no cos-queue min-bandwidth

- *bw-0* — Specifies the minimum transmission bandwidth for an interface. You can specify as many bandwidths as there are interfaces (bw-0 through bw-n). (Range: 0–100 in increments of 5)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode or Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The maximum number of queues supported per interface is seven.

Example

The following example displays how to specify the minimum transmission bandwidth for seven interfaces.

```
console(config)#cos-queue min-bandwidth  0 0 5 5 10 10
10
```

cos-queue random-detect

Use the **cos-queue random-detect** command in Interface Configuration mode to configure WRED queue management policy on an interface CoS queue. Use the **no** form of the command to disable WRED policy for a CoS queue on an interface.

Syntax

cos-queue {**random-detect** *queue-id1* [*queue-id2..queue-idn*]}

no cos-queue {**random-detect** *queue-id1* [*queue-id2..queue-idn*]}

Parameter Description

Parameter	Description
queue-id	An integer indicating the queue-id which is to be enabled for WRED. Range 0-6. Up to 7 queues may be simultaneously specified.

Default Configuration

WRED queue management policy is disabled by default. Tail-drop queue management policy is enabled by default.

Command Mode

Interface Configuration (physical or port-channel)

User Guidelines

When used on a port-channel, this command will override the settings on the individual interfaces that are part of the port channel.

This command can be used in Interface Range mode.

Use the cos-queue min-bandwidth command to configure the minimum bandwidth percentage for the CoS queues.

Use the show interfaces random-detect command to display the WRED configuration.

Example

Enable WRED on the default CoS queue for unmarked packets and set the green, yellow, red and non-TCP packet thresholds to utilize WRED at 98% of port bandwidth with a drop probability of 1%.

```
console(config)# cos-queue random-detect 1

console(config)# random-detect queue-parms 1 min-thresh 98
98 98 98 max-thresh 100 100 100 100 drop-prob-scale 1 1 1 1
```

cos-queue strict

Use the **cos-queue strict** command in either Global Configuration mode or Interface Configuration mode to activate the strict priority scheduler mode for each specified queue. To restore the default weighted scheduler mode for each specified queue, use the **no** form of this command.

Syntax

cos-queue strict {*queue-id-1*} [{*queue-id-2*} … {*queue-id-n*}]

no cos-queue strict {*queue-id-1*} [{*queue-id-2*} … {*queue-id-n*}]

- **queue-id-1** — Specifies the queue ID for which you are activating the strict priority scheduler. You can specify a queue ID for as many queues as you have (queue-id 1 through queue-id-n). (Range: 0–6)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode or Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to activate the strict priority scheduler mode for two queues.

```
console(config)#cos-queue strict 1 2
```

The following example displays how to activate the strict priority scheduler mode for three queues.

```
console(config)#cos-queue strict 1 2 4
```

diffserv

Use the **diffserv** command in Global Configuration mode to set the DiffServ operational mode to active. While disabled, the DiffServ configuration is retained and can be changed, but it is not activated. When enabled, DiffServ services are activated. To set the DiffServ operational mode to inactive, use the **no** form of this command.

Syntax

diffserv

no diffserv

Default Configuration

This command default is **enabled**.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to set the DiffServ operational mode to active.

```
console(Config)#diffserv
```

drop

Use the **drop** command in Policy-Class-Map Configuration mode to specify that all packets for the associated traffic stream are to be dropped at ingress.

Syntax

drop

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to specify that matching packets are to be dropped at ingress.

```
console(config-policy-classmap)#drop
```

mark cos

Use the **mark cos** command in Policy-Class-Map Configuration mode to mark all packets for the associated traffic stream with the specified class of service value in the priority field of the 802.1p header. If the packet does not already contain this header, one is inserted.

Syntax

mark cos *cos-value*

- *cos-value* — Specifies the CoS value as an integer. (Range: 0–7)

Default Configuration

There is no default cos-value for this command. Packets are not remarked by default.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to mark all packets with a CoS value.

```
console(config-policy-classmap)#mark cos 7
```

mark ip-dscp

Use the **mark ip-dscp** command in Policy-Class-Map Configuration mode to mark all packets for the associated traffic stream with the specified IP DSCP value.

Syntax

mark ip-dscp *dscpval*

- *dscpval* — Specifies a DSCP value (10, 12, 14, 18, 20, 22, 26, 28, 30, 34, 36, 38, 0, 8, 16, 24, 32, 40, 48, 56, 46) or a DSCP keyword (af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef).

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to mark all packets with an IP DSCP value of "cs4."

```
console(config-policy-classmap)#mark ip-dscp cs4
```

mark ip-precedence

Use the **mark ip-precedence** command in Policy-Class-Map Configuration mode to mark all packets for the associated traffic stream with the specified IP precedence value.

Syntax

mark ip-precedence *prec-value*

- *prec-value* — Specifies the IP precedence value as an integer. (Range: 0–7)

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines.

This command has no user guidelines.

Example

The following example displays

```
console(config)#policy-map p1 in
console(config-policy-map)#class c1
console(config-policy-classmap)#mark ip-precedence 2
console(config-policy-classmap)#
```

match class-map

Use the **match class-map** command to add to the specified class definition the set of match conditions defined for another class. Use the **no** form of this command to remove from the specified class definition the set of match conditions defined for another class.

Syntax

match class-map *refclassname*

no match class-map *refclassname*

- *refclassname* — The name of an existing DiffServ class whose match conditions are being referenced by the specified class definition.

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

- The parameters *refclassname* and *class-map-name* can not be the same.
- Only one other class may be referenced by a class.

- Any attempts to delete the *refclassname* class while the class is still referenced by any *class-map-name* fails.
- The combined match criteria of *class-map-name* and *refclassname* must be an allowed combination based on the class type.
- Any subsequent changes to the *refclassname* class match criteria must maintain this validity, or the change attempt fails.
- The total number of class rules formed by the complete reference class chain (including both predecessor and successor classes) must not exceed a platform-specific maximum. In some cases, each removal of a refclass rule reduces the maximum number of available rules in the class definition by one.

Example

The following example adds match conditions defined for the Dell class to the class currently being configured.

```
console(config-classmap)#match class-map Dell
```

The following example deletes the match conditions defined for the Dell class from the class currently being configured.

```
console(config-classmap)#no match class-map Dell
```

match cos

Use the **match cos** command in Class-Map Configuration mode to add to the specified class definition a match condition for the class of service value (the only tag in a single-tagged packet or the first or outer 802.1Q tag of a double-VLAN tagged packet).

Syntax

match cos

- cos-value — Specifies the CoS value as an integer (Range: 0–7)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition to the specified class.

```
console(config-classmap)#match cos 1
```

match destination-address mac

Use the **match destination-address mac** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the destination MAC address of a packet.

Syntax

match destination-address mac *macaddr macmask*

- *macaddr* — Specifies any valid layer 2 MAC address formatted as six two-digit hexadecimal numbers separated by colons.
- *macmask* — Specifies a valid layer 2 MAC address bit mask formatted as six two-digit hexadecimal numbers separated by colons. This address bit mask does not need to be contiguous.

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition for the specified MAC address and bit mask.

```
console(config-classmap)#match destination-address
mac AA:ED:DB:21:11:06  FF:FF:FF:EF:EE:EE
```

match dstip

Use the **match dstip** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the destination IP address of a packet.

Syntax

match dstip *ipaddr ipmask*

- *ipaddr* — Specifies a valid IP address.
- *ipmask* — Specifies a valid IP address bit mask. Note that even though this parameter is similar to a standard subnet mask, it does not need to be contiguous.

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition using the specified IP address and bit mask.

```
console(config-classmap)#match dstip 10.240.1.1
10.240.0.0
```

match dstip6

The **match dstip6** command adds to the specified class definition a match condition based on the destination IPv6 address of a packet.

Syntax

match dstip6 *destination-ipv6-prefix/prefix-length*

- *destination-ipv6-prefix*—IPv6 prefix in IPv6 global address format.
- *prefix-length*—IPv6 prefix length value.

Default Configuration

There is no default configuration for this command.

Command Mode

Ipv6-Class-Map Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-classmap)#match dstip6 2001:DB8::/32
```

match dstl4port

Use the **match dstl4port** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the destination layer 4 port of a packet using a single keyword or a numeric notation.

Syntax

match dstl4port {*portkey* | *port-number*}

- *portkey* — Specifies one of the supported port name keywords. A match condition is specified by one layer 4 port number. The currently supported values are: domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp, and www.
- *port-number* — Specifies a layer 4 port number (Range: 0–65535).

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition based on the destination layer 4 port of a packet using the "echo" port name keyword.

```
console(config-classmap)#match dstl4port echo
```

match ethertype

Use the **match ethertype** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the value of the ethertype.

Syntax

match ethertype {**keyword** | *0x0600-0xffff*}

- **keyword** — Specifies either a valid keyword or a valid hexadecimal number. The supported keywords are **appletalk**, **arp, ibmsna**, **ipv4, ipv6**, **ipx**, **mplsmcast**, **mplsucast**, **netbios**, **novell**, **pppoe**, **rarp**. (Range: 0x0600–0xFFFF)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to add a match condition based on ethertype.

```
console(config-classmap)#match ethertype arp
```

match ip6flowlbl

The **match ip6flowlbl** command adds to the specified class definition a match condition based on the IPv6 flow label of a packet.

Syntax

match ip6flowlbl *label*

- *label* - The value to match in the Flow Label field of the IPv6 header (Range 0-1048575).

Default Configuration

There is no default configuration for this command.

Command Mode

Ipv6-Class-Map Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example adds a rule to match packets whose IPv6 Flow Label equals 32312.

```
console(config-classmap)#match ip6flowlbl 32312
```

match ip dscp

Use the **match ip dscp** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the value of the IP DiffServ Code Point (DSCP) field in a packet. This field is defined as the high-order six bits of the Service Type octet in the IP header. The low-order two bits are not checked.

Syntax

match ip dscp *dscpval*

- *dscpval* — Specifies an integer value or a keyword value for the DSCP field. (Integer Range: 0–63) (Keyword Values: *af11*, *af12*, *af13*, *af21*, *af22*, *af23*, *af31*, *af32*, *af33*, *af41*, *af42*, *af43*, *be*, *cs0*, *cs1*, *cs2*, *cs3*, *cs4*, *cs5*, *cs6*, *cs7*, *ef*)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

The **ip dscp**, **ip precedence**, and **ip tos** match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header but with a slightly different user notation.

To specify a match on all DSCP values, use the **match ip tos** *tosbits tosmask* command with tosbits set to "0" (zero) and tosmask set to hex "03."

Example

The following example displays how to add a match condition based on the DSCP field.

```
console(config-classmap)# match ip dscp 3
```

match ip precedence

Use the **match ip precedence** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the value of the IP precedence field.

Syntax

match ip precedence *precedence*

- *precedence* — Specifies the precedence field in a packet. This field is the high-order three bits of the Service Type octet in the IP header. (Integer Range: 0–7)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

The **ip dscp**, **ip precedence**, and **ip tos** match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header but with a slightly different user notation.

To specify a match on all precedence values, use the **match ip tos** *tosbits tosmask* command with tosbits set to "0" (zero) and tosmask set to hex "1F."

Example

The following example displays adding a match condition based on the value of the IP precedence field.

```
console(config-classmap)#match ip precedence 1
```

match ip tos

Use the **match ip tos** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the value of the IP TOS field in a packet. This field is defined as all eight bits of the Service Type octet in the IP header.

Syntax

match ip tos *tosbits tosmask*

- *tosbits* — Specifies a two-digit hexadecimal number. (Range: 00–ff)
- *tosmask* — Specifies the bit positions in the tosbits parameter that are used for comparison against the IP TOS field in a packet. This value of this parameter is expressed as a two-digit hexadecimal number. (Range: 00–ff)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

The **ip dscp**, **ip precedence**, and **ip tos** match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header but with a slightly different user notation.

This specification is the *free form* version of the IP DSCP/Precedence/TOS match specification in that you have complete control of specifying which bits of the IP Service Type field are checked.

Example

The following example displays adding a match condition based on the value of the IP TOS field in a packet.

```
console(config-classmap)#match ip tos AA EF
```

match protocol

Use the **match protocol** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the value of the IP Protocol field in a packet using a single keyword notation or a numeric value notation.

Syntax

match protocol {*protocol-name* | *protocol-number*}

- *protocol-name* — Specifies one of the supported protocol name keywords. The supported values are *icmp*, *igmp*, *ip*, *tcp*, and *udp*.
- *protocol-number* — Specifies the standard value assigned by IANA. (Range 0–255)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition based on the "ip" protocol name keyword.

```
console(config-classmap)#match protocol ip
```

match source-address mac

Use the **match source-address mac** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the source MAC address of the packet.

Syntax

match source-address mac *address macmask*

- *macaddr* — Specifies any valid layer 2 MAC address formatted as six two-digit hexadecimal numbers separated by colons.
- *macmask* — Specifies a layer 2 MAC address bit mask formatted as six two-digit hexadecimal numbers separated by colons. This bit mask does not need to be contiguous.

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example adds to the specified class definition a match condition based on the source MAC address of the packet.

```
console(config-classmap)# match source-address mac
10:10:10:10:10:10 11:11:11:11:11:11
```

match srcip

Use the **match srcip** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the source IP address of a packet.

Syntax

match srcip *ipaddr ipmask*

- *ipaddr* — Specifies a valid IP address.
- *ipmask* — Specifies a valid IP address bit mask. Note that although this IP address bit mask is similar to a subnet mask, it does not need to be contiguous.

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition for the specified IP address and address bit mask.

```
console(config-classmap)#match srcip 10.240.1.1
10.240.0.0
```

match srcip6

The **match srcip6** command adds to the specified class definition a match condition based on the source IPv6 address of a packet.

Syntax

match srcip6 *source-ipv6-prefix/prefix-length*

- *source-ipv6-prefix*—IPv6 prefix in IPv6 global address format.
- *prefix-length*—IPv6 prefix length value.

Default Configuration

There is no default configuration for this command.

Command Mode

Ipv6-Class-Map Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-classmap)#match srcip6 2001:DB8::/32
```

match srcl4port

Use the **match srcl4port** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the source layer 4 port of a packet using a single keyword or a numeric notation.

Syntax

match srcl4port {*portkey* | *port-number*}

- *portkey* — Specifies one of the supported port name keywords. A match condition is specified by one layer 4 port number. The currently supported values are: domain, echo, ftp, ftpdata, http, smtp,snmp, telnet, tftp, and www.
- *port-number* — Specifies a layer 4 port number (Range: 0–65535).

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to add a match condition using the "snmp" port name keyword.

```
console(config-classmap)#match srcl4port snmp
```

match vlan

Use the **match vlan** command in Class-Map Configuration mode to add to the specified class definition a match condition based on the value of the layer 2 VLAN Identifier field. This field is the only tag in a single tagged packet or the first or outer tag of a double VLAN packet.

Syntax

match vlan *vlan-id*

- *vlan-id* — Specifies a VLAN ID as an integer. (Range: 0–4095)

Default Configuration

This command has no default configuration.

Command Mode

Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays adding a match condition for the VLAN ID "2."

```
console(config-classmap)#match vlan 2
```

mirror

Use the **mirror** command in Policy-Class-Map Configuration mode to mirror all the data that matches the class defined to the destination port specified.

Syntax

mirror *interface*

- *interface* — Specifies the Ethernet port to which data needs to be copied.

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

The port identified in this command is identical to the destination port of the **monitor** command.

Example

The following example displays how to copy all the data to port 1/0/5.

```
console(config-policy-classmap)#mirror 1/0/5
```

police-simple

Use the **police-simple** command in Policy-Class-Map Configuration mode to establish the traffic policing style for the specified class. The simple form of the police command uses a single data rate and burst size, resulting in two outcomes: conform and nonconform.

Syntax

police-simple {*datarate burstsize* conform-action {drop | set-prectransmit *cos* | set-dscp-transmit *dscpval* | transmit} [violateaction {drop | set-cos-transmit *cos* | set-prec-transmit *cos* | set-dscp-transmit *dscpval* | transmit}]}

- *datarate* — Data rate in kilobits per second (kbps). (Range: 1–4294967295)
- *burstsize* — Burst size in Kbps (Range: 1–128)
- **conform action** — Indicates what happens when the packet is conforming to the policing rule: it could be dropped, it could have its COS modified, it could have its IP precedence modified, or it could have its DSCP modified. The same actions are available for packets that do not conform to the policing rule.
- *cos* — Class of Service value. (Range: 0–7)
- dscpval — DSCP value. (Range: 0–63 or a keyword from this list, **af11**, **af12**, **af13**, **af21**, **af22**, **af23**, **af31**, **af32**, **af33**, **af41**, **af42**, **af43**, **be**, **cs0**, **cs1**, **cs2**, **cs3**, **cs4**, **cs5**, **cs6**, **cs7**, **ef**)

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

Only one style of police command (simple) is allowed for a given class instance in a particular policy.

Example

The following example shows how to establish the traffic policing style for the specified class.

```
console(config-policy-classmap)#police-simple 33 34
conform-action transmit violate-action transmit
```

policy-map

Use the **policy-map** command in Global Configuration mode to establish a new DiffServ policyor to enter policy map configuration mode. To remove the policy, use the **no** form of this command.

Syntax

policy-map *policyname* [**in**|**out**]

no policy-map *policyname*

Parameter Description

Parameter	Description
policyname	Specifies the DiffServ policy name as a unique case-sensitive alphanumeric string of characters. (Range: 1–31 alphanumeric characters.)
in	The policy is applied on ingress. Must be specified to create new DiffServ policies. An existing policy can be selected without specifying "in" or "out".
out	The policy is applied on egress. Either "in" or "out" must be specified to create a new DiffServ policy. An existing policy may be selected without the "in" or "out" parameter.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

The CLI mode is changed to Policy-Class-Map Configuration when this command is successfully executed.

The policy type dictates which of the individual policy attribute commands are valid within the policy definition.

Example

The following example shows how to establish a new ingress DiffServ policy named "DELL."

```
console(config)#policy-map DELL in
console(config-policy-classmap)#
```

redirect

Use the **redirect** command in Policy-Class-Map Configuration mode to specify that all incoming packets for the associated traffic stream are redirected to a specific egress interface (physical port or port-channel).

Syntax

redirect *interface*

- *interface* — Specifies any valid interface. Interface is Ethernet port or port-channel (Range: po1-po32 or gi1/0/1-gi1/0/24)

Default Configuration

This command has no default configuration.

Command Mode

Policy-Class-Map Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to redirect incoming packets to port 1/0/1.

```
console(config-policy-classmap)#redirect 1/0/1
```

service-policy

Use the **service-policy** command in either Global Configuration mode (for all system interfaces) or Interface Configuration mode (for a specific interface) to attach a policy to an interface. To return to the system default, use the **no** form of this command.

Syntax

service-policy in|out} *policymapname*

no service-policy in|out}*policymapname*

Parameter Description

Parameter	Description
policymapname	Specifies the DiffServ policy name as a unique case-sensitive alphanumeric string. (Range: 1–31 alphanumeric characters.)
in	Apply the policy on ingress.
out	Apply the policy on egress.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode (for all system interfaces)

Interface Configuration (Ethernet, Port-channel) mode (for a specific interface)

User Guidelines

This command effectively enables DiffServ on an interface. No separate interface administrative mode command for DiffServ is available. Use the policy-map command to configure the DiffServ policy. The service-policy direction must catch the direction given for the policy map.

Ensure that no attributes within the policy definition exceed the capabilities of the interface. When a policy is attached to an interface successfully, any attempt to change the policy definition, such that it would result in a violation of the interface capabilities, causes the policy change attempt to fail. ACLs and DiffServ policies may not both exist on the same interface in the same direction.

Example

The following example shows how to attach a service policy named "DELL" to all interfaces.

```
console(config)#service-policy DELL
```

show class-map

Use the **show class-map** command in Privileged EXEC mode to display all configuration information for the specified class.

Syntax

show class-map [*classname*]

- *classname* — Specifies the valid name of an existing DiffServ class. (Range: 1–31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays all the configuration information for the class named "Dell".

```
console#show class-map

                              Class L3
         Class Name           Type  Proto      Reference Class Name
------------------------------ ----- ----- ----------------------
------
ipv4                           All   ipv4
ipv6                           All   ipv6
stop_http_class                All   ipv6
match_icmp6                    All   ipv6

console#show class-map ipv4

Class Name..................................... ipv4
Class Type..................................... All
Class Layer3 Protocol.......................... ipv4

      Match Criteria                          Values
--------------------------- ------------------------------------
Source IP Address            2.2.2.2 (255.255.255.0)

console#show class-map stop_http_class

Class Name..................................... stop_http_class
Class Type..................................... All
Class Layer3 Protocol.......................... ipv6

      Match Criteria                          Values
--------------------------- ------------------------------------
Source IP Address            2001:DB8::/32
```

```
Source Layer 4 Port          80(http/www)
```

show classofservice dot1p-mapping

Use the **show classofservice dot1p-mapping** command in Privileged EXEC mode to display the current Dot1p (802.1p) priority mapping to internal traffic classes for a specific interface.

Syntax

show classofservice dot1p-mapping [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If the interface is specified, the 802.1p mapping table of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

Example

The following example displays the dot1p traffic class mapping and user priorities.

```
console#show classofservice dot1p-mapping

 User Priority    Traffic Class
 -------------    ---------------
       0              1
       1              1
       2              6
       3              4
```

4	3
5	4
6	5
7	6

The following table lists the parameters in the example and gives a description of each.

Parameter	Description
User Priority	The 802.1p user priority value.
Traffic Class	The traffic class internal queue identifier to which the user priority value is mapped.

show classofservice ip-dscp-mapping

Use the **show classofservice ip-dscp-mapping** command in Privileged EXEC mode to display the current IP DSCP mapping to internal traffic classes for a specific interface.

Syntax

show classofservice ip-dscp-mapping

- Command is supported only globally.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

Example

```
console#show classofservice ip-dscp-mapping
```

```
    IP DSCP       Traffic Class
 -------------    -------------
   0(be/cs0            1
   1                   1
   2                   1
   3                   1
   4                   1
   5                   1
   6                   1
   7                   1
   8(cs1)              0
   9                   0
   10(af11)            0
   11                  0
   12(af12)            0
   13                  0
   14(af13)            0
   15                  0
   16(cs2)             0
   17                  0
   18(af21)            0
   19                  0
--More-- or (q)uit
   20(af22)            0
   21                  0
   22(af23)            0
```

```
    23                  0
    24(cs3)             1
    25                  1
    26(af31)            1
    27                  1
    28(af32)            1
    29                  1
    30(af33)            1
    31                  1
    32(cs4)             2
    33                  2
    34(af41)            2
    35                  2
    36(af42)            2
    37                  2
    38(af43)            2
    39                  2
    40(cs5)             2
    41                  2
    42                  2
--More-- or (q)uit
    43                  2
    44                  2
    45                  2
    46(ef)              2
    47                  2
```

```
   48(cs6)              3
   49                   3
   50                   3
   51                   3
   52                   3
   53                   3
   54                   3
   55                   3
   56(cs7)              3
   57                   3
   58                   3
   59                   3
   60                   3
   61                   3
   62                   3
   63                   3
console#
```

show classofservice trust

Use the **show classofservice trust** command in Privileged EXEC mode to display the current trust mode setting for a specific interface.

Syntax

show classofservice trust [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If the interface is specified, the port trust mode of the interface is displayed. If omitted, the port trust mode for global configuration is shown.

Example

The following example displays the current trust mode settings for the specified port.

```
console#show classofservice trust 1/0/2

Class of Service Trust Mode: Dot1P
```

show diffserv

Use the **show diffserv** command in Privileged EXEC mode to display the DiffServ general information, which includes the current administrative mode setting as well as the current and maximum number of DiffServ components.

Syntax

show diffserv

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the DiffServ information.

```
console#show diffserv
DiffServ Admin mode.......................... Enable
Class Table Size Current/Max................. 5 / 25
Class Rule Table Size Current/Max............ 6 / 150
Policy Table Size Current/Max................ 2 / 64
Policy Instance Table Size Current/Max....... 2 / 640
Policy Attribute Table Size Current/Max...... 2 / 1920
Service Table Size Current/Max............... 26 / 214
```

show diffserv service interface

Use this command in Privileged EXEC mode to display policy service information for the specified interface.

Syntax

show diffserv service interface {**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port*} **in**|**out**}

Parameter Description

Parameter	Description
in	Show ingress policies.
out	Show engress policies.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show diffserv service interface
gigabitethernet 1/0/1 in


DiffServ Admin Mode.......................... Enable
Interface.................................... 1/0/1
Direction.................................... In
No policy is attached to this interface in this
direction.
```

show diffserv service interface port-channel

Syntax Description

show diffserv service interface port-channel *channel-group* **{in|out}**

Parameter Description

Parameter	Description
channel-group	A valid port-channel in the system. (Range: 1–18)
in	Show ingress policies.
out	Show engress policies.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

Not applicable

Example

```
console#show diffserv service interface port-channel 1 in


DiffServ Admin Mode.......................... Enable
Interface.................................... po1
Direction.................................... In
No policy is attached to this interface in this direction
```

show diffserv service brief

Use the **show diffserv service brief** command in Privileged EXEC mode to display all interfaces in the system to which a DiffServ policy has been attached.

Syntax

show diffserv service brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to display all interfaces in the system to which a DiffServ policy has been attached.

```
console# show diffserv service brief
Interface    Direction   OperStatus    Policy Name
```

```
-----------  ----------- ------------ ------------------
1/0/1         in          Down          DELL
```

show interfaces cos-queue

Use the **show interfaces cos-queue** command in Privileged EXEC mode to display the class-of-service queue configuration for the specified interface.

Syntax

show interfaces cos-queue [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If the interface is specified, the class-of-service queue configuration of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

Examples

The following example displays the COS configuration with no unit/slot/port or port-channel parameter.

```
console#show interfaces cos-queue


Global Configuration
Interface Shaping Rate..................... 0


Queue Id   Min. Bandwidth   Scheduler Type   Queue
Management Type
--------   --------------   --------------   --------------
```

```
0          0                Weighted          Tail Drop
1          0                Weighted          Tail Drop
2          0                Weighted          Tail Drop
3          0                Weighted          Tail Drop
4          0                Weighted          Tail Drop
5          0                Weighted          Tail Drop
6          0                Weighted          Tail Drop
```

This example displays the COS configuration for the specified interface 1/0/1.

```
console#show interfaces cos-queue gigabitethernet 1/0/1
Interface..................................... 1/0/1
Interface Shaping Rate........................ 0

Queue Id   Min. Bandwidth   Scheduler Type   Queue
Management Type
--------   --------------   --------------   --------------
0          0                Weighted         Tail Drop
1          0                Weighted         Tail Drop
2          0                Weighted         Tail Drop
3          0                Weighted         Tail Drop
4          0                Weighted         Tail Drop
5          0                Weighted         Tail Drop
6          0                Weighted         Tail Drop
```

The following table lists the parameters in the examples and gives a description of each.

Parameter	Description
Interface	The port of the interface. If displaying the global configuration, this output line is replaced with a global configuration indication.

Parameter	Description
Intf Shaping Rate	The maximum transmission bandwidth limit for the interface as a whole. It is independent of any per-queue maximum bandwidth values in effect for the interface. This value is a configured value.
Queue Mgmt Type	The queue depth management technique used for all queues on this interface.
Queue	An interface supports *n* queues numbered 0 to (*n*-1).The specific *n* value is platform-dependent. Internal egress queue of the interface; queues 0–6 are available.
Minimum Bandwidth	The minimum transmission bandwidth guarantee for the queue, expressed as a percentage. A value of 0 means bandwidth is not guaranteed and the queue operates using best-effort. This value is a configured value.
Scheduler Type	Indicates whether this queue is scheduled for transmission using a strict priority or a weighted scheme. This value is a configured value.

show interfaces random-detect

Use the **show interfaces random-detect** command in Privileged EXEC mode to display WRED policy on an interface.

Syntax

show interfaces random-detect *interface-id*

Parameter Description

Parameter	Description
interface-id	Specify an interface type. Valid interfaces include physical ports and port channels.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

Use the show interfaces cos-queue command to show the global or per interface scheduler type and queue management types.

show policy-map

Use the **show policy-map** command in Privileged EXEC mode to display all configuration information for the specified policy.

Syntax

show policy-map [*policyname*]

- *policyname* — Specifies the name of a valid existing DiffServ policy. (Range: 1-31)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the DiffServ information.

```
console#show policy-map
Policy Name  Policy Type  Class Members
-----------  -----------  -------------
POLY1        xxx           DellClass
DELL         xxx            DellClass
```

show policy-map interface

Use the **show policy-map interface** command in Privileged EXEC mode to display policy-oriented statistics information for the specified interface.

Syntax

show policy-map interface {**gigabithethernet** | **tengigabitethernet** *unit/slot/port*} {**in**|**out**}

Parameter Description

Parameter	Description
in	Show inbound service policies.
out	Show outbound service policies.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the statistics information for port 1/0/1.

```
console#show policy-map interface 1/0/1 in
Interface..................................... 1/0/1
Operational Status............................ Down
Policy Name................................... DELL
Interface Summary:
Class Name.................................... murali
In Discarded Packets.......................... 0
```

```
Class Name..................................... test
In Discarded Packets........................... 0
Class Name..................................... DELL1
In Discarded Packets........................... 0
Class Name..................................... DELL
In Discarded Packets........................... 0
```

show service-policy

Use the **show service-policy** command in Privileged EXEC mode to display a summary of policy-oriented statistics information for all interfaces.

Syntax

show service-policy

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a summary of policy-oriented statistics information.

```
console#show service-policy
       Oper           Policy
Intf   Stat            Name
------ ----- ------------------------------
1/0/1   Down  DELL
```

```
1/0/2    Down   DELL
1/0/3    Down   DELL
1/0/4    Down   DELL
1/0/5    Down   DELL
1/0/6    Down   DELL
1/0/7    Down   DELL
1/0/8    Down   DELL
1/0/9    Down   DELL
1/0/10    Down   DELL
```

traffic-shape

Use the **traffic-shape** command in Global Configuration mode and Interface Configuration mode to specify the maximum transmission bandwidth limit for the interface as a whole. This process, also known as *rate shaping*, has the effect of smoothing temporary traffic bursts over time so that the transmitted traffic rate is bounded. To restore the default interface shaping rate value, use the **no** form of this command.

Syntax

traffic-shape *bw* **kbps**

no traffic-shape

- *bw* — Maximum transmission bandwidth value expressed in Kbps. (Range: 64 - 4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the setting of traffic-shape to a maximum bandwidth of 1024 Kbps.

```
console(config-if-1/0/1)#traffic-shape 1024 kbps
```

31

RADIUS Commands

Managing and determining the validity of users in a large network can be significantly simplified by making use of a single database of accessible information supplied by an Authentication Server. These servers commonly use the Remote Authentication Dial In User Service (RADIUS) protocol as defined by RFC 2865.

RADIUS permits access to a user's authentication and configuration information contained on the server only when requests are received from a client that shares an encrypted secret with the server. This **secret** is never transmitted over the network in an attempt to maintain a secure environment. Any requests from clients that are not appropriately configured with the secret or access from unauthorized devices are silently discarded by the server.

RADIUS conforms to a client/server model with secure communications using UDP as a transport protocol. It is extremely flexible, supporting a variety of methods to authenticate and statistically track users. It is very extensible allowing for new methods of authentication to be added without disrupting existing network functionality.

PowerConnect supports a RADIUS client in conformance with RFC 2865 and accounting functions in conformance with RFC2866. The RADIUS client will apply user policies under control of the RADIUS server, e.g. password lockout or login time of day restrictions. The RADIUS client supports up to 32 named authentication and accounting servers.

Table 31-1below indicates the RADIUS attributes supported by various PowerConnect switch service. Administrators may configure these attributes on the RADIUS server(s) when utilizing the swith RADIUS service.

Table 31-1. RADIUS Attributes Supported by PowerConnect Switch Service

Type	RADIUS Attribute Name	802.1X	User Manager	Captive Portal
1	USER-NAME	Yes	No	No
2	USER-PASSWORD	Yes	No	No

Table 31-1. RADIUS Attributes Supported by PowerConnect Switch Service

Type	RADIUS Attribute Name	802.1X	User Manager	Captive Portal
4	NAS-IP-ADDRESS	Yes	No	No
5	NAS-PORT	Yes	No	No
6	SERVICE-TYPE	No	Yes	No
11	FILTER-ID	Yes	No	No
12	FRAMED-MTU	Yes	No	No
18	REPLY-MESSAGE	Yes	Yes	No
24	STATE	Yes	Yes	No
25	CLASS	Yes	No	No
26	VENDOR-SPECIFIC	No	No	Yes
27	SESSION-TIMEOUT	Yes	No	Yes
28	IDLE-TIMEOUT	No	No	Yes
29	TERMINATION-ACTION	Yes	No	No
30	CALLED-STATION-ID	Yes	No	No
31	CALLING-STATION-ID	Yes	No	No
32	NAS-IDENTIFIER	Yes	No	No
40	ACCT-STATUS-TYPE	Set by RADIUS client for Accounting	No	No
42	ACCT-INPUT-OCTETS	Yes	No	No
43	ACCT-OUTPUT-OCTETS	Yes	No	No
44	ACCT-SESSION-ID	Set by RADIUS client for Accounting	No	No
46	ACCT-SESSION-TIME	Yes	No	No
49	ACCT-TERMINATE-CAUSE	Yes	No	No
52	ACCT-INPUT-GIGAWORDS	Yes	No	No
53	ACCT-OUTPUT-GIGAWORDS	Yes	No	No

Table 31-1. RADIUS Attributes Supported by PowerConnect Switch Service

Type	RADIUS Attribute Name	802.1X	User Manager	Captive Portal
61	NAS-PORT-TYPE	Yes	No	No
64	TUNNEL-TYPE	Yes	No	No
65	TUNNEL-MEDIUM-TYPE	Yes	No	No
79	EAP-MESSAGE	Yes	No	No
80	MESSAGE-AUTHENTICATOR	Set by RADIUS client for Accounting	No	No
81	TUNNEL-PRIVATE-GROUP-ID	Yes	No	No

The following attributes are processed in the RADIUS Access-Accept message received from a RADIUS server:

- NAS-PORT
  - ifIndex of the port to be authenticated
- REPLY-MESSAGE
  - Trigger to respond to the Access-Accept message with an EAP notification
- STATE
  - RADIUS server state. Transmitted in Access-Request and Accounting-Request messages.
- SESSION-TIMEOUT
  - Session timeout value for the session (in seconds). Used by both 802.1x and Captive Portal.
- TERMINATION-ACTION
  - Indication as to the action taken when the service is completed.
- EAP-MESSAGE
  - Contains an EAP message to be sent to the user. This is typically used for MAB clients.
- VENDOR-SPECIFIC
  - No actions configured at this time.

- FILTER-ID
  - Name of the filter list for this user.
- TUNNEL-TYPE
  - Used to indicate that a VLAN is to be assigned to the user when set to tunnel type VLAN (13).
- TUNNEL-MEDIUM-TYPE
  - Used to indicate the tunnel medium type. Must be set to medium type 802 (6) to enable VLAN assignment.
- TUNNEL-PRIVATE-GROUP-ID
  - Used to indicate the VLAN to be assigned to the user. May be a string which matches a preconfigured VLAN name or a VLAN id. If a VLAN id is given, the string must only contain decimal digits.

Commands in this Chapter

This chapter explains the following commands:

aaa accounting network default start-stop group radius	primary	radius-server timeout
acct-port	priority	retransmit
auth-port	radius-server deadtime	show aaa servers
deadtime	radius-server host	show radius statistics
key	radius-server key	source-ip
msgauth	radius-server retransmit	timeout
name (RADIUS server)	radius-server source-ip	usage

aaa accounting network default start-stop group radius

Use the **aaa accounting network default start-stop group radius** command to enable RADIUS accounting on the switch. Use the “no” form of this command to disable RADIUS accounting.

Syntax

aaa accounting network default start-stop group radius

no aaa accounting network default start-stop group radius

Default Configuration

RADIUS accounting is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#aaa accounting network default start-
stop group radius
```

acct-port

Use the **acct-port** command to set the port that connects to the RADIUS accounting server. Use the "no" form of this command to reset the port to the default.

Syntax

acct-port *port*

no acct-port

- *port* — The layer 4 port number of the accounting server (Range: 1 - 65535).

Default Configuration

The default value of the port number is 1813.

Command Mode

Radius (accounting) mode

User Guidelines

There are no user guidelines for this command.

Example

The following example sets port number 56 for accounting requests.

```
console(config)#radius-server host acct 3.2.3.2
console(Config-acct-radius)#acct-port 56
```

auth-port

Use the **auth-port** command in Radius mode to set the port number for authentication requests of the designated Radius server.

Syntax

auth-port *auth-port-number*

- *auth-port-number* — Port number for authentication requests. (Range: 1 - 65535)

Default Configuration

The default value of the port number is 1812.

Command Mode

Radius mode

User Guidelines

The host is not used for authentication if set to 0.

User must enter the mode corresponding to a specific Radius server before executing this command.

Example

The following example sets the port number 2412 for authentication requests.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#auth-port 2412
```

deadtime

Use the **deadtime** command in Radius mode to configure the minimum amount of time to wait before attempting to re-contact an unresponsive RADIUS server. If a RADIUS server is currently active and responsive, that server will be used until it no longer responds. RADIUS servers whose deadtime interval has not expired are skipped when searching for a new RADIUS server to contact.

Syntax

deadtime *deadtime*

- *deadtime* — The amount of time that the unavailable server is skipped over. (Range: 0-2000 minutes)

Default Configuration

The default deadtime interval is 0 minutes.

Command Mode

Radius mode

User Guidelines

If only one RADIUS server is configured, it is recommended to use a deadtime interval of 0.

Example

The following example specifies a deadtime interval of 60 minutes.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#deadtime 60
```

key

Use the **key** command to specify the encryption key which is shared with the RADIUS server. Use the "no" form of this command to remove the key.

Syntax

key *key-string*

- *key-string* — A string specifying the encryption key (Range: 0 - 128 characters).

Default Configuration

There is no key configured by default.

Command Mode

Radius mode

User Guidelines

There are no user guidelines for this command.

Example

The following example specifies an authentication and encryption key of "*lion-king*".

```
console(config)#radius-server host acct 3.2.3.2
console(Config-acct-radius)#key keyacct
```

msgauth

Use the **msgauth** command to enable the message authenticator attribute to be used for the RADIUS Authenticating server being configured. Use the "no" form of this command to disable the message authenticator attribute.

Syntax

msgauth

no msgauth

Default Configuration

The message authenticator attribute is enabled by default.

Command Mode

Radius mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(Config-auth-radius)#msgauth
```

name (RADIUS server)

Use the **name** command to assign a name to a RADIUS server. Use the **no** form of the command to return the name to the default (unspecified). The **no** form of the command does not require the user to enter the configured name.

Syntax

name servername

no name

Parameter Description

Parameter	Description
servername	The name for the RADIUS server (Range: 1 - 32 characters).

Default Configuration

The default RADIUS server name is Default-RADIUS-Server.

Command Mode

Radius Config mode

User Guidelines

Names may only be set for authentication servers, not for accounting servers. Names may consist of alphanumeric characters and the underscore, dash and blanks.Embed the name in double quotes to use a name with blanks.

NOTE: When multiple radius servers are configured with different names, e.g..

ServerName is name1 and address is 1.1.1.1

ServerName is name2 and address is 1.1.1.2

The radius request is always sent to the first ordered name server list, i.e. name1 server list would be tried before moving on to name2. Even if the priority value of servers in name2 is lower (lower value indicates high priority) the request would be sent to the name1 servers. If for name1 list, the configured servers fail to respond, the request is sent to the second configured name list.

Within the same server list , the first primary server would be tried. You can have multiple secondary servers in the same name list. From the multiple secondary servers, the one with the lowest priority value would be tried. For a different named server list, the server name would be based on lexicographic order. For e.g.. if name9, name1, name6 are configured in this order, name1, then name6, then name9 would be tried.

Example

```
console(config)#radius-server host 44.44.44.44
console(Config-auth-radius)#name NAME
console(Config-auth-radius)#no name
```

primary

Use the **primary** command to specify that a configured server should be the primary server in the group of authentication servers which have the same server name. Multiple primary servers can be configured for each group of servers which have the same name. When the RADIUS client has to perform transactions with an authenticating RADIUS server of the specified name, it uses the primary server that has the specified server name by default. If it fails to communicate with the primary server for any reason, it uses the backup servers configured with the same server name. These backup servers are identified as the “Secondary” type.

Syntax

primary

Default Configuration

There is no primary authentication server by default.

Command Mode

Radius mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(Config-auth-radius)#primary
```

priority

Use the **priority** command in Radius mode to specify the order in which the servers are to be used, with 0 being the highest priority.

Syntax

priority *priority*

- *priority* — Sets server priority level. (Range 0-65535)

Default Configuration

The default priority is 0.

Command Mode

Radius mode

User Guidelines

User must enter the mode corresponding to a specific Radius server before executing this command.

Example

The following example specifies a priority of 10 for the designated server.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#priority 10
```

radius-server deadtime

Use the **radius-server deadtime** command in Global Configuration mode to configure the minimum amount of time to wait before attempting to recontact an unresponsive RADIUS server. If a RADIUS server is currently active and responsive, that server will be used until it no longer responds. RADIUS servers whose deadtime interval has not expired are skipped when searching for a new RADIUS server to contact. To set the deadtime to 0, use the **no** form of this command.

Syntax

radius-server deadtime *deadtime*

no radius-server deadtime

- *deadtime* — Length of time in minutes, for which a Radius server is skipped over by transaction requests. (Range: 0–2000 minutes). **Deadtime** is used to mark an unavailable Radius server as dead until this user-configured time expires. **Deadtime** is configurable on a Radius server basis.

Default Configuration

The default dead time is 0 minutes.

Command Mode

Global Configuration mode

User Guidelines

If only one RADIUS server is configured, it is recommended that the deadtime interval be left at 0.

Example

The following example sets the minimum interval for a RADIUS server will not be contacted after becoming unresponsive.

```
console(config)#radius-server deadtime 10
```

radius-server host

Use the **radius-server host** command in Global Configuration mode to specify a RADIUS server host and enter RADIUS Configuration mode. To delete the specified Radius host, use the **no** form of this command.

Syntax

radius-server host [**acct** | **auth**] { *ip–address* | *hostname* }

no radius-server host [**acct** | **auth**] { *ip–address* | *hostname* }

Parameter Description

Parameter	Description
acct | **auth**	The type of server (accounting or authentication).
ip–address	The RADIUS server host IP address.
hostname	Host name of the Radius server host. (Range: 1–255 characters).

Default Configuration

The default server type is authentication. The default server name is **Default RADIUS Server**. The default port number is 1812 for an authentication server and 1813 for an accounting server.

Command Mode

Global Configuration mode

User Guidelines

Radius servers are keyed by the host name, therefore it is advisable to use unique server host names.

Example

The following example specifies a Radius server host with the following characteristics:

Server host IP address — 192.168.10.1

```
console(config)#radius-server host 192.168.10.1
```

radius-server key

Use the **radius-server key** command in Global Configuration mode to set the authentication and encryption key for all Radius communications between the switch and the Radius server. To reset to the default, use the **no** form of this command.

Syntax

radius-server key [*key-string*]

no radius-server key

- *key-string* — Specifies the authentication and encryption key for all Radius communications between the switch and the Radius server. This key must match the encryption used on the Radius server. (Range: 1-128 characters)

Default Configuration

The default is an empty string.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the authentication and encryption key for all Radius communications between the device and the Radius server to "dell-server."

```
console(config)#radius-server key dell-server
```

radius-server retransmit

Use the **radius-server retransmit** command in Global Configuration mode to specify the number of times the Radius client will retransmit requests to the Radius server. To reset the default configuration, use the **no** form of this command.

Syntax

radius-server retransmit *retries*

no radius-server retransmit

- *retries* — Specifies the retransmit value. (Range: 1–10)

Default Configuration

The default is 3 attempts.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the number of times the Radius client attempts to retransmit requests to the Radius server to 5 attempts.

```
console(config)#radius-server retransmit 5
```

radius-server source-ip

Use the **radius-server source-ip** command in Global Configuration mode to specify the source IP address used for communication with Radius servers. To return to the default, use the **no** form of this command. 0.0.0.0 is interpreted as a request to use the IP address of the outgoing IP interface.

Syntax

radius-server source-ip *source*

no radius-server source-ip

- *source* — Specifies the source IP address.

Default Configuration

The default IP address is the outgoing IP interface.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the source IP address used for communication with Radius servers to 10.1.1.1.

```
console(config)#radius-server source-ip 10.1.1.1
```

radius-server timeout

Use the **radius-server timeout** command in Global Configuration mode to set the interval for which a switch waits for a server host to reply. To restore the default, use the **no** form of this command.

Syntax

radius-server timeout *timeout*

no radius-server timeout

- *timeout* — Specifies the timeout value in seconds. (Range: 1–30)

Default Configuration

The default value is 3 seconds.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the interval for which a switch waits for a server host to reply to 5 seconds.

```
console(config)#radius-server timeout 5
```

retransmit

Use the **retransmit** command in Radius mode to specify the number of times the Radius client retransmits requests to the Radius server.

Syntax

retransmit *retries*

- *retries* — Specifies the retransmit value. (Range: 1-10 attempts)

Default Configuration

The default number for attempts is 3.

Command Mode

Radius mode

User Guidelines

User must enter the mode corresponding to a specific Radius server before executing this command.

Example

The following example of the retransmit command specifies five retries.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#retransmit 5
```

show aaa servers

Use the **show aaa servers** command to display the list of configured RADIUS servers and the values configured for the global parameters of the RADIUS client.

Syntax

show aaa servers [**accounting** | **authentication**] [**name** [*servername*]]

Parameter Description

Parameter	Description
accounting	This optional parameter will cause accounting servers to be displayed.
authentication	This optional parameter will cause authentication servers to be displayed.
name	This optional parameter will cause the server names to be displayed instead of the server configuration parameters.
servername	Will cause only the server(s) with *server-name* name to be displayed. There are no global parameters displayed when this parameter is specified.

Default Configuration

Authentication servers are displayed by default.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

The following fields are displayed:

Field	Description
Configured Authentication Servers	The number of RADIUS Authentication servers that have been configured.

Field	Description
Configured Accounting Servers	The number of RADIUS Accounting servers that have been configured.
Named Authentication Server Groups	The number of configured named RADIUS server groups.
Named Accounting Server Groups	The number of configured named RADIUS server groups.
Timeout	The configured timeout value, in seconds, for request retransmissions.
Retransmit	The configured value of the maximum number of times a request packet is retransmitted.
Deadtime	The length of time an unavailable RADIUS server is skipped.
RADIUS Accounting Mode	A Global parameter to indicate whether the accounting mode for all the servers is enabled or not.
RADIUS Attribute 4 Mode	A Global parameter to indicate whether the NAS-IP-Address attribute has been enabled to use in RADIUS requests.
RADIUS Attribute 4 Value	A Global parameter that specifies the IP address to be used in NAS-IP-Address attribute to be used in RADIUS requests.

Example

```
console#show aaa servers

IP address       Type  Port  TimeOut Retran. DeadTime Source IP   Prio. Usage
---------------- ----- ----- ------- ------- -------- ---------- ----- ------

6.6.6.6          Auth  1812  Global  Global  Global   Global        0     all
5.5.5.5          Auth  1812  Global  Global  Global   Global        0     all
4.4.4.4          Auth  1812  Global  Global  Global   Global        0     all
3.3.3.3          Auth  1812  Global  Global  Global   Global        0     all
2.2.2.2          Auth  1812  Global  Global  Global   Global        0     all
1.1.1.1          Acct  1813  N/A     N/A     N/A      N/A           N/A   N/A

Global values
-----------------------------------------
Number of Configured Authentication Servers.... 5
Number of Configured Accounting Servers........ 1
```

```
Number of Named Authentication Server Groups... 2
Number of Named Accounting Server Groups....... 1
Number of Retransmits.......................... 3
Timeout Duration............................... 15
Deadtime....................................... 0
Source IP...................................... 0.0.0.0
RADIUS Accounting Mode......................... Disable
RADIUS Attribute 4 Mode........................ Disable
--More-- or (q)uit
RADIUS Attribute 4 Value....................... 0.0.0.0

console#show aaa servers name

Server Name                     Host Address             Port   Secret
                                                                Configured
------------------------------- ----------------------- ------ ----------
Default-RADIUS-Server           4.4.4.4                  1812   No
test                            6.6.6.6                  1812   No

console#show radius-servers
IP address    Type  Port  TimeOut Retran. DeadTime  Source IP
Prio. Usage
------------- ----- ----- ------- ------- -------- ------------- --
--- -----


10.27.5.157   Auth  1812  Global  Global  Global   10.27.65.13   0
all


Global values
Configured Authentication Servers : 1
Configured Accounting Servers : 0
Named Authentication Server Groups : 1
Named Accounting Server Groups : 0
Timeout : 3
Retransmit : 3
Deadtime : 0
Source IP : 0.0.0.0
RADIUS Attribute 4 Mode : Disable
RADIUS Attribute 4 Value : 0.0.0.0
```

```
console#show radius-servers accounting name

Server Name             Host Address    Port   Type
---------------------- -------------- ------ ----------
Default-RADIUS-Server   2.2.2.2        1813   Secondary

console#show radius-servers name Default-RADIUS-Server

RADIUS Server Name..... Default-RADIUS-Server
Current Server IP Address..... 1.1.1.1
Retransmits..... 4
Timeout..... 5
Deadtime..... 0
Port..... 1812
Source IP..... 0.0.0.0
Secret Configured..... No
Message Authenticator..... Enable
```

show radius statistics

Use the **show radius statistics** command to show the statistics for an authentication or accounting server.

Syntax

show radius statistics [**accounting** | **authentication**] [{*ipaddress* | *hostname* | **name** *servername* }]

Parameter Description

Parameter	Description
accounting | authentication	The type of server (accounting or authentication).

Parameter	Description
ipaddress	The RADIUS server host IP address.
hostname	Host name of the Radius server host. (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes. For example, console(config)#snmp-server host "host name"
servername	The alias used to identify the server.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

The following fields are displayed for accounting servers:

Field	Description
RADIUS Accounting Server Name	Name of the accounting server.
Server Host Address	IP address of the host.
Round Trip Time	The time interval, in hundredths of a second, between the most recent Accounting Response and the Accounting Request that matched it from this RADIUS accounting server.
Requests	The number of RADIUS Accounting Request packets sent to this server not including the retransmissions.
Retransmissions	The number of RADIUS Accounting Request packets retransmitted to this RADIUS accounting server.
Responses	The number of RADIUS packets received on the accounting port from this server.

Field	Description
Malformed Responses	The number of malformed RADIUS Accounting Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed accounting responses.
Bad Authenticators	The number of RADIUS Accounting Response packets containing invalid authenticators received from this accounting server.
Pending Requests	The number of RADIUS Accounting Request packets destined for this server that have not yet timed out or received a response.
Timeouts	The number of accounting timeouts on this server.
Unknown Types	The number of packets unknown type which were received from this server on accounting port.
Packets Dropped	The number of RADIUS packets received from this server on accounting port and dropped for some other reason.

The following fields are displayed for authentication servers:

Field	Description
RADIUS Server Name	Name of the authenticating server.
Server Host Address	IP address of the host.
Access Requests	The number of RADIUS Access Request packets sent to this server. This number does not include retransmissions.
Access Retransmissions	The number of RADIUS Access Request packets retransmitted to this RADIUS authentication server.
Access Accepts	The number of RADIUS Access Accept packets, including both valid and invalid packets, that were received from this server.
Access Rejects	The number of RADIUS Access Reject packets, including both valid and invalid packets, that were received from this server.
Access Challenges	The number of RADIUS Access Challenge packets, including both valid and invalid packets, that were received from this server.

Field	Description
Malformed Access Responses	The number of malformed RADIUS Access Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed access responses.
Bad Authenticators	The number of RADIUS Access Response packets containing invalid authenticators or signature attributes received from this server.
Pending Requests	The number of RADIUS Access Request packets destined for this server that have not yet timed out or received a response.
Timeouts	The number of authentication timeouts to this server.
Unknown Types	The number of packets unknown type which were received from this server on the authentication port.
Packets Dropped	The number of RADIUS packets received from this server on authentication port and dropped for some other reason.

Example

```
console#show radius statistics accounting 192.168.37.200


RADIUS Accounting Server Name.................
Default_RADIUS_Server

Host Address.................................
192.168.37.200

Round Trip Time.............................. 0.00

Requests..................................... 0

Retransmissions.............................. 0

Responses.................................... 0

Malformed Responses.......................... 0

Bad Authenticators........................... 0

Pending Requests............................. 0

Timeouts..................................... 0

Unknown Types................................ 0
```

```
Packets Dropped.............................. 0


console#show radius statistics name Default_RADIUS_Server


RADIUS Server Name.............................
Default_RADIUS_Server
Server Host Address...........................
192.168.37.200
Access Requests.............................. 0.00
Access Retransmissions....................... 0
Access Accepts............................... 0
Access Rejects............................... 0
Access Challenges............................ 0
Malformed Access Responses................... 0
Bad Authenticators........................... 0
Pending Requests............................. 0
Timeouts..................................... 0
Unknown Types................................ 0
Packets Dropped.............................. 0
```

source-ip

Use the **source-ip** command in Radius mode to specify the source IP address to be used for communication with Radius servers. 0.0.0.0 is interpreted as a request to use the IP address of the outgoing IP interface.

Syntax

source-ip *source*

- *source* — A valid source IP address.

Default Configuration

The IP address is of the outgoing IP interface.

Command Mode

Radius mode

User Guidelines

User must enter the mode corresponding to a specific Radius server before executing this command.

Example

The following example specifies 10.240.1.23 as the source IP address.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#source-ip 10.240.1.23
```

timeout

Use the timeout command in Radius mode to set the timeout value in seconds for the designated Radius server.

Syntax

timeout *timeout*

- *timeout* — Timeout value in seconds for the specified server. (Range: 1-30 seconds.)

Default Configuration

The default value is 3 seconds.

Command Mode

Radius mode

User Guidelines

User must enter the mode corresponding to a specific Radius server before executing this command.

Example

The following example specifies the timeout setting for the designated Radius Server.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#timeout 20
```

usage

Use the **usage** command in Radius mode to specify the usage type of the server.

Syntax

usage *type*

- *type* — Variable can be one of the following values: *login*, *802.1x* or *all*.

Default Configuration

The default variable setting is *all*.

Command Mode

Radius mode

User Guidelines

User must enter the mode corresponding to a specific Radius server before executing this command.

Example

The following example specifies usage type *login*.

```
console(config)#radius-server host 192.143.120.123
console(config-radius)#usage login
```

32

Spanning Tree Commands

The Multiple Spanning Tree Protocol (MSTP) component complies with IEEE 802.1s by efficiently navigating VLAN traffic over separate interfaces for multiple instances of Spanning Tree. IEEE 802.1D, Spanning Tree and IEEE 802.1w, Rapid Spanning Tree are supported through the IEEE 802.1s implementation. The difference between the RSTP and STP (IEEE 802.1D) is the ability to configure and recognize full-duplex connectivity and ports that are connected to end stations. The difference enables RSTP to rapidly transition to the **Forwarding** state and to suppress the Topology Change Notification PDUs, where possible.

A VLAN ID does not have to be pre-configured before mapping it to an MST instance.

Management of MSTP is compliant with the requirements of RFC5060.

The following features are supported by PowerConnect MSTP:

STP Loop Guard - The Loop Guard feature is an enhancement of the Multiple Spanning Tree Protocol. Loop guard protects a network from forwarding loops induced by BPDU packet loss. It can be configured to prevent a blocked port from transitioning to the forwarding state when the port stops receiving BPDUs for some reason (such as a uni-directional link failure).

STP BPDU Guard - The STP BPDU guard allows the network administrator to enforce the STP domain borders and keep the active topology consistent and predictable. The switches behind the edge ports that have STP BPDU guard enabled are not able to influence the overall STP topology. At the reception of BPDUs, the BPDU guard operation disables the port that is configured with this option and transitions the port into disable state. This would lead to administrative disable of the port.

STP Root Guard - The root guard ensures that the port on which root guard is enabled is the designated port. In a root bridge ports are all designated ports, unless two or more ports of the root bridge are connected together. If the bridge receives superior STP BPDUs on a root guard enabled port, root guard moves this port to a root inconsistent STP state. This root inconsistent state is effectively equal to a listening state. No traffic is forwarded across this

port. In this way, the root guard enforces the position of the root bridge. In MSTP scenario the port may be designated in one of the instances while being alternate in the CIST, and so on. Root guard is a per port (not a per port per instance command) configuration so all the MSTP instances this port participates in should not be in root role.

STP BPDU Filtering - STP BPDU filtering applies to all operational edge ports. Edge Port in an operational state is supposed to be connected to hosts that typically drop BPDUs. If an operational edge port receives a BPDU, it immediately loses its operational status. In that case, if BPDU filtering is enabled on this port then it drops the BPDUs received on this port.

STP BPDU Flooding - STP BPDU flooding feature applies to the STP disabled switch. To enable BPDU flooding on a port, STP should be disabled on the switch administratively. When this feature is enabled on the switch, it floods all the ports with the BPDU flood feature enabled on it.

Commands in this Chapter

This chapter explains the following commands:

clear spanning-tree detected-protocols	spanning-tree auto-portfast	spanning-tree max-age	spanning-tree portfast bpdufilter default
exit (mst)	spanning-tree bpdu flooding	spanning-tree max-hops	spanning-tree portfast default
instance (mst)	spanning-tree bpdu-protection	spanning-tree mode	spanning-tree port-priority
name (mst)	spanning-tree cost	spanning-tree mst configuration	spanning-tree priority
revision (mst)	spanning-tree disable	spanning-tree mst cost	spanning-tree tcnguard
show spanning-tree	spanning-tree forward-time	spanning-tree mst port-priority	spanning-tree transmit hold-count
show spanning-tree summary	spanning-tree guard	spanning-tree mst priority	
spanning-tree	spanning-tree loopguard	spanning-tree portfast	

clear spanning-tree detected-protocols

Use the **clear spanning-tree detected-protocols** command in Privileged EXEC mode to restart the protocol migration process (force the renegotiation with neighboring switches) on all interfaces or on the specified interface.

Syntax

clear spanning-tree detected-protocols [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}]

Default Configuration

This command has no default setting.

Command Mode

Privileged EXEC mode

User Guidelines

This feature is used only when working in RSTP or MSTP mode.

Example

The following example restarts the protocol migration process (forces the renegotiation with neighboring switches) on 1/0/1.

```
console#clear spanning-tree detected-protocols
gigabitethernet 1/0/1
```

exit (mst)

Use the **exit command in MST** mode to exit the MST configuration mode and apply all configuration changes.

Syntax

exit

Default Configuration

MST configuration.

Command Mode

MST mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to exit the MST configuration mode and save changes.

```
console(config)#spanning-tree mst configuration
console(config-mst)#exit
```

instance (mst)

Use the **instance command** in MST mode to map VLANS to an MST instance.

Syntax

instance *instance-id* {**add** | **remove**} **vlan** *vlan-range*

- *instance-ID* — ID of the MST instance. (Range: 1-15)
- *vlan-range* — VLANs to be added to the existing MST instance. To specify a range of VLANs, use a hyphen. To specify a series of VLANs, use a comma. (Range: 1-4093)

Default Configuration

VLANs are mapped to the common and internal spanning tree (CIST) instance (instance 0).

Command Mode

MST mode

User Guidelines

Before mapping VLANs to an instance use the **spanning-tree mst enable** command to enable the instance.

All VLANs that are not explicitly mapped to an MST instance are mapped to the common and internal spanning tree (CIST) instance (instance 0) and cannot be unmapped from the CIST.

For two or more switches to be in the same MST region, they must have the same VLAN mapping, the same configuration revision number, and the same name.

PowerConnect MSTP supports mapping of VLANs to MST instances, even though the underlying VLAN may not be defined on the switch. Traffic received on VLANs not defined on the port received is dropped.

Example

The following example maps the entire range of VLANs to MST instances (MST instance 0 is mapped to VLAN 1 by default). Additionally, two 10G ports have some, but not all, of the VLANs mapped to MST instances.

```
console(config)#spanning-tree mode mst
console(config)#spanning-tree mst 1 priority 8192
console(config)#spanning-tree mst 2 priority 28672
console(config)#spanning-tree mst configuration
console(config-mst)#instance 1 add vlan 2-199
console(config-mst)#instance 1 add vlan 350
console(config-mst)#instance 1 add vlan 400-449
console(config-mst)#instance 1 add vlan 500-1999
console(config-mst)#instance 1 add vlan 2200-2499
console(config-mst)#instance 1 add vlan 2600-2799
console(config-mst)#instance 1 add vlan 3000-4093
console(config-mst)#instance 2 add vlan 200-349
console(config-mst)#instance 2 add vlan 351-399
console(config-mst)#instance 2 add vlan 450-499
console(config-mst)#instance 2 add vlan 2000-2199
console(config-mst)#instance 2 add vlan 2500-2599
console(config-mst)#instance 2 add vlan 2800-2999
console(config-mst)#exit
```

```
console(config)#interface te1/1/1
console(config-if-Te1/1/1)#switchport mode trunk
console(config-if-Te1/1/1)#switchport trunk allowed vlan
add 2-150
console(config-if-Te1/1/1)#spanning-tree mst 1 port-
priority 16
console(config-if-Te1/1/1)#interface te1/1/2
console(config-if-Te1/1/2)#switchport mode trunk
console(config-if-Te1/1/2)#switchport trunk allowed vlan
add 200-349
console(config-if-Te1/1/2)#spanning-tree mst 2 port-
priority 16
console(config-if-Te1/1/2)#exit
```

name (mst)

Use the **name command in MST** mode to define the configuration name. To return to the default setting, use the **no** form of this command.

Syntax

name *string*

- *string* — *Case sensitive* MST configuration name. (Range: 1-32 characters)

Default Configuration

Bridge address.

Command Mode

MST mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the configuration name to "region1".

```
console(config)#spanning-tree mst configuration
console(config-mst)#name region1
```

revision (mst)

Use the **revision command in MST** mode to identify the configuration revision number. To return to the default setting, use the **no** form of this command.

Syntax

revision *version*

no revision

- *version* — Configuration revision number. (Range: 0-65535)

Default Configuration

Revision number is 0.

Command Mode

MST mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the configuration revision to 1.

```
console(config)#spanning-tree mst configuration
console(config-mst)#revision 1
```

show spanning-tree

Use the **show spanning-tree** command in Privileged EXEC mode to display the spanning-tree configuration.

Syntax

show spanning-tree [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}] [**instance** *instance-id*]

show spanning-tree [**detail**] [**active** | **blockedports**] | [**instance** *instance-id*]

show spanning-tree mst-configuration

Parameter Description

Parameter	Description
detail	Displays detailed information.
active	Displays active ports only.
blockedports	Displays blocked ports only.
mst-configuration	Displays the MST configuration identifier.
instance -id	ID of the spanning -tree instance.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following examples display spanning-tree information.

```
console#show spanning-tree
Spanning tree :Enabled - BPDU Flooding :Disabled - Portfast BPDU filtering
:Disabled - mode :rstp
CST Regional Root:        80:00:00:1E:C9:AA:AD:1B
Regional Root Path Cost:  0
ROOT ID
              Priority        32768
              Address         0010.1882.1C53
              Path Cost       20000
```

```
              Root Port       Gi1/0/1
             Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec TxHoldCount
6 sec
Bridge ID
              Priority        32768
              Address         001E.C9AA.AD1B
              Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
Interfaces

Name     State    Prio.Nbr  Cost      Sts  Role  Restricted
------   -------- --------- --------- ---- ----- ----------
Gi1/0/1  Enabled  128.1     20000     FWD  Root  No
Gi1/0/2  Enabled  128.2     0         DIS  Disb  No
Gi1/0/3  Enabled  128.3     0         DIS  Disb  No
Gi1/0/4  Enabled  128.4     0         DIS  Disb  No



console#show spanning-tree gigabitethernet 1/0/1

Port Gi1/0/1 Enabled
State: Forwarding                                Role: Root
Port id: 128.1                                   Port Cost: 20000
Port Fast:  No                                   Root Protection: No
Designated bridge Priority: 32768                Address: 0010.1882.1C53
Designated port id: 128.48                       Designated path cost: 0
CST Regional Root: 80:00:00:10:18:82:1C:53       CST Port Cost: 0
Root Guard..................................... FALSE
Loop Guard..................................... FALSE
TCN Guard...................................... FALSE
Auto Portfast.................................. TRUE
Port Up Time Since Counters Last Cleared....... 0 day 0 hr 17 min 1 sec
BPDU: sent 24, received 496



console#show spanning-tree detail
Spanning tree Enabled (BPDU flooding : Disabled) Portfast BPDU filtering
Disabled mode rstp
CST Regional Root:        80:00:00:1E:C9:AA:AD:1B
Regional Root Path Cost:  0
ROOT ID
              Priority        32768
              Address         0010.1882.1C53
```

```
              Path Cost       20000
              Root Port       Gi1/0/1
              Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
Bridge ID
              Priority        32768
              Address         001E.C9AA.AD1B
              Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec

Number of topology changes 1 last change occurred 0d0h17m7s ago
Times: hold 6, hello 2, max age 20, forward delay 15

Port Gi1/0/1 Enabled
State: Forwarding                                Role: Root
Port id: 128.1                                   Port Cost: 20000
Root Protection: No
Designated bridge Priority: 32768                Address: 0010.1882.1C53
Designated port id: 128.48                       Designated path cost: 0
CST Regional Root: 80:00:00:10:18:82:1C:53       CST Port Cost: 0
BPDU: sent 24, received 500

console#show spanning-tree detail active
Spanning tree Enabled (BPDU flooding : Disabled) Portfast BPDU filtering
Disabled mode rstp
CST Regional Root:        80:00:00:1E:C9:AA:AD:1B
Regional Root Path Cost:  0
ROOT ID
              Priority        32768
              Address         0010.1882.1C53
              Path Cost       20000
              Root Port       Gi1/0/1
              Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
Bridge ID
              Priority        32768
              Address         001E.C9AA.AD1B
              Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec

Number of topology changes 1 last change occurred 0d0h17m15s ago
Times: hold 6, hello 2, max age 20, forward delay 15

Port Gi1/0/1 Enabled
State: Forwarding                                Role: Root
Port id: 128.1                                   Port Cost: 20000
Root Protection: No
```

```
Designated bridge Priority: 32768               Address: 0010.1882.1C53
Designated port id: 128.48                      Designated path cost: 0
CST Regional Root: 80:00:00:10:18:82:1C:53      CST Port Cost: 0
BPDU: sent 24, received 504

Port Gi1/0/5 Enabled
State: Forwarding                               Role: Designated
Port id: 128.5                                  Port Cost: 20000
Root Protection: No
Designated bridge Priority: 32768               Address: 001E.C9AA.AD1B
Designated port id: 128.5                       Designated path cost: 20000
CST Regional Root: 80:00:00:1E:C9:AA:AD:1B      CST Port Cost: 0
BPDU: sent 524, received 0


console#show spanning-tree detail blockedports
Spanning tree Enabled (BPDU flooding : Disabled) Portfast BPDU filtering
Disabled mode rstp
CST Regional Root:        80:00:00:1E:C9:AA:AD:1B
Regional Root Path Cost:  0
ROOT ID
              Priority        32768
              Address         0010.1882.1C53
              Path Cost       20000
              Root Port       Gi1/0/1
              Hello Time 2 Sec Max Age 20 sec Forward Delay 15 sec
Bridge ID
              Priority        32768
              Address         001E.C9AA.AD1B
              Hello Time 2 Sec Max Age 20
```

show spanning-tree summary

Use the **show spanning-tree summary** command to display spanning tree settings and parameters for the switch.

Syntax

show spanning-tree summary

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

The following fields are displayed:

Field	Description
Spanning Tree Admin Mode	Enabled or disabled
Spanning Tree Version	Version of 802.1 currently supported (IEEE 802.1s, IEEE 802.1w, or IEEE 802.1d) based upon the mode parameter.
BPDU Protection Mode	Enabled or disabled.
BPDU Filter Mode	Enabled or disabled.
BPDU Flooding Mode	Enabled or disabled.
Configuration Name	Identifier used to identify the configuration currently being used.
Configuration Revision Level	Identifier used to identify the configuration currently being used.
Configuration Digest Key	A generated Key used in the exchange of the BPDUs.
Configuration Format Selector	Specifies the version of the configuration format being used in the exchange of BPDUs. The default value is zero.
MST Instances	List of all multiple spanning tree instances configured on the switch.

Example

```
console#show spanning-tree summary
Spanning Tree Adminmode.......... Enabled
Spanning Tree Version............. IEEE 802.1w
BPDU Guard Mode................... Disabled
BPDU Flood Mode................... Disabled
```

```
BPDU Filter Mode.................. Disabled
Configuration Name................ 00-1E-C9-AA-AC-84
Configuration Revision Level...... 0
Configuration Digest Key.........
0xac36177f50283cd4b83821d8ab26de62
Configuration Format Selector..... 0
```

spanning-tree

Use the **spanning-tree** command in Global Configuration mode to enable spanning-tree functionality. To disable spanning-tree functionality, use the **no** form of this command.

Syntax

spanning-tree

no spanning-tree

Default Configuration

Spanning-tree is enabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables spanning-tree functionality.

```
console(config)#spanning-tree
```

spanning-tree auto-portfast

Use the **spanning-tree auto-portfast** command to set the port to auto portfast mode. This enables the port to become a portfast port if it does not see any BPDUs for 3 seconds. Use the "no" form of this command to disable auto portfast mode.

Syntax

spanning-tree auto-portfast

no spanning-tree auto-portfast

Default Configuration

Auto portfast mode is disabled by default.

Command Mode

Interface Configuration (Ethernet, Port Channel) mode

Usage Guidelines

There are no user guidelines for this command.

Example

The following example enables spanning-tree functionality on gigabit ethernet interface 4/0/1.

```
console#config
console(config)#interface gigabitethernet 4/0/1
console(config-if-4/0/1)#spanning-tree auto-portfast
```

spanning-tree bpdu flooding

The **spanning-tree bpdu flooding** command allows flooding of BPDUs received on non-spanning-tree ports to all other non-spanning-tree ports. Use the "no" form of the command to disable flooding.

Syntax

spanning-tree bpdu flooding

no spanning-tree bpdu flooding

Default Configuration

This feature is disabled by default.

Command Mode

Global Configuration mode

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#spanning-tree bpdu flooding
```

spanning-tree bpdu-protection

Use the **spanning-tree bpdu-protection** command in Global Configuration mode to enable BPDU protection on a switch. Use the **no** form of this command to resume the default status of BPDU protection function.

For an access layer device, the access port is generally connected to the user terminal (such as a desktop computer) or file server directly and configured as an edge port to implement the fast transition. When the port receives a BPDU packet, the system sets it to non-edge port and recalculates the spanning tree, which causes network topology flapping. In normal cases, these ports do not receive any BPDU packets. However, someone may forge BPDU to maliciously attack the switch and cause network flapping.

RSTP provides BPDU protection function against such attack. After BPDU protection function is enabled on a switch, the system disables an edge port that has received BPDU and notifies the network manager about it. The disabled port can only be enabled by the **no** version of the command.

Syntax

spanning-tree bpdu-protection

no spanning-tree bpdu-protection

Default Configuration

BPDU protection is not enabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables BPDU protection.

```
console(config)#spanning-tree bpdu-protection
```

spanning-tree cost

Use the **spanning-tree cost** command in Interface Configuration mode to configure the external spanning-tree path cost for a port. To return to the default port path cost, use the **no** form of this command.

Syntax

spanning-tree cost *cost*

no spanning-tree cost

- *cost* — The port path cost. (Range: 0–200,000,000)

Default Configuration

The default cost is 0, which signifies that the cost is automatically calculated based on port speed.

- **10G Port path cost** — 2000
- **Port Channel** — 20,000
- **1000 mbps (giga)** — 20,000
- **100 mbps** — 200,000
- **10 mbps** — 2,000,000

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command configures the external cost. Since by default each switch is in its own region, the external cost is considered in determining the spanning tree of the network.

This command is also used to configure the rstp path cost.

Example

The following example configures the spanning-tree cost on 1/0/5 to 35000.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/5)#spanning-tree cost 35000
```

spanning-tree disable

Use the **spanning-tree disable** command in Interface Configuration mode to disable spanning-tree on a specific port. To enable spanning-tree on a port, use the **no** form of this command.

Syntax

spanning-tree disable

no spanning-tree disable

Default Configuration

By default, all ports are enabled for spanning-tree.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example disables spanning-tree on 1/0/5.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/5)#spanning-tree disable
```

spanning-tree forward-time

Use the **spanning-tree forward-time** command in Global Configuration mode to configure the spanning-tree bridge forward time, which is the amount of time a port remains in the listening and learning states before entering the forwarding state.

To reset the default forward time, use the **no** form of this command.

Syntax

spanning-tree forward-time *seconds*

no spanning-tree forward-time

- *seconds* — Time in seconds. (Range: 4–30)

Default Configuration

The default forwarding-time for IEEE Spanning-tree Protocol (STP) is 15 seconds.

Command Mode

Global Configuration mode.

User Guidelines

When configuring the Forward-Time the following relationship should be satisfied:

2*(Forward-Time - 1) >= Max-Age.

Example

The following example configures spanning-tree bridge forward time to 25 seconds.

```
console(config)#spanning-tree forward-time 25
```

spanning-tree guard

The **spanning-tree guard** command selects whether loop guard or root guard is enabled on an interface. If neither is enabled, the port operates in accordance with the multiple spanning tree protocol. Use the "no" form of this command to disable loop guard or root guard on the interface.

Syntax

spanning-tree guard { **root** | **loop** | **none** }

- **root** — Enables root guard.
- **loop** — Enables loop guard
- **none** — Disables root and loop guard.

Default Configuration

Neither root nor loop guard is enabled.

Command Mode

Interface Configuration (Ethernet, Port Channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example disables spanning-tree guard functionality on gigabit ethernet interface 4/0/1.

```
console#config
console(config)#interface gigabitethernet 4/0/1
console(config-if-4/0/1)#spanning-tree guard none
```

spanning-tree loopguard

Use the **spanning-tree loopguard** command to enable loop guard on all ports. Use the "no" form of this command to disable loop guard on all ports.

Syntax

spanning-tree loopguard default

no spanning-tree loopguard default

Default Configuration

Loop guard is disabled by default.

Command Mode

Global Configuration mode

Usage Guidelines

There are no usage guidelines for this command.

Example

The following example enables spanning-tree loopguard functionality on all ports.

```
console(config)#spanning-tree loopguard default
```

spanning-tree max-age

Use the **spanning-tree max-age** command in Global Configuration mode to configure the spanning-tree bridge maximum age. To reset the default maximum age, use the **no** form of this command.

Syntax

spanning-tree max-age *seconds*

no spanning-tree max-age

- *seconds* -Time in seconds. (Range: 6–40)

Default Configuration

The default max-age for IEEE STP is 20 seconds.

Command Mode

Global Configuration mode

User Guidelines

When configuring the Max-Age the following relationships should be satisfied:

2*(Forward-Time - 1) >= Max-Age

Max-Age >= 2*(Hello-Time + 1)

Example

The following example configures the spanning-tree bridge maximum-age to 10 seconds.

```
console(config)#spanning-tree max-age 10
```

spanning-tree max-hops

Use the **spanning-tree max-hops** command to set the MSTP Max Hops parameter to a new value for the common and internal spanning tree. Use the "no" form of this command to reset the Max Hops to the default.

Syntax

spanning-tree max-hops *hops*

no spanning-tree max-hops

- *hops* — The maximum number of hops to use (Range: 1–127).

Default Configuration

The Maximum number of hops is 20 by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#spanning-tree max-hops 32
```

spanning-tree mode

Use the **spanning-tree mode** command in Global Configuration mode to configure the spanning-tree protocol. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree mode {**stp** | **rstp** | **mst**}

no spanning-tree mode

- **stp** — Spanning Tree Protocol (STP) is enabled.
- **rstp** — Rapid Spanning Tree Protocol (RSTP) is enabled.
- **mst** — Multiple Spanning Tree Protocol (MSTP) is enabled.

Default Configuration

Rapid Spanning Tree Protocol (RSTP) is supported.

Command Mode

Global Configuration mode

User Guidelines

In RSTP mode, the switch would use STP when the neighbor switch is using STP. In MSTP mode, the switch would use RSTP when the neighbor switch is using RSTP and would use STP when the neighbor switch is using STP.

Example

The following example configures the spanning-tree protocol to MSTP.

```
console(config)#spanning-tree mode mst
```

spanning-tree mst configuration

Use the **spanning-tree mst configuration** command in Global Configuration mode to enable configuring an MST region by entering the multiple spanning-tree (MST) mode.

Syntax

spanning-tree mst configuration

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

For two or more switches to be in the same MST region, they must have the same VLAN mapping, the same configuration revision number and the same name.

Example

The following example configures an MST region.

```
console (config)#spanning-tree mst configuration
console (config-mst)#instance 1 add vlan 10-20
console (config-mst)#name region1
console (config-mst)#revision 1
```

spanning-tree mst cost

Use the **spanning-tree mst cost** command in Interface Configuration mode to configure the internal path cost for multiple spanning tree (MST) calculations. If a loop occurs, the spanning tree considers path cost when selecting an interface to put in the forwarding state. To return to the default port path cost, use the **no** form of this command.

Syntax

spanning-tree mst *instance-id* **cost** *cost*

no spanning-tree mst *instance-id* **cost**

- *instance-ID* — ID of the spanning -tree instance. (Range: 1-15)

- *cost* — The port path cost. (Range: 0–200,000,000)

Default Configuration

The default value is 0, which signifies that the cost will be automatically calculated based on port speed.

The default configuration is:

- Ethernet (10 Mbps) — 2,000,000
- Fast Ethernet (100 Mbps) — 200,000
- Gigabit Ethernet (1000 Mbps) — 20,000
- Port-Channel — 20,000

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

MST instance id 0 is the common internal spanning tree instance (CIST).

Example

The following example configures the MSTP instance 1 path cost for interface 1/0/9 to 4.

```
console(config)#interface gigabitethernet 1/0/9
console(config-if-1/0/9)#spanning-tree mst 1 cost 4
```

spanning-tree mst port-priority

Use the **spanning-tree mst port-priority** command in Interface Configuration mode to configure port priority. To return to the default port priority, use the **no** form of this command.

Syntax

spanning-tree mst *instance-id* **port-priority** *priority*

no spanning-tree mst *instance-id* **port-priority**

Parameter Description

Parameter	Description
instance-id	ID of the spanning-tree instance. (Range: 1-4094)
priority	The port priority. (Range: 0-240 in multiples of 16.)

Default Configuration

The default port-priority for IEEE STP is 128.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The priority will be set to the nearest multiple of 4096 if not an exact multiple of 4096.

Example

The following example configures the port priority of gigabit Ethernet interface 1/0/5 to 144.

```
console(config)#interface gigabitethernet 1/0/5

console(config-if)#spanning-tree mst 1 port-priority
144
```

spanning-tree mst priority

Use the **spanning-tree mst priority** command in Global Configuration mode to set the switch priority for the specified spanning-tree instance. To return to the default setting, use the **no** form of this command.

Syntax

spanning-tree mst *instance-id* **priority** *priority*

no spanning-tree mst *instance-id* **priority**

Parameter Description

Parameter	Description
instance-id	ID of the spanning-tree instance. (Range: 1-4094)
priority	Sets the switch priority for the specified spanning-tree instance. This setting affects the likelihood that the switch is selected as the root switch. A lower value increases the probability that the switch is selected as the root switch. (Range: 0-61440)

Default Configuration

The default bridge priority for IEEE STP is 32768.

Command Mode

Global Configuration mode

User Guidelines

The priority value must be a multiple of 4096. The priority will be set to the nearest multiple of 4096 if not an exact multiple of 4096.

The switch with the lowest priority is selected as the root of the spanning tree.

Example

The following example configures the spanning tree priority of instance 1 to 4096.

```
console(config)#spanning-tree mst 1 priority 4096
```

spanning-tree portfast

Use the **spanning-tree portfast** command in Interface Configuration mode to enable PortFast mode. In PortFast mode, the interface is immediately put into the forwarding state upon linkup, without waiting for the timer to expire. To disable PortFast mode, use the **no** form of this command.

Syntax

spanning-tree portfast

no spanning-tree portfast

Default Configuration

PortFast mode is disabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command only applies to access ports. The command is to be used only with interfaces connected to end stations. Otherwise, an accidental topology loop could cause a data packet loop and disrupt switch and network operations.

An interface with PortFast mode enabled is moved directly to the spanning tree forwarding state when linkup occurs without waiting the standard forward-time delay.

Example

The following example enables PortFast on 1/0/5.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/5)#spanning-tree portfast
```

spanning-tree portfast bpdufilter default

The **spanning-tree portfast bpdufilter default** command discards BPDUs received on spanning-tree ports in portfast mode. Use the "no" form of the command to disable discarding.

Syntax

spanning-tree portfast bpdufilter default

no spanning-tree portfast bpdufilter default

Default Configuration

This feature is disabled by default.

Command Mode

Global Configuration mode

Usage Guidelines

There are no usage guidelines for this command.

Example

The following example discards BPDUs received on spanning-tree ports in portfast mode.

```
console#spanning-tree portfast bpdufilter default
```

spanning-tree portfast default

Use the **spanning-tree portfast default** command to enable Portfast mode only on access ports. Use the **no** form of this command to disable Portfast mode on all ports.

Syntax

spanning-tree portfast default

no spanning-tree portfast default

Default Configuration

Portfast mode is disabled by default.

Command Mode

Global Configuration mode

Usage Guidelines

This command only applies to access ports.

NOTE: This command should be used with care. An interface with PortFast mode enabled is moved directly to the spanning tree forwarding state when linkup occurs without waiting for the standard forward-time delay. Setting a port connected to another switch into PortFast mode may cause an accidental topology loop and disrupt switch and network operations.

Example

The following example enables Portfast mode on all access ports.

```
console(config)#spanning-tree portfast default
```

spanning-tree port-priority

Use the **spanning-tree port-priority** command in Interface Configuration mode to configure port priority. To reset the default port priority, use the **no** form of this command.

Syntax

spanning-tree port-priority *priority*

no spanning-tree port-priority

- *priority* — The port priority. (Range: 0–240)

Default Configuration

The default port-priority for IEEE STP is 128.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The priority value must be a multiple of 16.

Example

The following example configures the spanning priority on 1/0/5 to 96.

```
console(config)#interface gigabitethernet 1/0/5

console(config-if-1/0/5)#spanning-tree port-priority
96
```

spanning-tree priority

Use the **spanning-tree priority** command in Global Configuration mode to configure the spanning-tree priority. The priority value is used to determine which bridge is elected as the root bridge. To reset the default spanning-tree priority use the **no** form of this command.

Syntax

spanning-tree priority *priority*

no spanning-tree priority

- *priority* — Priority of the bridge. (Range: 0–61440)

Default Configuration

The default bridge priority for IEEE STP is 32768.

Command Mode

Global Configuration mode

User Guidelines

The priority value must be a multiple of 4096.

The switch with the lowest priority is the root of the spanning tree.

Example

The following example configures spanning-tree priority to 12288.

```
console(config)#spanning-tree priority 12288
```

spanning-tree tcnguard

Use the **spanning-tree tcnguard** command to prevent a port from propagating topology change notifications. Use the "no" form of the command to enable TCN propagation.

Syntax

spanning-tree tcnguard

no spanning-tree tcnguard

Default Configuration

TCN propagation is disabled by default.

Command Mode

Interface Configuration (Ethernet, Port Channel) mode

User Guidelines

There are no user guidelines for this command.

Example

The following example configures spanning-tree tcnguard on 4/0/1.

console(config-if-4/0/1)#spanning-tree tcnguard

spanning-tree transmit hold-count

Use the **spanning-tree transmit hold-count** command to set the maximum number of BPDUs that a bridge is allowed to send within a hello time window (2 seconds). Use the **no** form of this command to reset the hold count to the default value.

Syntax

spanning-tree transmit [**hold-count**] [*value*]

no spanning-tree transmit hold-count

- *value* — The maximum number of BPDUs to send (Range: 1–10).

Default Configuration

The default hold count is 6 BPDUs.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

The following example sets the maximum number of BPDUs sent to 6.

```
console(config)#spanning-tree transmit hold-count 6
```

33

VLAN Commands

PowerConnect 802.1Q VLANs are an implementation of the Virtual Local Area Network, specification 802.1Q. Operating at Layer 2 of the OSI model, the VLAN is a means of parsing a single network into logical user groups or organizations as if they physically resided on a dedicated LAN segment of their own. In reality, this virtually defined community may have individual members scattered across a large, extended LAN. The VLAN identifier is part of the 802.1Q tag, which is added to an Ethernet frame by an 802.1Q-compliant switch or router. Devices recognizing 802.1Q-tagged frames maintain appropriate tables to track VLANs. The first 3 bits of the 802.1Q tag are used by 802.1p to establish priority for the packet.

PowerConnect supports 802.1Q VLANs. As such, ports may simultaneously belong to multiple VLANs. VLANs allow a network to be logically segmented without regard to the physical locations of devices in the network.

PowerConnect switching supports up to 1024 VLANs for forwarding.

VLANs can be allocated by subnet and netmask pairs, thus allowing overlapping subnets. For example, subnet 10.10.128.0 with Mask 255.255.128.0 and subnet 10.10.0.0 with Mask 255.255.0.0 can have different VLAN associations.

Double VLAN Mode

An incoming frame is identified as tagged or untagged based on Tag Protocol Identifier (TPID) value it contains. The 802.1Q standard specifies a TPID value (0x8100) to recognize an incoming frame as tagged or untagged. Any valid Ethernet frame with a value 0x8100 in the 12th and 13th bytes is recognized as tagged frame. 802.1Q switches check the 12th and 13th bytes to decide the tag status of incoming frame.

The PowerConnect switching component can be configured to enable the port in double-VLAN (DVLAN) mode. In this mode switch looks for 12th, 13th, 16th, and 17th bytes for the tag status in the incoming frame. The outer tag (S-TAG) TPID is identified with the 12th and 13th bytes values. The inner tag (C-TAG) TPID is identified with 16th and 17th bytes values. These

two TPID values can be different or the same. VLAN normalization, source MAC learning, and forwarding are based on the S-TAG value in a received frame.

PowerConnect supports configuring one outer VLAN TPID value per switch. The global default TPID is 0x88A8, which indicates a Virtual Metropolitan Area Network (VMAN).

Independent VLAN Learning

Independent VLAN Learning (IVL) allows unicast address-to-port mappings to be created based on a MAC Address in conjunction with a VLAN ID.

This arrangement associates the MAC Address only with the VLAN on which the frame was received. Therefore, frames are forwarded based on their unicast destination address as well as their VLAN membership. This configuration affords multiple occurrences of an address in the forwarding database. Each address associates with a unique VLAN. Care must be taken in the administration of networks, as multiple instances of a MAC address, each on a different VLAN, can quickly eat up address entries.

Each VLAN is associated with its own forwarding database. Hence the number of forwarding databases equals the number of VLANs supported.

The MAC address stored is supplemented by a 2-byte VLAN ID. The first 2 bytes of a forwarding database entry contain the VLAN ID associated, and the next 6 bytes contain the MAC address. There is a one-to-one relationship between VLAN ID and FID (forwarding database ID).

Protocol Based VLANs

The main purpose of Protocol-based VLANs (PBVLANs) is to selectively process packets based on their upper-layer protocol by setting up protocol-based filters. Packets are bridged through user-specified ports based on their protocol.

In PBVLANs, the VLAN classification of a packet is based on its protocol (IP, IPX, NetBIOS, and so on). PBVLANs help optimize network traffic because protocol-specific broadcast messages are sent only to end stations using that protocol. End stations do not receive unnecessary traffic, and bandwidth is used more efficiently. It is a flexible method that provides a logical grouping of users. An IP subnet or an IPX network, for example, can each be assigned

its own VLAN. Additionally, protocol-based classification allows an administrator to assign nonroutable protocols, such as NetBIOS or DECnet, to larger VLANs than routable protocols like IPX or IP. This maximizes the efficiency gains that are possible with VLANs.

In port-based VLAN classification, the Port VLAN Identifier (PVID) is associated with the physical ports. The VLAN ID (VID) for an untagged packet is equal to the PVID of the port. In port-and protocol-based VLAN classifications, multiple VIDs are associated with each of the physical ports. Each VID is also associated with a protocol. The ingress rules used to classify incoming packets include the use of the packet's protocol, in addition to the PVID, to determine the VLAN to which the packet belongs. This approach requires one VID on each port for each protocol for which the filter is desired.

IP Subnet Based VLANs

This feature allows an untagged packet to be placed in a configured VLAN based upon its IP address.

MAC-Based VLANs

This feature allows an untagged packet to be placed in a configured VLAN based upon its MAC address.

Commands in this Chapter

This chapter explains the following commands:

dvlan-tunnel ethertype	show dvlan-tunnel interface	switchport general allowed vlan	vlan database
interface vlan	show interfaces switchport	switchport general ingress-filtering disable	vlan makestatic
interface range vlan	show port protocol	switchport general pvid	vlan protocol group
mode dvlan-tunnel	show vlan	switchport mode	vlan protocol group add protocol

name (VLAN Configuration)	show vlan association mac	switchport trunk	vlan protocol group name
protocol group	show vlan association subnet	vlan	vlan protocol group remove
protocol vlan group	switchport access vlan	vlan (Global Config)	vlan routing
protocol vlan group all	switchport forbidden vlan	vlan association mac	
show dvlan-tunnel	switchport general acceptable-frame-type tagged-only	vlan association subnet	

dvlan-tunnel ethertype

Use the **dvlan-tunnel ethertype** command in Global Configuration mode to enable the configuration of the outer VLAN tag ethertype.

To configure the EtherType to its default value, use the **no** form of this command.

Syntax

dvlan-tunnel ethertype {802.1Q | **vman** | **custom** *0-65535* [*primary-tpid*]}

no dvlan-tunnel ethertype

Parameter Description

Parameter	Description
802.1Q	Configures the EtherType as 0x8100.
vman	Configures the EtherType as 0x88A8
custom	Configures a custom EtherType for the DVLAN tunnel. The value must be 0-65535.
primary-tpid	Globally configures the tag protocol identifier on the outer VLAN tag (S-TAG).

Default Configuration

The default for this command is 802.1Q. The default S-TAG TPID, when double-tagging is enabled, is 0x88A8. The default C-TAG TPID when double vlan tagging is enabled is 0x8100.

Command Mode

Global Configuration, Interface Configuration mode

User Guidelines

This command configures the TPID value on the outer VLAN (S-VLAN). The global configuration form of the command configures all physical and port-channel interfaces to use the specified ethertype. The interface form of the command enables/disables the use of the ethertype on the specific interface. The ethertype used in the interface form of the command must use the same ethertype as specified in the global configuration form of the command. The inner vlan tag (C-TAG) is configured using the switchport command in interface configuration mode.

Example

The following example displays configuring Double VLAN tunnel for vman EtherType.

```
console(config)#dvlan-tunnel ethertype vman
```

interface vlan

Use the **interface vlan** command in Global Configuration mode to configure a VLAN type and to enter Interface Configuration mode.

Syntax

interface vlan *vlan-id*

Parameter Description

Parameter	Description
vlan-id	The ID of a valid VLAN (Range: 1–4093).

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the VLAN 1 IP address of 131.108.1.27 and subnet mask 255.255.255.0.

```
console(config)#interface vlan 1

console(config-vlan)#ip address 131.108.1.27
255.255.255.0
```

interface range vlan

Use the **interface range vlan** command in Global Configuration mode to execute a command on multiple VLANs at the same time.

Syntax

interface range vlan {*vlan-range* | ***all***}

- *vlan-range* — A list of valid VLAN IDs to add. Separate nonconsecutive VLAN IDs with a comma and no spaces; use a hyphen to designate a range of IDs. (Range: 2–4093)
- **all** — All existing static VLANs.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

Commands used in the interface range context are executed independently on each interface in the range. If the command returns an error on one of the interfaces, an error message is displayed and execution continues on other interfaces.

Example

The following example groups VLAN 221 till 228 and VLAN 889 to receive the same command.

```
console(config)#interface range vlan 221-228,889
console(config-if)#
```

mode dvlan-tunnel

Use the **mode dvlan-tunnel** command in Interface Configuration mode to enable Double VLAN Tunneling on the specified interface. To disable Double VLAN Tunneling on the specified interface, use the **no** form of this command.

Syntax

mode dvlan-tunnel

no mode dvlan-tunnel

Default Configuration

By default, Double VLAN Tunneling is *disabled*.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to enable Double VLAN Tunneling at gigabit ethernet port 1/0/1.

```
console(config-if-1/0/1)#mode dvlan-tunnel
```

name (VLAN Configuration)

Use the **name** command in VLAN Configuration mode to configure the VLAN name. To return to the default configuration, use the **no** form of this command.

NOTE: This command cannot be configured for a range of interfaces (range context).

Syntax

name *vlan–name*

no name

Parameter Description

Parameter	Description
vlan–name	The name of the VLAN. Must be 1–32 characters in length.

Default Configuration

The default VLAN name is **default**.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

The VLAN name may include any alphanumeric characters including a space, underscore, or dash. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may truncate entries at the first illegal character or reject the entry entirely.

Example

The following example configures a VLAN name of **office2** for VLAN 2.

```
console(config)#interface vlan 2
console(config-vlan)#name "RDU-NOC Management VLAN"
```

protocol group

Use the **protocol group** command in VLAN Database mode to attach a VLAN ID to the protocol-based group identified by *groupid*. A group may only be associated with one VLAN at a time. However, the VLAN association can be changed. The referenced VLAN should be created prior to the creation of the protocol-based group except when GVRP is expected to create the VLAN.

To detach the VLAN from this protocol-based group identified by this *groupid*, use the **no** form of this command.

Syntax

protocol group *groupid vlanid*

no protocol group *groupid vlanid*

- *groupid* — The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command. To see the group ID associated with the name of a protocol group, use the **show port protocol all** command.
- *vlanid* — A valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

VLAN Database mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to attach the VLAN ID "100" to the protocol-based VLAN group "3."

```
console#vlan database
console(config-vlan)#protocol group 3 100
```

protocol vlan group

Use the **protocol vlan group** command in Interface Configuration mode to add the physical unit/slot/port interface to the protocol-based group identified by *groupid*. A group may have more than one interface associated with it. Each interface and protocol combination can be associated with one group only. If adding an interface to a group causes any conflicts with protocols currently associated with the group, this command fails and the interface(s) are not added to the group. Ensure that the referenced VLAN is created prior to the creation of the protocol-based group except when GVRP is expected to create the VLAN.

To remove the interface from this protocol-based VLAN group that is identified by this *groupid*, use the **no** form of this command.

If you select **all**, all ports are removed from this protocol group.

Syntax

protocol vlan group *groupid*

no protocol vlan group *groupid*

- *groupid* — The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command. To see the group ID associated with the name of a protocol group, use the **show port protocol all** command.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to add a physical port interface to the group ID of "2."

```
console(config-if-1/0/1)#protocol vlan group 2
```

protocol vlan group all

Use the **protocol vlan group all** command in Global Configuration mode to add all physical interfaces to the protocol-based group identified by *groupid*. A group may have more than one interface associated with it. Each interface and protocol combination can be associated with one group only. If adding an interface to a group causes any conflicts with protocols currently associated with the group, this command fails and the interface(s) are not added to the group. Ensure that the referenced VLAN is created prior to the creation of the protocol-based group except when GVRP is expected to create the VLAN.

To remove all interfaces from this protocol-based group that is identified by this *groupid*, use the **no** form of the command

Syntax

protocol vlan group all *groupid*

no protocol vlan group all *groupid*

- *groupid* — The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command. To see the group ID associated with the name of a protocol group, use the **show port protocol all** command.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to add all physical interfaces to the protocol-based group identified by group ID "2."

```
console(config)#protocol vlan group all 2
```

show dvlan-tunnel

Use the **show dvlan-tunnel** command in Privileged EXEC mode to display all interfaces enabled for Double VLAN Tunneling.

Syntax

show dvlan-tunnel

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to display all interfaces for Double VLAN Tunneling.

```
console#show dvlan-tunnel

Interfaces Enabled for DVLAN Tunneling..... 1/0/1
```

show dvlan-tunnel interface

Use the **show dvlan-tunnel interface** command in Privileged EXEC mode to display detailed information about Double VLAN Tunneling for the specified interface or all interfaces.

Syntax

show dvlan-tunnel interface {**gigabithethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port* | **all**}

- **all** — Displays information for all interfaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays detailed information for port 1/0/1.

```
console#show dvlan-tunnel interface 1/0/1

Interface  Mode    EtherType

---------  ------- --------------

1/0/1       Enable  vMAN
```

The following table describes the significant fields shown in the example.

Field	Description
Mode	This field specifies the administrative mode through which Double VLAN Tunneling can be enabled or disabled. The default value for this field is *disabled*.
Interface	Interface Number.

EtherType	This field represents a 2-byte hex EtherType to be used as the first 16 bits of the DVLAN tunnel. The three different EtherType tags are: (1) 802.1Q, which represents the commonly used value of 0x8100. (2) vMAN, which represents the commonly used value of 0x88A8. (3) If EtherType is not one of these two values, it is a custom tunnel value, representing any value in the range of 0 to 65535.

show interfaces switchport

Use the **show interfaces switchport** command in Privileged EXEC mode to display switchport configuration.

Syntax

show interfaces switchport {{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*}}

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following example displays switchport configuration individually for gi1/0/1.

```
console#show interface switchport gigabitethernet
1/0/1

Port 1/0/1:

VLAN Membership mode: General

Operating parameters:
```

```
PVID: 1 (default)
Ingress Filtering: Enabled
Acceptable Frame Type: All
GVRP status: Enabled
Protected: Enabled
Port 1/0/1 is member in:
VLAN      Name           Egress rule      Type
----      ---------      -----------      -----
1         default        untagged         Default
8         VLAN008        tagged           Dynamic
11        VLAN0011       tagged           Static
19        IPv6 VLAN      untagged         Static
72        VLAN0072       untagged         Static
Static configuration:
PVID: 1 (default)
Ingress Filtering: Enabled
Acceptable Frame Type: All
Port 1/0/1 is statically configured to:
VLAN     Name           Egress rule
----     ---------      -----------
11       VLAN0011       tagged
19       IPv6 VLAN      untagged
72       VLAN0072       untagged
Forbidden VLANS:
VLAN       Name
----       ---------
```

```
73          Out
```

The following example displays switchport configuration individually for 1/0/2.

```
console#show interface switchport gigabitethernet
1/0/2
Port 1/0/2:
VLAN Membership mode: General
Operating parameters:
PVID: 4095 (discard vlan)
Ingress Filtering: Enabled
Acceptable Frame Type: All
Port 1/0/1 is member in:
VLAN       Name           Egress rule       Type
----       ---------      -----------       -----
91         IP Telephony   tagged            Static
Static configuration:
PVID: 8
Ingress Filtering: Disabled
Acceptable Frame Type: All
Port 1/0/2 is statically configured to:
VLAN       Name           Egress rule
----       ---------      -----------
8          VLAN0072       untagged
91         IP Telephony   tagged
Forbidden VLANS:
VLAN      Name
```

```
----       ---------
73         Out
```

The following example displays switchport configuration individually for 2/0/19.

```
console#show interfaces switchport gigabitethernet
2/0/19
Port 2/0/19:
Operating parameters:
PVID: 2922
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged
GVRP status: Disabled
Port 2/0/19 is member in:
VLAN       Name           Egress rule       Type
----       ---------      -----------       -----
2921      Primary A      untagged          Static
2922      Community A1   untagged          Static
Static configuration:
PVID: 2922
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged
GVRP status: Disabled
Port 2/0/19 is member in:
VLAN       Name           Egress rule       Type
----       ---------      -----------       -----
2921       Primary A      untagged          Static
```

```
2922       Community A1   untagged          Static
```

show port protocol

Use the **show port protocol** command in Privileged EXEC mode to display the Protocol-Based VLAN information for either the entire system or for the indicated group.

Syntax

show port protocol {*groupid* | **all**}

- *groupid* — The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command.
- **all** — Enter **all** to show all interfaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the Protocol-Based VLAN information for either the entire system.

```
console#show port protocol all
                Group
Group Name       ID     Protocol(s  VLAN  Interface(s)
---------------  -----  ----------  ----  ------------
test             1      IP          1     1/0/1
```

show vlan

Use the **show vlan** command in Privileged EXEC mode to display detailed information, including interface information and dynamic VLAN type, for a specific VLAN. The ID is a valid VLAN identification number.

Syntax

show vlan [**id** *vlanid* | name vlan-name]

Parameter Description

Parameter	Description
vlanid	VLAN identifier
vlan-name	A valid VLAN name (Range 1-32 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays information for VLAN id 1, 2 and 3.

```
console#show vlan id 1
VLAN   Name                       Ports          Type
-----  ---------------            -------------  --------------
1      default                    Po1-48,        Default
                                  Gi1/0/1-10
console#show vlan id 2

VLAN   Name                       Ports          Type
```

```
-----  ---------------          -------------  --------------
2      VLAN0002                 Gi1/0/11-20    Dynamic (DOT1X)

console#show vlan id 3

VLAN   Name                     Ports          Type
-----  ---------------          -------------  --------------
3      VLAN0003                 Gi1/0/21-24    Dynamic (GVRP)
```

show vlan association mac

Use the **show vlan association mac** command in Privileged EXEC mode to display the VLAN associated with a specific configured MAC address. If no MAC address is specified, the VLAN associations of all the configured MAC addresses are displayed.

Syntax

show vlan association mac [*mac-address*]

- *mac-address* — Specifies the MAC address to be entered in the list. (Range: Any valid MAC address)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows no entry in MAC address to VLAN cross-reference.

```
console#show vlan association mac
```

```
MAC Address               VLAN ID
-----------------------   -------
0001.0001.0001.0001         1


console#
```

show vlan association subnet

Use the **show vlan association subnet** command in Privileged EXEC mode to display the VLAN associated with a specific configured IP-Address and netmask. If no IP Address and net mask are specified, the VLAN associations of all the configured IP-subnets are displayed.

Syntax

show vlan association subnet [*ip-address ip-mask*]

- *ip-address* — Specifies IP address to be shown
- *ip-mask* — Specifies IP mask to be shown

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The command has no user guidelines.

Example

The following example shows the case if no IP Subnet to VLAN association exists.

```
console#show vlan association subnet
IP Address       IP Mask          VLAN ID
---------------- ---------------- -------
```

```
The IP Subnet to VLAN association does not exist.
```

switchport access vlan

Use the **switchport access vlan** command in Interface Configuration mode to configure the VLAN ID when the interface is in access mode. To reconfigure the default, use the **no** form of this command.

Syntax

switchport access vlan *vlan-id*

no switchport access vlan

- *vlan-id* — A valid VLAN ID of the VLAN to which the port is configured.

Default Configuration

The default value for the *vlan-id* parameter is 1.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

The command automatically removes the port from the previous VLAN and adds it to the new VLAN.

Example

The following example configures a VLAN ID of interface 1/0/8 to become an access member of VLAN ID 23.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#switchport access vlan 23
```

switchport forbidden vlan

Use the **switchport forbidden vlan** command in Interface Configuration mode to forbid adding specific VLANs to a port. To revert to allowing the addition of specific VLANs to the port, use the **remove** parameter of this command.

Syntax

switchport forbidden vlan {**add** *vlan-list* | **remove** *vlan-list*}

- **add** *vlan-list* — List of valid VLAN IDs to add to the forbidden list. Separate nonconsecutive VLAN IDs with a comma and no spaces. Use a hyphen to designate a range of IDs.
- **remove** *vlan-list* — List of valid VLAN IDs to remove from the forbidden list. Separate nonconsecutive VLAN IDs with a comma and no spaces. Use a hyphen to designate a range of IDs.

Default Configuration

All VLANs allowed.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example forbids adding VLAN numbers 234 through 256 to port 1/0/8.

```
console(config)#interface gigabitethernet 1/0/8

console(config-if-1/0/8)#switchport forbidden vlan
add 234-256
```

switchport general acceptable-frame-type tagged-only

Use the **switchport general acceptable-frame-type tagged-only** command in Interface Configuration mode to discard untagged frames at ingress. To enable untagged frames at ingress, use the **no** form of this command.

Syntax

switchport general acceptable-frame-type tagged-only

no switchport general acceptable-frame-type tagged-only

Default Configuration

All frame types are accepted at ingress.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures 1/0/8 to discard untagged frames at ingress.

```
console(config)#interface gigabitethernet 1/0/8

console(config-if-1/0/8)#switchport general
acceptable-frame-type tagged-only
```

switchport general allowed vlan

Use the **switchport general allowed vlan** command in Interface Configuration mode to add VLANs to or remove VLANs from a general port.

Syntax

switchport general allowed vlan add *vlan-list* [**tagged** | **untagged**]

switchport general allowed vlan remove *vlan-list*

- **add** *vlan-list* — List of VLAN IDs to add. Separate nonconsecutive VLAN IDs with a comma and no spaces. Use a hyphen to designate a range of IDs.
- **remove** *vlan-list* — List of VLAN IDs to remove. Separate nonconsecutive VLAN IDs with a comma and no spaces. Use a hyphen to designate a range of IDs.
- **tagged** — Sets the port to transmit tagged packets for the VLANs. If the port is added to a VLAN without specifying tagged or untagged, the default is untagged.
- **untagged** — Sets the port to transmit untagged packets for the VLANs.

Default Configuration

Untagged.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

You can use this command to change the egress rule (for example, from tagged to untagged) without first removing the VLAN from the list.

Example

The following example shows how to add VLANs 1, 2, 5, and 8 to the allowed list.

```
console(config-if-1/0/8)#switchport general allowed
vlan add 1,2,5,8 tagged
```

switchport general ingress-filtering disable

Use the **switchport general ingress-filtering disable** command in Interface Configuration mode to disable port ingress filtering. To enable ingress filtering on a port, use the **no** form of this command.

Syntax

switchport general ingress-filtering disable

no switchport general ingress-filtering disable

Default Configuration

Ingress filtering is enabled.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to enables port ingress filtering on 1/0/8.

```
console(config)#interface gigabitethernet 1/0/8

console(config-if-1/0/8)#switchport general ingress-
filtering disable
```

switchport general pvid

Use the **switchport general pvid** command in Interface Configuration mode to configure the Port VLAN ID (PVID) when the interface is in general mode. Use the **switchport mode general** command to set the VLAN membership mode of a port to "general." To configure the default value, use the **no** form of this command.

Syntax

switchport general pvid *vlan-id*

no switchport general pvid

- *vlan-id* — PVID. The VLAN ID may belong to a non-existent VLAN.

Default Configuration

The default value for the *vlan-id* parameter is 1 when the VLAN is enabled. Otherwise, the value is 4093.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to configure the PVID for 1/0/8, when the interface is in general mode.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#switchport general pvid 234
```

switchport mode

Use the **switchport mode** command in Interface Configuration mode to configure the VLAN membership mode of a port. To reset the mode to the appropriate default for the switch, use the **no** form of this command.

Syntax

switchport mode {**access** | **trunk** | **general**}

no switchport mode

Parameter Description

Parameter	Description
access	An access port connects to a single end station belonging to a single VLAN. An access port is configured with ingress filtering enabled and will accept either an untagged frame or a packet tagged with the access port VLAN. An access port transmits only untagged packets.

Parameter	Description
trunk	A trunk port connects two switches. A trunk port may belong to multiple VLANs. A trunk port accepts only packets tagged with the VLAN IDs of the VLANs to which the trunk is a member or untagged packets if configured with a PVID. A trunk only transmits tagged packets.
general	Full 802.1q support VLAN interface. A general mode port is a combination of both trunk and access ports capabilities. It is possible to fully configure all VLAN features on a general mode port. Both tagged and untagged packets may be accepted and transmitted.

Default Configuration

The default for this command is **access**.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures 1/0/5 to access mode.

```
console(config)#interface gigabitethernet 1/0/5
console(config-if-1/0/8)#switchport mode access
```

switchport trunk

Use the **switchport trunk** command in Interface Configuration mode to add VLANs to or remove VLANs from a trunk port, or to set the PVID for an interface in Trunk Mode.

Syntax

switchport trunk {**allowed vlan** *vlan–list* | **native vlan** *vlan–id*}

Parameter Description

Parameter	Description
vlan–list	Set the list of allowed VLANs that can receive and send traffic on this interface in tagged format when in trunking mode. The default is **all**. The vlan–list format is as follows: The vlan-list format is all | [add | remove | except] vlan–atom [, vlan–atom...] where: **all** specifies all VLANs from 1 to 4093. This keyword is not allowed on commands that do not permit all VLANs in the list to be set at the same time. **add** adds the defined list of VLANs to those currently set instead of replacing the list. **remove** removes the defined list of VLANs from those currently set instead of replacing the list. Valid IDs are from 1 to 4093; extended-range VLAN IDs of the form X-Y or X,Y,Z are valid in this command. **except** lists the VLANs that should be calculated by inverting the defined list of VLANs. (VLANs are added except the ones specified.) **vlan-atom** is either a single VLAN number from 1 to 4093 or a continuous range of VLANs described by two VLAN numbers, the lesser one first, separated by a hyphen.
valid–id	A valid VLAN id from 1–4093.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-Gi1/0/1)#switchport trunk allowed
vlan 1-1024

console(config-if-Gi1/0/1)#switchport trunk allowed
vlan except 1,2,3,5,7,11,13
```

vlan

Use the **vlan** command in VLAN Database mode to configure a VLAN. To delete a VLAN, use the **no** form of this command.

Syntax

vlan *vlan-range*

no vlan *vlan-range*

- *vlan-range* — A list of valid VLAN IDs to be added. List separate, non-consecutive VLAN IDs separated by commas (without spaces); use a hyphen to designate a range of IDs. (Range: 2–4093)

Default Configuration

This command has no default configuration.

Command Mode

VLAN Database mode

User Guidelines

Deleting the VLAN for an access port will cause that port to become unusable until it is assigned a VLAN that exists.

Example

The following example shows how to create (add) VLAN of IDs 22, 23, and 56.

```
console(config-vlan)#vlan 22,23,56

console(config-vlan)#
```

vlan (Global Config)

Use the **vlan** command in Global Configuration mode to configure a VLAN. To delete a VLAN, use the **no** form of this command.

Syntax

vlan {*vlan–id* | *vlan–range*}

no vlan {*vlan–id* | *vlan–range*}

Parameter Description

Parameter	Description
vlan–id	A valid VLAN ID. (Range: 2–4093)
vlan–range	A list of valid VLAN IDs. List separate, non-consecutive VLAN IDs separated by commas (without spaces). Use a hyphen to designate a range of IDs. (Range: 2–4093)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration (Config)

User Guidelines

This command has no user guidelines.

Example

The following example shows how to create (add) VLAN of IDs 22, 23, and 56.

```
console(config)#vlan 22,23,56
console(config-vlan)#
```

vlan association mac

Use the **vlan association mac** command in VLAN Database mode to associate a MAC address to a VLAN. The maximum number of MAC-based VLANs is 256.

Syntax

vlan association mac *mac-address vlanid*

no vlan association mac *mac-address*

mac-address — MAC address to associate. (Range: Any MAC address in the format xxxx.xxxx.xxxx)

vlanid — VLAN to associate with subnet. (Range: 1-4093)

Default Configuration

No assigned MAC address.

Command Mode

VLAN Database mode

User Guidelines

This command has no user guidelines.

Example

The following example associates MAC address with VLAN ID 1.

```
console(config-vlan)#vlan association mac
0001.0001.0001 1
```

vlan association subnet

Use the **vlan association subnet** command in VLAN Database mode to associate a VLAN to a specific IP-subnet.

Syntax

vlan association subnet *ip-address subnet-mask vlanid*

no vlan association subnet *ip-address subnet-mask*

- *ip-address* — Source IP address. (Range: Any valid IP address)
- *subnet-mask* — Subnet mask. (Range: Any valid subnet mask)
- *vlanid* — VLAN to associated with subnet. (Range: 1-4093)

Default Configuration

No assigned ip-subnet.

Command Mode

VLAN Database mode

User Guidelines

This command has no user guidelines.

Example

The following example associates IP address with VLAN ID 100.

```
console(config-vlan)#vlan association subnet
192.245.23.45 255.255.255.0 100
```

vlan database

Use the **vlan database** command in Global Configuration mode to enter the VLAN database configuration mode.

Syntax

vlan database

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enters the VLAN database mode.

```
console(config)#vlan database
console(config-vlan)#
```

vlan makestatic

This command changes a dynamically created VLAN (one that is created by GVRP registration) to a static VLAN (one that is permanently configured and defined). The ID is a valid VLAN identification number. VLAN range is 2-4093.

Syntax

vlan makestatic *vlan-id*

- *vlan-id* — Valid vlan ID. Range is 2–4093.

Default Configuration

This command has no default configuration.

Command Mode

VLAN Database Mode

User Guidelines

The dynamic VLAN (created via GRVP) should exist prior to executing this command. See the Type column in output from the show vlan command to determine that the VLAN is dynamic.

Example

The following changes vlan 3 to a static VLAN.

```
console(config-vlan)#vlan makestatic 3
```

vlan protocol group

Use the **vlan protocol group** command in Global Configuration mode to add protocol-based groups to the system. When a protocol group is created, it is assigned a unique group ID number. The group ID is used to identify the group in subsequent commands. Use the **no** form of the command to remove the specified VLAN protocol group name from the system.

In previous implementations, when multiple VLAN protocol groups when created, and then one of the groups was deleted and the configuration was saved, this command resulted an in incorrect application of the groupids upon reload So, the existing command **vlan protocol group** *groupname* is updated to **vlan protocol group** *groupid* so that **groupid** is used for both configuration and script generation.

NOTE: If an attempt is made to migrate to the latest implementation with any of the groupnames deleted prior to saving configuration on the pre 3.1.4.x code (applicable only for platforms PC8024/PC8024F), the problem on the latest code will remain.

Syntax

vlan protocol group *groupid*

no vlan protocol group *groupid*

- *groupid* — The protocol-based VLAN group ID, to create a protocol-based VLAN group. To see the created protocol groups, use the **show port protocol all** command.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config)# vlan protocol group 1
```

vlan protocol group add protocol

Use the **vlan protocol group add protocol** command in Global Configuration mode to add a protocol to the protocol-based VLAN groups identified by *groupid*. A group may have more than one protocol associated with it. Each interface and protocol combination can be associated with one group only. If adding a protocol to a group causes any conflicts with interfaces currently associated with the group, this command fails and the protocol is not added to the group.

To remove the protocol from the protocol-based VLAN group identified by *groupid*, use the **no** form of this command.

Syntax

vlan protocol group add protocol *groupid* **ethertype** *value*

no vlan protocol group add protocol *groupid* **ethertype** *value*

- *groupid* — The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command. To see the group ID associated with the name of a protocol group, use the **show port protocol all** command.
- **ethertype** *value* — The protocol you want to add. The ethertype value can be any valid hexadecimal number in the range 0x0600 to 0xffff.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to add the "ip" protocol to the protocol based VLAN group identified as "2."

```
console(config)#vlan protocol group add protocol 2
ethertype 0xXXXX
```

vlan protocol group name

This is a new command for assigning a group name to **vlan protocol group id**.

Syntax

vlan protocol group name *groupid groupName*

no vlan protocol group name *groupid*

- *groupid*—The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command. To see the group ID associated with the name of a protocol group, use the **show port protocol all** command
- *groupName*—The group name you want to add. The group name can be up to 16 characters length. It can be any valid alpha numeric characters.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config)# vlan protocol group name 1 usergroup
```

vlan protocol group remove

Use the **vlan protocol group remove** command in Global Configuration mode to remove the protocol-based VLAN group identified by *groupid*.

Syntax

vlan protocol group remove *groupid*

- *groupid* — The protocol-based VLAN group ID, which is automatically generated when you create a protocol-based VLAN group with the **vlan protocol group** command. To see the group ID associated with the name of a protocol group, use the **show port protocol all** command.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the removal of the protocol-based VLAN group identified as "2."

```
console(config)#vlan protocol group remove 2
```

vlan routing

Use the **vlan routing** command to enable routing on a VLAN. Use the **no** form of this command to disable routing on a VLAN.

Syntax

vlan routing {vlanid [index]}

Parameter Description

Parameter	Description
vlanid	Valid VLAN ID (Range 1–4093).

Parameter	Description
index	Internal interface ID. This optional parameter is listed in the configuration file for all VLAN routing interfaces. When a nonstop forwarding failover occurs, this information enables the system to correlate checkpointed state information with the proper interfaces and their configuration.

Default Configuration

Routing is enabled on VLAN 1 by default.

Command Mode

VLAN Database mode

User Guidelines

This command has no user guidelines.

Examples

```
console(config-vlan)# vlan routing 10 1
```

34

TACACS+ Commands

TACACS+ provides access control for networked devices via one or more centralized servers, similar to RADIUS this protocol simplifies authentication by making use of a single database that can be shared by many clients on a large network. TACACS+ is based on the TACACS protocol (described in RFC1492) but additionally provides for separate authentication, authorization and accounting services. The original protocol was UDP based with messages passed in clear text over the network; TACACS+ uses TCP to ensure reliable delivery and a shared key configured on the client and daemon server to encrypt all messages.

PowerConnect supports authentication of a user using a TACACS+ server. When TACACS+ is configured as the authentication method for a user login type (CLI/HTTP/HTTPS), the NAS will prompt for the user login credentials and request services from the FASTPATH TACACS+ client; the client will then use the configured list of servers for authentication and provide results back to the NAS. The TACACS+ server list is configured with one or more hosts defined via their network IP address; each can be assigned a priority to determine the order in which the TACACS+ client will contact them, a server is contacted when a connection attempt fails or times out for a higher priority server. Each server host can be separately configured with a specific connection type, port, timeout, and shared key, or the global configuration may be used for the key and timeout. Like RADIUS, the TACACS+ server may do the authentication itself, or redirect the request to another back-end device, all sensitive information is encrypted and the shared secret is never passed over the network.

Commands in this Chapter

This chapter explains the following commands:

key	tacacs-server host
port	tacacs-server key
priority	tacacs-server timeout
show tacacs	timeout

key

Use the **key** command in TACACS Configuration mode to specify the authentication and encryption key for all TACACS communications between the device and the TACACS server. This key must match the key used on the TACACS daemon.

Syntax

key [key-string]

- key-string — *To specify the key name. (Range: 1–128 characters)*

Default Configuration

If left unspecified, the key-string parameter defaults to the global value.

Command Mode

TACACS Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example specifies an encryption and authentication key of 12.

```
console(tacacs)#key 12
```

port

Use the **port** command in TACACS Configuration mode to specify a server port number.

Syntax

port [port-number]

- *port-number — The server port number. If left unspecified, the default port number is 49. (Range: 0–65535)*

Default Configuration

The default port number is 49.

Command Mode

TACACS Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays how to specify server port number 1200.

```
console(tacacs)#port 1200
```

priority

Use the **priority** command in TACACS Configuration mode to specify the order in which servers are used, where 0 (zero) is the highest priority.

Syntax

priority [priority]

- *priority — Specifies the priority for servers. 0 (zero) is the highest priority. (Range: 0–65535)*

Default Configuration

If left unspecified, this parameter defaults to 0 (zero).

Command Mode

TACACS Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example shows how to specify a server priority of 10000.

```
console(tacacs)#priority 10000
```

show tacacs

Use the **show tacacs** command in Privileged EXEC mode to display the configuration and statistics of a TACACS+ server.

Syntax

show tacacs [*ip-address*]

- *ip-address* — The name or IP address of the host.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following example displays TACACS+ server settings.

```
console#show tacacs


Global Timeout: 5
```

```
IP address        Port    Timeout   Priority
---------------   -----   -------   --------
10.254.24.162     49      Global    0
```

tacacs-server host

Use the **tacacs-server host** command in Global Configuration mode to configure a TACACS+ server. This command enters into the TACACS+ configuration mode. To delete the specified hostname or IP address, use the **no** form of this command.

Syntax

tacacs-server host {*ip-address* | *hostname*}

no tacacs-server host {*ip-address* | *hostname*}

- *ip-address* — The IP address of the TACACS+ server.
- *hostname* — The hostname of the TACACS+ server. (Range: 1-255 characters).

Default Configuration

No TACACS+ host is specified.

Command Mode

Global Configuration mode

User Guidelines

To specify multiple hosts, multiple **tacacs-server host** commands can be used. TACACS servers are keyed by the host name, therefore it is advisable to use unique host names.

Example

The following example specifies a TACACS+ host.

```
console(config)#tacacs-server host 172.16.1.1
console(tacacs)#
```

tacacs-server key

Use the **tacacs-server key** command in Global Configuration mode to set the authentication and encryption key for all TACACS+ communications between the switch and the TACACS+ daemon. To disable the key, use the **no** form of this command.

Syntax

tacacs-server key [*key-string*]

no tacacs-server key

- *key-string* — Specifies the authentication and encryption key for all TACACS communications between the switch and the TACACS+ server. This key must match the key used on the TACACS+ daemon. (Range: 0–128 printable characters except for question marks and double quotes.)

Default Configuration

The default is an empty string.

Command Mode

Global Configuration mode

User Guidelines

The tacacs-server key command accepts any printable characters for the key except a double quote or question mark. Enclose the string in double quotes to include spaces within the key. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may accept entries up to the first illegal character or reject the entry entirely.

Example

The following example sets the authentication encryption key.

```
console(config)#tacacs-server key "I've got a secret"
```

```
console(config)#tacacs-server key @#$%^&*()_+=-
{}][<>.,/';:|
```

tacacs-server timeout

Use the **tacacs-server timeout** command in Global Configuration mode to set the interval during which a switch waits for a server host to reply. To restore the default, use the **no** form of this command.

Syntax

tacacs-server timeout [*timeout*]

no tacacs-server timeout

- *timeout* — The timeout value in seconds. (Range: 1–30)

Default Configuration

The default value is 5 seconds.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the timeout value as 30.

```
console(config)#tacacs-server timeout 30
```

timeout

Use the **timeout** command in TACACS Configuration mode to specify the timeout value in seconds. If no timeout value is specified, the global value is used.

Syntax

timeout [timeout]

- *timeout* — The timeout value in seconds. (Range: 1–30)

Default Configuration

If left unspecified, the timeout defaults to the global value.

Command Mode

TACACS Configuration mode

User Guidelines

This command has no user guidelines.

Example

This example shows how to specify the timeout value.

```
console(tacacs)#timeout 23
```

35

Voice VLAN Commands

The Voice VLAN feature enables switch ports to carry voice traffic with an administrator-defined priority so as to enable prioritization of voice traffic over data traffic. Using Voice VLAN helps to ensure that the sound quality of an IP phone is protected from deterioration when the data traffic utilization on the port is high.

Voice VLAN is the preferred solution for applying QoS to voice traffic in an enterprise environment. Voice VLAN scales with the number of ports and does not make significant demands on the switch CPU for classification of voice traffic. However ,Voice VLAN does require the administrator to perform the additional configuration step of defining the QoS policy to be applied to voice traffic.

The switch can be configured to support voice VLAN on a port connecting to the VoIP phone. When a VLAN is associated with the voice VLAN port, then the VLAN ID information is passed onto the VoIP phone using the LLDP-MED mechanism. The voice data coming from the VoIP phone is tagged with the exchanged VLAN ID; thus, regular data arriving on the switch is given the default PVID of the port, and the voice traffic is received on a predefined VLAN. The two types of traffic are therefore segregated so that better service can be provided to the voice traffic.

When a dot1p priority is associated with the voice VLAN port instead of VLAN ID, then the priority information is passed onto the VoIP phone using the LLDP-MED mechanism. Thus, the voice data coming from the VoIP phone is tagged with VLAN 0 and with the exchanged priority. Regular data arriving on the switch is given the default priority of the port (default 0), and the voice traffic is received with higher priority, thus segregating both the traffic to provide better service to the voice traffic.

The switch can be configured to override the data traffic CoS. This feature enables overriding the 802.1P priority of the data traffic packets arriving at the port enabled for voice VLAN. Thus, a rogue client that is also connected to the voice VLAN port does not deteriorate the voice traffic. Voice VLAN is recommended for enterprise-wide deployment of voice services on the IP network.

Commands in this Chapter

This chapter explains the following commands:

voice vlan	voice vlan data priority
voice vlan (Interface)	show voice vlan

voice vlan

This command is used to enable the voice vlan capability on the switch.

Syntax

voice vlan

no voice vlan

Parameter Ranges

Not applicable

Command Mode

Global Configuration

Usage Guidelines

Not applicable

Default Value

This feature is disabled by default.

Example

```
console(config)#voice vlan
console(config)#no voice vlan
```

voice vlan (Interface)

This command is used to enable the voice vlan capability on the interface.

Syntax

voice vlan {*vlanid* | **dot1p** *priority* | **none** | **untagged** | **data priority** { **trust** | **untrust** } | **auth** { **enable** | **disable** } | **dscp** *dscp* }

no voice vlan

Parameter Description

Parameter	Description
auth	Enables/disables authentication on the voice vlan port.
data	Observe the priority on received voice vlan traffic (trusted mode).
dot1p	Configure Voice VLAN 802.1p priority tagging for voice traffic.
dscp	Configure DSCP value for voice traffic on the voice vlan port. (Range: 0–64).
none	Allow the IP phone to use its own configuration to send untagged voice traffic.
priority	The Dot1p priority for the voice VLAN on the port.
trust	Trust the dot1p priority or DSCP values contained in packets arriving on the voice vlan port.
untagged	Configure the phone to send untagged voice traffic.
untrust	Do not trust the dot1p priority or DSCP values contained in packets arriving on the voice vlan port.
vlanid	The voice VLAN ID.

Default Configuration

The default DSCP value is 46.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-Gi1/0/1)#voice vlan 1
console(config-if-Gi1/0/1)#voice vlan dot1p 1
console(config-if-Gi1/0/1)#voice vlan none
console(config-if-Gi1/0/1)#voice vlan untagged
```

voice vlan data priority

This command is to either trust or not trust (untrust) the data traffic arriving on the voice VLAN port.

Syntax

voice vlan data priority { **trust** | untrust }

- **trust**—Trust the dot1p priority or DSCP values contained in packets arriving on the voice vlan port.
- **untrust**—Do not trust the dot1p priority or DSCP values contained in packets arriving on the voice vlan port.

Command Mode

Interface Configuration

Default Value

trust

Example

console(config-if-1/0/1)#voice vlan data priority untrust

console(config-if-1/0/1)#voice vlan data priority trust

show voice vlan

show voice vlan [**interface** {**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port* | **all**}]

Syntax

When the **interface** parameter is not specified, only the global mode of the voice VLAN is displayed.

When the **interface** parameter is specified, the following is displayed:

When the interface parameter is specified:	
Voice VLAN Mode	The admin mode of the voice VLAN on the interface.
Voice VLAN ID	The voice VLAN ID.
Voice VLAN Priority	The Dot1p priority for the voice VLAN on the port.
Voice VLAN Untagged	The tagging option for the voice VLAN traffic.
Voice VLAN COS Override	The Override option for the voice traffic arriving on the port.
Voice VLAN Status	The operational status of voice VLAN on the port.

Command Mode

Privileged EXEC

Example

```
(console) #show voice vlan interface 1/0/1


Interface.....................................1/0/1
Voice VLAN Interface Mode.....................Enabled
Voice VLAN ID.................................1
Voice VLAN COS Override.......................False
Voice VLAN Port Status........................Disabled
```

36

802.1x Commands

Local Area Networks (LANs) are often deployed in environments that permit the attachment of unauthorized devices. The networks also permit unauthorized users to attempt to access the LAN through existing equipment. In such environments, the administrator may desire to restrict access to the services offered by the LAN.

Port-based network access control makes use of the physical characteristics of LAN infrastructures to provide a means of authenticating and authorizing devices attached to a LAN port. Port-based network access control prevents access to the port in cases in which the authentication and authorization process fails. A port is defined as a single point of attachment to the LAN.

The PowerConnect supports an 802.1x Authenticator service with a local authentication server or authentication using remote RADIUS or TACACS servers.

Supported security methods for communication with remote servers include MD5, PEAP, EAP-TTL, EAP-TTLS, and EAP-TLS.

Local 802.1X Authentication Server

The PowerConnect switch supports a dedicated database for local authentication of users for network access through the Dot1x feature. This functionality is distinct from management access for the switch. This feature supports creating users for Dot1x (port) access only.

The Internal Authentication Server feature provides support for the creation of users for Dot1x access only, i.e. without management access. This feature maintains a separate database (henceforth called as Dot1x user database) of users allowed for Dot1x access.

A new authentication method **internal** is added to the list of methods supported by authentication list creation in order to support the IDAS user database lookup. The **internal** method cannot be added in the same authentication list that has other methods like local, radius and reject.

Whenever an operator configures a port in Dot1x authentication mode and selects the authentication method as internal, then the user credentials received from the Dot1x supplicant is validated against the IDAS by Dot1x component. The Dot1x application accesses the Dot1x user database to check whether the user credentials present in the authentication message corresponds to a valid user or not. If so then an event is generated which triggers the Dot1x state machine to send a challenge to the supplicant. Otherwise a failure is returned to the Dot1x state machine and the user is not granted access to the port.

If user(s) credentials are changed, the existing user connection(s) are not disturbed and the changed user(s) credentials are only used when a new EAP request arises.

A CLI configuration mode is added in order to configure dot1x users and their attributes. The Dot1x maintained user database can be exported (uploaded) or imported (downloaded) to/from a central location using a TFTP server.

MAC Authentication Bypass

Today, 802.1x has become the recommended port-based authentication method at the access layer in enterprise networks. However, there may be 802.1x unaware devices such as printers, fax-machines etc that would require access to the network without 802.1x authentication. MAC Authentication Bypass (MAB) is a supplemental authentication mechanism to allow 802.1x unaware clients to authenticate to the network. It uses the 802,1x infrastructure and MAB cannot be supported independent of the Dot1x component.

MAC Authentication Bypass (MAB) provides 802.1x unaware clients controlled access to the network using the devices' MAC address as an identifier. This requires that the known and allowable MAC address and corresponding access rights be pre-populated in the authentication server. MAB only works when the port control mode of the port is MAC-based.

Port access by MAB clients is allowed if the Dot1x user database has corresponding entries added for the MAB clients with user name and password attributes set to the MAC address of MAB clients.

Guest VLAN

The Guest VLAN feature allows a PowerConnect switch to provide a distinguished service to unauthenticated users (not rogue users who fail authentication). This feature provides a mechanism to allow visitors and contractors to have network access to reach external network with no ability to surf internal LAN.

When a client that does not support 802.1X is connected to an unauthorized port that is 802.1X-enabled, the client does not respond to the 802.1X requests from the switch. Therefore, the port remains in the unauthorized state, and the client is not granted access to the network. If a guest VLAN is configured for that port, then the port is placed in the configured guest VLAN, and the port is moved to the authorized state, allowing access to the client.

802.1x Monitor Mode

Monitor mode is a special mode that can be enabled in conjunction with Dot1x authentication. It allows network access even in case where there is a failure to authenticate but logs the results of the authentication process for diagnostic purposes. The exact details are described in the below sections. The main aim of the monitor mode is to provide a mechanism to the operator to be able to identify the short-comings in the configuration of a Dot1x authentication on the switch without affecting the network access to the users of the switch.

There are three important aspects to this feature after activation:

1. To allow successful authentications using the returned information from authentication server.
2. To provide a mechanism to report unsuccessful authentications without negative repercussions to the user due to operator errors or failure cases from the Authentication server or supplicants.
3. To accurately report the data received from the successful and unsuccessful operations so that the operator can make the appropriate changes or learn where the problem areas are.

The monitor mode can be configured globally on a switch. If the switch fails to authenticate the user for any reason (say RADIUS access reject from RADIUS server, RADIUS timeout, or the client itself is Dot1x unaware), the

client is authenticated and is undisturbed by the failure condition(s). The reasons for failure are logged and buffered into the local logging database such that the operator can track the failure conditions.

RADIUS-based Dynamic VLAN Assignment

If VLAN assignment is enabled in the RADIUS server then as part of the response message, the RADIUS server sends the VLAN ID which the client is requested to use in the 802.1x tunnel attributes. If dynamic VLAN creation is enabled on the switch and the RADIUS assigned VLAN does not exist, then the assigned VLAN is dynamically created. This implies that the client can connect from any port and be assigned to the appropriate VLAN. This gives flexibility for clients to move around the network with out requiring the operator to perform additional provisioning for each network interface.

Commands in this Chapter

This chapter explains the following commands:

dot1x dynamic-vlan enable	dot1x timeout guest-vlan-period	show dot1x clients
dot1x mac-auth-bypass	dot1x timeout quiet-period	show dot1x interface
dot1x max-req	dot1x timeout re-authperiod	show dot1x statistics
dot1x max-users	dot1x timeout server-timeout	show dot1x users
dot1x port-control	dot1x timeout supp-timeout	clear dot1x authentication–history
dot1x re-authenticate	dot1x timeout tx-period	
dot1x reauthentication	show dot1x	
dot1x system-auth-control monitor	show dot1x authentication-history	

802.1x Advanced Features

dot1x guest-vlan	dot1x unauth-vlan	show dot1x advanced

802.1x Option 81

radius-server attribute 4

dot1x dynamic-vlan enable

Use the **dot1x dynamic-vlan enable** command in Global Configuration mode to enable the capability of creating VLANs dynamically when a RADIUS–assigned VLAN does not exist in the switch. Use the **no** form of the command to disable this capability.

Syntax

dot1x dynamic-vlan enable

no **dot1x dynamic-vlan enable**

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is Disabled.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

dot1x initialize

This command begins the initialization sequence on the specified port. This command is only valid if the control mode for the specified port is auto or mac-based. If the control mode is not auto or mac-based, an error will be returned.

Syntax

dot1x initialize [**interface** *interface-id*]

Syntax Description

Parameter	Description
interface-id	The port to be initialized.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

dot1x mac-auth-bypass

Use the **dot1x mac-auth-bypass** command to enable MAB on an interface. Use the "no" form of this command to disable MAB on an interface.

Syntax

dot1x mac-auth-bypass

no dot1x mac-auth-bypass

Default Configuration

MAC Authentication Bypass is disabled by default.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

There are no user guidelines for this command.

Example

The following example sets MAC Authentication Bypass on interface 1/2:

```
console(config-if-1/0/2)#dot1x mac-auth-bypass
```

dot1x max-req

Use the **dot1x max-req** command in Interface Configuration mode to set the maximum number of times that the switch sends an Extensible Authentication Protocol (EAP)-request frame (assuming that no response is received) to the client before restarting the authentication process. To return to the default setting, use the **no** form of this command.

Syntax

dot1x max-req *count*

no dot1x max-req

- *count* — Number of times that the switch sends an EAP-request/identity frame before restarting the authentication process. (Range: 1–10)

Default Configuration

The default value for the *count* parameter is 2.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

Change the default value of this command only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients and authentication servers.

Example

The following example sets the number of times that the switch sends an EAP-request/identity frame to 6.

```
console(config)# interface gigabitethernet 1/0/16
console(config-if-1/0/16)# dot1x max-req 6
```

dot1x max-users

Use the **dot1x max-users** command in Interface Configuration mode to set the maximum number of clients supported on the port when MAC-based 802.1X authentication is enabled on the port. Use the **no** version of the command to reset the maximum number of clients supported on the port when MAC-based 802.1X authentication is enabled on the port. The value would be reset to 8.

Syntax

dot1x max-users *users*

no dot1x max-users

- *users* — The number of users the port supports for MAC-based 802.1X authentication (Range: 1–16)

Default Configuration

The default number of clients supported on a port with MAC-based 802.1X authentication is 8.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following command limits the number of devices that can authenticate on port 1/0/2 to 3.

```
console(config-if-1/0/2)#dot1x max-users 3
```

dot1x port-control

Use the **dot1x port-control** command in Interface Configuration mode to enable the IEEE 802.1X operation on the port.

Syntax

dot1x port-control {force-authorized | force-unauthorized | auto | mac-based}

no dot1x port-control

- **auto** — Enables 802.1x authentication on the interface and causes the port to transition to the authorized or unauthorized state based on the 802.1x authentication exchange between the switch and the client.
- **force-authorized** — Disables 802.1x authentication on the interface and causes the port to transition to the authorized state without any authentication exchange required. The port sends and receives normal traffic without 802.1x-based authentication of the client.
- **force-unauthorized** — Denies all access through this interface by forcing the port to transition to the unauthorized state, ignoring all attempts by the client to authenticate. The switch cannot provide authentication services to the client through the interface.
- **mac-based** — Enables 802.1x authentication on the interface and allows multiple hosts to authenticate on a single port. The hosts are distinguished by their MAC addresses.

Default Configuration

The default configuration is **auto**.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

It is recommended that you disable the spanning tree or enable spanning-tree PortFast mode on 802.1x edge ports (ports in **auto** state that are connected to end stations), in order to go immediately to the forwarding state after successful authentication.

When configuring a port to use MAC-based authentication, the port must be in switchport general mode.

Example

The following command enables MAC-based authentication on port 1/0/2

```
console(config)# interface gigabitethernet 1/0/2

console(config-if-1/0/2)# dot1x port-control mac-
based
```

dot1x re-authenticate

Use the **dot1x re-authenticate** command in Privileged EXEC mode to enable manually initiating a re-authentication of all 802.1x-enabled ports or the specified 802.1x-enabled port.

Syntax

dot1x re-authenticate [**gigabitethernet** *unit/slot/port*]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following command manually initiates a re-authentication of the 802.1x-enabled port.

```
console# dot1x re-authenticate gigabitethernet 1/0/16
```

dot1x reauthentication

Use the **dot1x reauthentication** command in Interface Configuration mode to enable periodic re-authentication of the client. To return to the default setting, use the **no** form of this command.

Syntax

dot1x reauthentication

no dot1x reauthentication

Default Configuration

Periodic re-authentication is disabled.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example enables periodic re-authentication of the client.

```
console(config)# interface gigabitethernet 1/0/16
console(config-if-1/0/16)# dot1x reauthentication
```

dot1x system-auth-control monitor

Use the **dot1x system-auth-control monitor** command in Global Configuration mode to enable 802.1x monitor mode globally. To disable this function, use the **no** form of this command.

Syntax

dot1x system-auth-control monitor

no dot1x system-auth-control monitor

Parameter Description

This command has no arguments or keywords.

Default Configuration

Dot1x monitor mode is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables 802.1x globally.

```
console(config)# dot1x system-auth-control monitor
```

dot1x timeout guest-vlan-period

Use the **dot1x timeout guest-vlan-period** command in Interface Configuration mode to set the number of seconds that the switch waits before authorizing the client if the client is a dot1x unaware client.

Syntax

dot1x timeout guest-vlan-period *seconds*

seconds — Time in seconds that the switch waits before authorizing the client if the client is a dot1x unaware client.

Default Configuration

The switch remains in the quiet state for 90 seconds.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

It is recommended that the user set the dot1x timeout guest-vlan-period to at least three times the **while** timer, so that at least three EAP Requests are sent, before assuming that the client is a dot1x unaware client.

Example

The following example sets the dot1x timeout guest vlan period to 100 seconds.

```
console(config)# dot1x timeout guest-vlan-period 100
```

dot1x timeout quiet-period

Use the **dot1x timeout quiet-period** command in Interface Configuration mode to set the number of seconds that the switch remains in the quiet state following a failed authentication exchange (for example, the client provided an invalid password). To return to the default setting, use the **no** form of this command.

Syntax

dot1x timeout quiet-period *seconds*

no dot1x timeout quiet-period

- *seconds* — Time in seconds that the switch remains in the quiet state following a failed authentication exchange with the client. (Range: 0–65535 seconds)

Default Configuration

The switch remains in the quiet state for 60 seconds.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

During the quiet period, the switch does not accept or initiate any authentication requests.

Change the default value of this command only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients and authentication servers.

To provide a faster response time to the user, enter a smaller number than the default.

Example

The following example sets the number of seconds that the switch remains in the quiet state following a failed authentication exchange to 3600.

```
console(config)# interface gigabitethernet 1/0/16

console(config-if-1/0/16)# dot1x timeout quiet-period
3600
```

dot1x timeout re-authperiod

Use the **dot1x timeout re-authperiod** command in Interface Configuration mode to set the number of seconds between re-authentication attempts. To return to the default setting, use the **no** form of this command.

Syntax

dot1x timeout re-authperiod *seconds*

no dot1x timeout re-authperiod

- *seconds* — Number of seconds between re-authentication attempts. (Range: 300–4294967295)

Default Configuration

Re-authentication period is 3600 seconds.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the number of seconds between re-authentication attempts to 300.

```
console(config)# interface gigabitethernet 1/0/16

console(config-if-1/0/16)# dot1x timeout re-
authperiod 300
```

dot1x timeout server-timeout

Use the **dot1x timeout server-timeout** command in Interface Configuration mode to set the time that the switch waits for a response from the authentication server. To return to the default setting, use the **no** form of this command.

Syntax

dot1x timeout server-timeout *seconds*

no dot1x timeout server-timeout

- *seconds* — Time in seconds that the switch waits for a response from the authentication server. (Range: 1–65535)

Default Configuration

The period of time is set to 30 seconds.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

The actual timeout is this parameter or the product of the Radius transmission times the Radius timeout, whichever is smaller.

Example

The following example sets the time for the retransmission to the authentication server to 3600 seconds.

```
console(config-if-1/0/1)# dot1x timeout server-
timeout 3600
```

dot1x timeout supp-timeout

Use the **dot1x timeout supp-timeout** command in Interface Configuration mode to set the time that the switch waits for a response before retransmitting an Extensible Authentication Protocol (EAP)-request frame to the client. To return to the default setting, use the **no** form of this command.

Syntax

dot1x timeout supp-timeout *seconds*

no dot1x timeout supp-timeout

seconds — Time in seconds that the switch should wait for a response to an EAP-request frame from the client before resending the request. (Range: 1–65535)

Default Configuration

The period of time is set to 30 seconds.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

Change the default value of this command only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients and authentication servers.

Example

The following example sets the time for the retransmission of an EAP-request frame to the client to 3600 seconds.

```
console(config-if-1/0/1)# dot1x timeout supp-timeout
3600
```

dot1x timeout tx-period

Use the **dot1x timeout tx-period** command in Interface Configuration mode to set the number of seconds that the switch waits for a response to an Extensible Authentication Protocol (EAP)-request/identity frame from the client before resending the request. To return to the default setting, use the **no** form of this command.

Syntax

dot1x timeout tx-period *seconds*

no dot1x timeout tx-period

- *seconds* — Time in seconds that the switch should wait for a response to an EAP-request/identity frame from the client before resending the request.
  (Range: 1–65535)

Default Configuration

The period of time is set to 30 seconds.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

Change the default value of this command only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients and authentication servers.

Example

The following command sets the number of seconds that the switch waits for a response to an EAP-request/identity frame to 3600 seconds.

```
console(config)# interface gigabitethernet 1/0/16

console(config-if-1/0/16)# dot1x timeout tx-period
3600
```

show dot1x

Use the **show dot1x** command in Privileged EXEC mode to display:

- A summary of the global dot1x configuration.
- Summary information of the dot1x configuration for a specified port or all ports.
- Detailed dot1x configuration for a specified port
- Dot1x statistics for a specified port, depending on the tokens used.

Syntax

show dot1x [**interface** *interface-id* [**statistics**]]

Parameter Description

Parameter	Description
interface-id	Any valid interface. See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If you do not use the optional parameters, the command displays the global dot1x mode and the VLAN Assignment mode.

Field	Description
Administrative Mode	Indicates whether authentication control on the switch is enabled or disabled.
VLAN Assignment Mode	Indicates whether assignment of an authorized port to a RADIUS assigned VLAN is allowed (enabled) or not (disabled).

Field	Description
Monitor Mode	Indicates whether the Dot1x Monitor mode on the switch is enabled or disabled.

Example

```
console#show dot1x
Administrative Mode.............Enabled
VLAN Assignment Mode............Disabled
Monitor Mode....................Disabled
```

show dot1x authentication-history

Use the **show dot1x** authentication-history command in Privileged EXEC mode to display the dot1x authentication events and information during successful and unsuccessful dot1x authentication processes. The command is available to display all events, or events per interface, or only failure authentication events in summary or in detail.

Syntax

show dot1x authentication-history {*interface-id* | all} [failed-auth-only] [detail]

Parameter Description

The following table explains the output parameters.

Parameter	Description
Time Stamp	Exact time at which the event occurs.
Interface	Physical Port on which the event occurs.
MAC-Address	Supplicant/Client MAC Address
VLAN assigned	VLAN assigned to the client/port on authentication.
VLAN assigned Reason	Type of VLAN ID assigned i.e Guest VLAN, Unauth, Default, Radius Assigned or Monitor Mode VLAN ID.
Auth Status	Authentication Status

Parameter	Description
Reason	Actual reason behind the successful or failure authentication.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show dot1x authentication-history all detail

Time Stamp.............................. Mar 22 2010 01:16:31
Interface............................... Gi1/0/2
MAC-Address............................. 00:01:02:03:04:05
VLAN Assigned........................... 111
VLAN Assigned Reason.................... Guest VLAN
Auth Status............................. Authorized
Reason...... ............................ Dot1x Authentication
                                         due to Guest VLAN
                                         Timer Expiry.

......
......

console#show dot1x authentication-history all
Time Stamp           Interface MAC-Address       VLANID Auth Status
-------------------- --------- ----------------- ------ ----------
Mar 22 2010 01:16:31  gi1/0/2   00:01:02:03:04:05 111    Authorized
Mar 22 2010 01:20:33  gi1/0/7   00:00:0D:00:00:00 222    Authorized
```

```
console#show dot1x authentication-history gi1/0/1
Time Stamp            Interface MAC-Address       VLANID Auth Status
--------------------- --------- ----------------- ------ ----------
Mar 22 2010 01:16:31  gi1/0/1   00:01:02:03:04:05 111    Authorized
Mar 22 2010 01:18:22  gi1/0/1   00:00:00:03:04:05 0
Unauthorized
console#show dot1x authentication-history gi1/0/1 failed-auth-only
Time Stamp            Interface MAC-Address       VLANID Auth Status
--------------------- --------- ----------------- ------ ----------
Mar 22 2010 01:18:22  gi1/0/2   00:00:00:03:04:05 0
Unauthorized
```

show dot1x clients

Use the **show dot1x clients** command in Privileged EXEC mode to display 802.1x client information. The client information is displayed in summary or in detail. The command also displays the statistics of the number of clients that are authenticated using Monitor Mode and using 802.1x.

Syntax

show dot1x clients {*interface–id* | **all**}

Parameter Description

Parameter	Description
interface–id	Any valid interface. See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The following fields are displayed by this command.

Field	Description
Clients Authenticated using Monitor Mode	Indicates the number of Dot1x clients authenticated using Monitor mode.
Clients Authenticated using Dot1x	Indicates the number of Dot1x clients authenticated using 802.1x authentication process.

The following table describes the significant fields shown in the display.

Field	Description
Interface	The port number.
Username	The username representing the identity of the Supplicant. This field shows the username when the port control is **auto** or **mac-based**. If the port is Authorized, it shows the username of the current user. If the port is unauthorized it shows the last user that was authenticated successfully.
Supp MAC Address	The MAC-address of the supplicant
Session Time	The amount of time, in seconds, since the client was authenticated on the port.
Filter ID	The Filter ID assigned to the client by the RADIUS server. This field is not applicable when the Filter-ID feature is disabled on the RADIUS server and client.
VLAN Assigned	The VLAN assigned to the client by the radius server. When VLAN assignments are disabled, RADIUS server does not assign any VLAN to the port, and this field is set to 0.

Example

The following example displays information about the 802.1x clients.

```
console#show dot1x clients all
Clients Authenticated using Monitor Mode....... 1
```

```
Clients Authenticated using Dot1x.............. 1

Logical Interface.............................. 16
Interface...................................... gi1/0/2
User Name...................................... 000102030405
Supp MAC Address............................... 00:01:02:03:04:05
Session Time................................... 518
Filter Id.....................................
VLAN Id........................................ 1
VLAN Assigned.................................. Default
Session Timeout................................ 0
Session Termination Action..................... Default

Logical Interface.............................. 96
Interface...................................... gi1/0/7
User Name...................................... brcm
Supp MAC Address............................... 00:08:A1:7E:45:1A
Session Time................................... 67
VLAN Id........................................ 1
VLAN Assigned.................................. Monitor Mode
Session Timeout................................ 0
Session Termination Action..................... Default
```

show dot1x interface

This command shows the status of MAC Authentication Bypass. This feature is an extension of Dot1x Option 81 feature added in Power Connect Release 2.1. to accept a VLAN name as an alternative to a number when RADIUS indicates the Tunnel-Private-Group-ID for a supplicant.

Syntax

show dot1x interface {**gigabitethernet** *unit/slot/port* | **tengigabitethernet***unit/slot/port* }

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show dot1x interface gigabitethernet 1/0/10


Administrative Mode.............. Disabled
Dynamic VLAN Creation Mode........ Disabled
Monitor Mode..................... Disabled


Port     Admin              Oper          Reauth
Reauth
         Mode               Mode          Control
Period
-------  -----------------  ------------  --------  -
---------
Gi1/0/10 auto                N/A           FALSE
3600


Quiet Period..................................... 60
Transmit Period.................................. 30
Maximum Requests................................. 2
Max Users........................................ 16
```

```
VLAN Assigned.................................

Supplicant Timeout............................ 30

Guest-vlan Timeout............................ 30

Server Timeout (secs)......................... 30

MAB mode (configured).........................
Disabled

MAB mode (operational)........................
Disabled

Authenticator PAE State.......................
Initialize

Backend Authentication State..................
Initialize
```

show dot1x statistics

Use the **show dot1x statistics** command in Privileged EXEC mode to display 802.1x statistics for the specified interface.

Syntax

show dot1x statistics {**gigabitethernet** *unit/slot/port* | **tengigabitethernet***unit/slot/port* }

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays 802.1x statistics for the specified interface.

```
console#show dot1x statistics gigabitethernet 1/0/2

Port..................................... 1/0/2
EAPOL Frames Received.................... 0
EAPOL Frames Transmitted................. 0
EAPOL Start Frames Received.............. 0
EAPOL Logoff Frames Received............. 0
Last EAPOL Frame Version................. 0
Last EAPOL Frame Source.....
0000.0000.0000
EAP Response/Id Frames Received.......... 0
EAP Response Frames Received............. 0
EAP Request/Id Frames Transmitted........ 0
EAP Request Frames Transmitted........... 0
Invalid EAPOL Frames Received............ 0
EAPOL Length Error Frames Received....... 0
```

The following table describes the significant fields shown in the display.

Field	Description
EapolFramesRx	The number of valid EAPOL frames of any type that have been received by this Authenticator.
EapolFramesTx	The number of EAPOL frames of any type that have been transmitted by this Authenticator.
EapolStartFramesRx	The number of EAPOL Start frames that have been received by this Authenticator.
EapolLogoffFramesRx	The number of EAPOL Logoff frames that have been received by this Authenticator.
EapolRespIdFramesRx	The number of EAP Resp/Id frames that have been received by this Authenticator.

Field	Description
EapolRespFramesRx	The number of valid EAP Response frames (other than Resp/Id frames) that have been received by this Authenticator.
EapolReqIdFramesTx	The number of EAP Req/Id frames that have been transmitted by this Authenticator.
EapolReqFramesTx	The number of EAP Request frames (other than Rq/Id frames) that have been transmitted by this Authenticator.
InvalidEapolFramesRx	The number of EAPOL frames that have been received by this Authenticator in which the frame type is not recognized.
EapLengthErrorFramesRx	The number of EAPOL frames that have been received by this Authenticator in which the Packet Body Length field is invalid.
LastEapolFrameVersion	The protocol version number carried in the most recently received EAPOL frame.
LastEapolFrameSource	The source MAC address carried in the most recently received EAPOL frame.

show dot1x users

Use the **show dot1x users** command in Privileged EXEC mode to display 802.1x authenticated users for the switch.

Syntax

show dot1x users [**username** *username*]

- *username* — Supplicant username (Range: 1–160 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays 802.1x users.

```
console#show dot1x users
Port      Username
--------- ---------
1/0/1       Bob
1/0/2       John
Switch# show dot1x users username Bob
Port       Username
--------- ---------
1/0/1       Bob
```

The following table describes the significant fields shown in the display:

Field	Description
Username	The username representing the identity of the Supplicant.
Port	The port that the user is using.

clear dot1x authentication–history

Use the **clear dot1x** authentication–history command in Privileged EXEC mode to clear the authentication history table captured during successful and unsuccessful authentication.

Syntax

show dot1x authentication–history [*interface–id*]

Parameter Description

Parameter	Description
interface–id	Any valid interface. See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#clear dot1x authentication-history

Purge all entries from the log.

console#clear dot1x authentication-history gi1/0/1

Purge all entries for the specified interface from the
log.
```

802.1x Advanced Features

dot1x guest-vlan

Use the **dot1x guest-vlan** command in Interface Configuration mode to set the guest VLAN on a port. The VLAN must already have been defined. The **no** form of this command sets the guest VLAN id to zero, which disables the guest VLAN on a port.

Syntax

dot1x guest-vlan *vlan-id*

no dot1x guest-vlan

- *vlan-id* — The ID of a valid VLAN to use as the guest VLAN (Range: 0-4093).

Default Configuration

The guest VLAN is disabled on the interface by default.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

Configure the guest VLAN before using this command.

Example

The following example sets the guest VLAN on port 1/0/2 to VLAN 10.

```
console(config-if-1/0/2)#dot1x guest-vlan 10
```

dot1x unauth-vlan

Use the dot1x unauth-vlan command in Interface Configuration mode to specify the unauthenticated VLAN on a port. The unauthenticated VLAN is the VLAN to which supplicants that fail 802.1X authentication are assigned.

Syntax

dot1x unauth-vlan *vlan-id*

no dot1x unauth-vlan

- *vlan-id* — The ID of a valid VLAN to use for unauthenticated clients (Range: 0-4093).

Default Configuration

The unauthenticated VLAN is disabled on the interface by default.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

Configure the unauthenticated VLAN before using this command.

Example

The following example set the unauthenticated VLAN on port 1/0/2 to VLAN 20.

```
console(config-if-1/0/2)#dot1x unauth-vlan 20
```

show dot1x advanced

Use the **show dot1x advanced** command in Privileged EXEC mode to display 802.1x advanced features for the switch or for the specified interface. The output of this command has been updated in release 2.1 to remove the Multiple Hosts column and add an Unauthenticated VLAN column, which indicates whether an unauthenticated VLAN is configured on a port. The command has also been updated to show the Guest VLAN ID (instead of the status) since it is now configurable per port.

Syntax

show dot1x advanced [{**gigabitethernet** *unit/slot/port* | **tengigabitethernet***unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays 802.1x advanced features for the switch.

```
console#show dot1x advanced

Port        Guest       Unauthenticated
```

```
             VLAN            Vlan
---------   ---------   ---------------
1/0/1        Disabled    Disabled
1/0/2        10          20
1/0/3        Disabled    Disabled
1/0/4        Disabled    Disabled
1/0/5        Disabled    Disabled
1/0/6        Disabled    Disabled

console#show dot1x advanced gigabitethernet 1/0/2

Port        Guest       Unauthenticated
            VLAN             Vlan
---------   ---------   ---------------
1/0/2        10          20
```

802.1x Option 81

radius-server attribute 4

Use the **radius-server attribute 4** command in Global Configuration mode to set the network access server (NAS) IP address for the RADIUS server. Use the **no** version of the command to set the value to the default.

Syntax

radius-server attribute 4 *ip-address*

no dot1x guest-vlan

- *ip-address* — Specifies the IP address to be used as the RADIUS attribute 4, the NAS IP address.

Default Configuration

If a RADIUS server has been configured on the switch, the default attribute 4 value is the RADIUS server IP address.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the NAS IP address in RADIUS attribute 4 to 192.168.10.22.

```
console(config)#radius-server attribute 4
192.168.10.22
```

37

Data Center Technology Commands

NOTE: Fiber Channel over Ethernet (FCoE) commands are only supported on the PC8024 and PC8024F switches. CLI commands and Dell OpenManage Switch Administrator pages are not available for other switch models.

This section of the document contains the following FCoE commands:

Data Center Bridging Commands

FIP Snooping Commands

Priority Flow Control Commands

38

Data Center Bridging Commands

NOTE: Fiber Channel over Ethernet (FCoE) commands are only supported on the PC8024 and PC8024F switches. CLI commands and Dell OpenManage Switch Administrator pages are not available for other switch models.

Data Center Bridging Exchange Protocol

The Data Center Bridging Exchange Protocol (DCBX) is used by DCB devices to exchange configuration information with directly connected peers. The protocol is also used to detect misconfiguration of the peer DCB devices and, optionally, for configuration of peer DCB devices.

DCBX is expected to be deployed in support of lossless operation for FCoE or iSCSI traffic. In these scenarios, all network elements are DCBX-enabled (DCBX is enabled end-to-end).

The DCBX protocol implementation conforms to the IEEE 802.1Qaz specification with some exceptions. To be interoperable with legacy industry implementations of DCBX protocol, a hybrid model is used to support both the IEEE version of DCBX and legacy DCBX versions. The hybrid version of the DCBX conforms to all aspects of the legacy standards to the degree necessary to support interoperability with a wide variety of FCoE capable switches.

The main objective of DCBX is to perform the following operations:

- Discovery of DCB capability in a peer

  DCBX is used to learn about the capabilities of the peer device. It is a means to determine if the peer device supports a particular feature such as PFC.

- DCB feature misconfiguration detection

  DCBX can be used to detect misconfiguration of a feature between the peers on a link. Misconfiguration detection is feature-specific because some features may allow asymmetric configuration.

- Peer configuration of DCB features

DCBX can be used by a device to perform configuration of DCB features in its peer device if the peer device is willing to accept configuration.

Interoperability with IEEE DCBX

The PowerConnect switch automatically detects if a peer is operating with either of the two CEE DCBX versions or the IEEE standard DCBX version. This is the default mode. DCBX can also be configured to manually select one of the legacy versions or IEEE standard mode. In auto-detect mode, the switch starts operating in IEEE DCBX mode on a port and if it detects a legacy DCBX device based on the OUI of the organization TLV, then the switch changes its DCBX mode on that port to support the version detected. There is no timeout mechanism to move back to IEEE mode. Once the DCBX peer times out, multiple peers are detected, the link is reset (link down/up) or as commanded by the operator, DCBX resets its operational mode to IEEE.

The interaction between DCBX component and other components remains the same irrespective of the operational mode it is executing. For instance, DCBX component interacts with PFC to get needed information to pack the TLVs to be sent out on the interface. Based on the operational control mode of the port, DCBX packs it in the proper frame format.

Port Roles

Each port's behavior is dependent on the operational mode of that port and of other ports in the stack. The port mode is a DCBX configuration item that is passed to the DCBX clients to control the processing of their configuration information. There are four port roles:

1. Manual
2. Auto-Upstream
3. Auto-Downstream
4. Configuration Source

Manual

Ports operating in the **Manual** role do not have their configuration affected by peer devices or by internal propagation of configuration. These ports have their operational mode and TC and bandwidth information specified

explicitly by the operator. These ports will advertise their configuration to their peer if DCBX is enabled on that port. Incompatible peer configurations will be logged and counted with an error counter.

The default operating mode for each port is **Manual** for PowerConnect releases; however, customer platforms may change the default mode for selected ports to either **Auto-Upstream** or **Auto-Downstream** mode. An example of this would be a blade switch that needed to support **touchless** configuration and has certain ports that are upstream ports and other ports that are downstream ports. A port that is set to manual mode sets the willing bit for DCBX client TLVs to false. Manually configured ports never internally propagate or accept internal or external configuration from other ports. Manually configured ports may notify the operator of incompatible configurations if client configuration exchange over DCBX is enabled. Manually configured ports are always operationally enabled for DCBX clients, regardless of whether DCBX is enabled.

Auto-Upstream

Advertises a configuration, but is also willing to accept a configuration from the link-partner and propagate it internally to the auto-downstream ports as well as receive configuration propagated internally by other auto-upstream ports. Specifically, the willing parameter is enabled on the port and the recommendation TLV is sent to the peer and processed if received locally. The first auto-upstream port to successfully accept a compatible configuration becomes the configuration source. The configuration source propagates its configuration to other auto-upstream and auto-downstream ports. Only the configuration source may propagate configuration to other ports internally. Auto-upstream ports that receive internally propagated information ignore their local configuration and utilize the internally propagated information.

Peer configurations received on auto-upstream ports other than the configuration source result in one of two possibilities.

1. If the configuration is compatible with the configuration source, then the DCBX client becomes operationally active on the upstream port.
2. If the configuration is not compatible with the configuration source, then a message is logged indicating an incompatible configuration, an error counter is incremented, and the DCBX client is operationally disabled on

the port. The expectation is that the network administrator configures the upstream devices appropriately so that all such devices advertise a compatible configuration.

Auto-Downstream

Advertises a configuration but is not willing to accept one from the link partner. However, the port will accept a configuration propagated internally by the configuration source. Specifically, the willing parameter is disabled on auto-downstream. By default, auto-downstream ports have the recommendation TLV parameter enabled. Auto-downstream ports that receive internally propagated information ignore their local configuration and utilize the internally propagated information.

Configuration Source

In this role, the port has been manually selected to be the configuration source. Configuration received over this port is propagated to the other auto-configuration ports, however, no automatic election of a new configuration source port is allowed. Events that cause selection of a new configuration source are ignored. The configuration received over the configuration source port is maintained until cleared by the operator (set the port to the manual role). FIP snooping must be enabled to set a port to configuration source.

Configuration Source Port Selection Process

When an auto-upstream or auto-downstream port receives a configuration from a peer, the DCBX client first checks if there is an active configuration source. If there is a configuration source already selected, the received configuration is checked against the local port operational values as received from the configuration source, and if compatible, the client marks the port as operationally enabled. If the configuration received from the peer is determined to not be compatible, a message is logged, an error counter is incremented and the DCBX clients become operationally disabled on the port. The port continues to keep link up and exchanges DCBX packets. If a compatible configuration is later received, the DCBX clients will become operationally enabled.

If there is no configuration source, a port may elect itself as the configuration source on a first-come, first-serve basis from the set of eligible ports. A port is eligible to become the configuration source if:

- No other port is the configuration source.
- The port role is auto-upstream.
- The port is enabled with link up and DCBX enabled.
- The port has negotiated a DCBX relationship with the partner.
- The switch is capable of supporting the received configuration values, either directly or by translating the values into an equivalent configuration N.B. Whether or not the peer configuration is compatible with the configured values is NOT considered.

The newly elected configuration source propagates DCBX client information to the other ports and is internally marked as being the port over which configuration has been received. Configuration changes received from the peer over the configuration source port are propagated to the other auto-configuration ports. Ports receiving auto-configuration information from the configuration source ignore their current settings and utilize the configuration source information.

When a configuration source is selected, all auto-upstream ports other than the configuration source are marked as willing disabled.

In order to reduce flapping of configuration information, if the configuration source port is disabled, disconnected or loses LLDP connectivity, the system clears the selection of configuration source port (if not manually selected) and enables the willing bit on all auto-upstream ports. The configuration on the auto-configuration ports is not cleared (configuration holdover). If the user wishes to clear the configuration on the system in this scenario, the user can put the configuration source port into manual mode.

When a new port is selected as configuration source, it is marked as the configuration source, the DCBX configuration is refreshed on all auto-configuration ports and each port may begin configuration negotiation with their peer again (if any information has changed).

Commands in this Chapter

This chapter explains the following commands:

datacenter-bridging	lldp dcbx port-role
lldp dcbx version	show lldp tlv-select

datacenter-bridging

Use the **datacenter-bridging** command for an ethernet interface in order to enter the DataCenterBridging mode. Priority-Flow-Control is configurable from within the DataCenterBridging mode.

Syntax

datacenter-bridging

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console#config
console(config)#interface range ethernet all
console(config-if)#datacenter-bridging
console(config-if-dcb)#priority-flow-control mode on
console(config-if-dcb)#priority-flow-control priority
1 no-drop
```

lldp dcbx version

Use the **lldp dcbx version** command in Global Configuration mode to configure the administrative version for the Data Center Bridging Capability Exchange (DCBX) protocol. This command enables the switch to support a specific version of the DCBX protocol or to detect the peer version and match

it. DCBX can be configured to operate in IEEE mode or CEE mode or CIN mode. In auto mode, version detection is based on the peer device DCBX version. The switch operates in either IEEE or one of the legacy modes on each interface.

NOTE: CIN is Cisco Intel Nuova DCBX (version 1.0). CEE is converged enhanced ethernet DCBX (version 1.06).

Use the **no** form of the command to reset the dcbx version to the default value of auto.

Syntax

lldp dcbx version { auto | cin | cee | ieee }

no lldp dcbx version

Parameter Description

Parameter	Description
auto	Automatically select the version based on the peer response.
CIN	Force the mode to Cisco-Intel-Nuova. (DCBX 1.0)
CEE	Force the mode to CEE (DCBX 1.06)
IEEE	Force the mode to IEEE 802.1Qaz

Default Configuration

The default version is auto.

Command Mode

Global Config

User Guidelines

In auto mode, the switch will attempt to jump start the exchange by sending an IEEE frame, followed by a CEE frame followed by a CIN frame. The switch will parse the received response and immeditely switch to the peer version.

Example

The following example configures the switch to use CEE DCBX.

```
s1(config)#lldp dcbx version cee
```

lldp tlv-select dcbxp

Use the **lldp tlv-select dcbxp** command in Interface Configuration or Global Configuration mode to send specific DCBX TLVs if LLDP is enabled to transmit on the given interface. If no parameter is given, all DCBX TLVs are enabled for transmission. The default is all DCBX TLVs are enabled for transmission. If executed in interface mode, the interface configuration overrides the global configuration for that interface. Entering the command with no parameters enables transmission of all TLVs.

The **no** form of the command disables LLDP from sending all or individual DCBX TLVs even if LLDP is enabled for transmission on the given interface.

Syntax

lldp tlv-select dcbxp [**pfc** | **application-priority**]

no lldp tlv-select dcbxp [**pfc** | **application-priority**]

Parameter Description

Parameter	Description
pfc	Transmit the PFC configuration TLV.
application-priority	Transmit the application priority TLV.

Default Configuration

The default value is to transmit all TLVs as enabled by the auto-configuration port role. In manual mode, the default is to transmit all TLVs.

Command Mode

Interface Config, Global Config

User Guidelines

Interface configuration overrides the global configuration on the designated interface.

Example

The following example configures the port to transmit all TLVs.

```
console(interface-config)#no lldp tlv-select dcbxp
```

lldp dcbx port-role

Use the **lldp dcbx port-role** command in Interface Configuration mode to configure the port role to manual, auto-upstream, auto-downstream and configuration source. The default port role is manual.

Syntax

lldp dcbx port-role {auto-up |auto-down | manual | configuration-source}

Parameter Description

Parameter	Description
Manual	Ports operating in the 'Manual' role do not have their configuration affected by peer devices or by internal propagation of configuration. These ports will advertise their configuration to their peer if DCBX is enabled on that port. The willing bit is set to disabled on manual role ports.
Auto-up	Advertises a configuration, but is also willing to accept a configuration from the link-partner and propagate it internally to the auto-downstream ports as well as receive configuration propagated internally by other auto-upstream ports. These ports have the willing bit enabled. These ports should be connected to FCFs.
Auto-down	Advertises a configuration but is not willing to accept one from the link partner. However, the port will accept a configuration propagated internally by the configuration source. These ports have the willing bit set to disabled. Selection of a port based upon compatibility of the received configuration is suppressed. These ports should be connected to a trusted FCF.

Parameter	Description
Configuration Source	In this role, the port has been manually selected to be the configuration source. Configuration received over this port is propagated to the other auto-configuration ports. Selection of a port based upon compatibility of the received configuration is suppressed. These ports should be connected to a trusted FCF. These ports have the willing bit enabled.

Default Configuration

The default port role is manual.

Command Mode

Interface Config

User Guidelines

In order to reduce configuration flapping, ports that obtain configuration information from a configuration source port will maintain that configuration for 2x the LLDP timeout, even if the configuration source port becomes operationally disabled.

Examples

This example configures an FCF facing port:

```
console(config-if-Te1/1/1)#lldp dcbx port-role auto-up
```

This example configures an FCoE host facing port:

```
console(config-if-Te1/1/1)#lldp dcbx port-role auto-down
```

show lldp tlv-select

Use the **show lldp tlv-select** command in Privileged EXEC mode to display the per interface TLV configuration.

Syntax

show lldp tlv-select [interface <all | interface-id>]

Parameter Description

Parameter	Description
interface-id	A valid physical interface specifier.
all	All interfaces.

Default Configuration

The default is to show the per interface TLV configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Examples

```
switch(config)# show lldp tlv-select interface
te1/0/1

Interface    PFC  App Priority

-------------- ---  ------------

te1/0/         Yes  No


switch(config)# show lldp tlv-select

   access-management

   dcbx

      pfc

      application-priority

   port-description

   port-vlan

   system-capabilities
```

```
   system-description
   system-name

switch(config)# show lldp tlv-select interface all
Interface    PFC  App Priority
-------------- ---  ------------
te1/0/1        Yes  No
te1/0/2        Yes  No
```

show lldp dcbx

Use the **show lldp dcbx** command in Privileged EXEC mode to display the per interface DCBX configuration and status.

Syntax

show lldp dcbx [interface <all | interface-id [detail | status]>]

Parameter Description

Parameter	Description
interface-id	A valid physical interface specifier.
all	All interfaces.
Detail	Display detailed DCBX information.
Status	Displays a status summary.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example 1

The following example displays DCBX status.

```
switch(config)# show lldp dcbx interface all status
                                        DCBX   DCBX  Frame  TLV
Interface  Status   Role     Version    Tx     Rx    Dscrd
Dscrd
---------- -------  -------- -------- ------ ------ ------ -
-----
te1/0/1    Enabled  Auto-up  CEE 1.06    32     37     0
0
te1/0/2    Enabled  Auto-up  IEEE        32     37     0
0
te2/0/1    Enabled  Auto-dn  CIN 1.0     32     37     0
0
te2/0/2    Enabled  Auto-dn  IEEE        32     37     0
0
te3/0/1    Enabled  Auto-dn  CIN 1.0     32     37     0
0
te3/0/2    Disabled Manual   IEEE         0      0     0
0
```

The following example displays DCBX enabled – legacy device (CIN/CEE).

```
switch(config)# show lldp dcbx interface te1/0/1 detail
Interface te1/0/1
 DCBX Admin Status:                  Enabled
 Configured Version:                 Auto-detect
 Peer DCBX Version:                CIN Version 1.0
 Peer MAC: 00:23:24:A4:21:03
 Peer Description:                   Cisco Nexus 5020 IOS
Version 5.00
```

```
 Auto-configuration Port Role:        Auto-downstream
 Peer Is Configuration Source:        False

Local Configuration:

               Max/Oper
Type  Subtype  Version   En/Will/Adv
PFC(3) 000     000       Y/Y/Y
PG(2)  000     000       Y/Y/Y
APP(4) 000     000       Y/Y/Y

PFC Enable Vector:    0:0  1:1  2:0   3:0   4:0   5:0   6:0
7:0

Peer Configuration:

Operation version: 00  Max version: 00  Seq no: 23  Ack no:
22

               Max/Oper
Type   Subtype Version   En/Will/Err
PFC(3) 000     000/000   Y/N/N
PG(2)  000     000/000   Y/N/N
APP(4) 000     000/000   Y/N/N



PFC Enable Vector:    0:0  1:1  2:0   3:0   4:0   5:1   6:0
7:0

Application Priority (TX Enabled)
```

```
 Type         Application    Priority    Status
 ------------------------------------------------
 Ethernet     FC0E            3          Enabled
 TCP/SCTP     860             4          Disabled
 TCP/SCTP     3260            4          Disabled

Error Counters:
 ETS Incompatible Configuration: 0
 PFC Incompatible Configuration: 0
 Disappearing Neighbor:          0
 Multiple Neighbors Detected:    0
```

Example 3

The following example displays DCBX enabled – IEEE device (DCBX Version Forced).

```
switch(config)# show lldp dcbx interface te1/0/1
Interface te1/0/1
 DCBX Admin Status:                  Enabled
 Configured DCBX Version:            CIN 1.0
 Peer DCBX Version:                  CEE 1.6
 Peer MAC: 00:23:24:A4:21:03
 Peer Description:                   Cisco Nexus 5020 IOS
Version 5.00
 Auto-configuration Port Role:       Auto-upstream
 Peer Is Configuration Source:       True

Error Counters:
 ETS Incompatible Configuration: 7
 PFC Incompatible Configuration: 0
 Disappearing Neighbor:          0
```

```
 Multiple Neighbors Detected:    0
```

Example 5

The following example displays DCBX enabled—detailed view. Displays the transmitted and received TLV information. The ETS information is documented in IEEE 802.1az D2.4, tables D-2, D-3, and D-4. The PFC Enable Vector information is documented in IEEE 802.1az D2.4, table D-5. The transmitted recommendation TLV is never displayed because it is always the same as the configured TLV. The peer description is obtained from the LLDP System Name:

```
switch(config)# show lldp dcbx interface te1/0/1 detail
Interface te1/0/1
 DCBX Admin Status:                    Enabled
 Configured Version:                   Auto-detect
 Auto-configuration Port Role:         Configuration Source
 Peer Is Configuration Source:         True

PFC Capability (TX Enabled)
 Willing: True     MBC: False  Max PFC classes supported: 3
 PFC Enable Vector:       0:0 1:1 2:0 3:0 4:0 5:1 6:0 7:0


Peer DCBX Version:              CEE 1.6
Peer Description:              Cisco Nexus 5020 IOS Version
5.00
Peer MAC:                       00:23:24:A4:21:03
Peer PFC Capability:
 Willing: False   MBC: False   Max PFC classes supported: 3
 PFC Enable Vector       0:0 1:1 2:0 3:0 4:0 5:1 6:0 7:0

Peer Application Priority
```

```
Type          Application     Priority
-------------------------------------
Ethernet      FC0E             3
TCP/SCTP      3260             4
```

39

FIP Snooping Commands

NOTE: Fiber Channel over Ethernet (FCoE) commands are only supported on the PC8024 and PC8024F switches. CLI commands and Dell OpenManage Switch Administrator pages are not available for other switch models.

The FCoE Initialization Protocol (FIP) is used to perform the functions of FC_BB_E device discovery, initialization and maintenance. FIP uses a separate EtherType from FCoE to enable the distinction of discovery, initialization, and maintenance traffic from other FCoE traffic. FIP frames (with one exception) are the standard Ethernet size (1518 Byte 802.1q frame) whereas FCoE frames are a maximum of 2240 bytes.

This document describes FIP snooping, which is a frame inspection method used by FIP Snooping Bridges to monitor FIP frames and apply policies based upon the L2 header information in those frames, following recommendations in Annex C of FC_BB_5 Rev 2.00. This allows for:

1. Auto-configuration of Ethernet ACLs based on information in the Ethernet headers of FIP frames.
2. Emulation of FC point-to-point links within the DCB Ethernet network.
3. Enhanced FCoE security/robustness by preventing FCoE MAC spoofing.

The FIP Snooping Bridge solution in PowerConnect 4.2 release supports configuration-only of perimeter port role and FCF-facing port roles and is only intended for use at the edge of the switched network.

The role of FIP Snooping-enabled ports on the switch falls under one of the following types:

1. Perimeter or Edge port (connected directly to ENode).
2. FCF facing port (that receives traffic from FCFs targeted to the ENodes).

The default port role in an FCoE enabled VLAN is as a perimeter port. FCF facing ports must be configured by the user.

Setting Up FIP Snooping

Three steps are required to set up FIP snooping:

1. Enable FIP snooping

```
feature fip-snooping
```

2 Configure a VLAN and enable it for FIP Snooping. The example below sets up ports 1 through 16 (CNA connected ports) and port 24 (FCF connected port) to use VLAN 100 and enables VLAN 100 for FIP snooping.

```
vlan 100
fip-snooping enable
exit
interface range te1/0/1-16,te1/0/24
switchport mode general
switchport general allowed vlan add 100 tagged
exit
```

3 Set up the port roles. The example below configures ports 1-16 as CNA connected ports which will receive information from the FCF connected port and sets the FCF connected port as the configuration source.

```
interface te1/0/24
lldp dcbx port-role configuration-source
fip-snooping port-mode fcf
interface range te1/0/1-16
lldp dcbx port-role auto-down
exit
```

Commands in this Chapter

This chapter explains the following commands:

feature fip-snooping	show fip-snooping fcf
fip-snooping enable	show fip-snooping sessions
fip-snooping fc-map	show fip-snooping statistics
fip-snooping port-mode	show fip-snooping vlan

show fip-snooping	clear fip-snooping statistics
show fip-snooping enode	–

feature fip-snooping

Use the **feature fip-snooping** command in Global Configuration mode to globally enable Fibre Channel over Ethernet Initialization Protocol (FIP) snooping on the switch. Use the **no** form of the command to return the settings to the default values and disable FIP snooping.

Use the **no** form of the command to globally disable FIP snooping. When FIP snooping is globally disabled, received FIP frames are forwarded or flooded using the normal multicast rules. In addition, other FIP snooping commands are not available until the FIP snooping feature is enabled.

Syntax

feature fip-snooping

no feature fip-snooping

Default Configuration

The default mode is off (FIP snooping feature is disabled).

Command Mode

Global Configuration mode

User Guidelines

When FIP snooping is disabled, received FIP frames are forwarded or flooded using the normal multicast rules.

When FIP snooping is enabled, FC-BB-5 Annex D ACLs are installed on the switch and FIP frames are snooped. FIP snooping will not allow FIP or Fiber Channel over Ethernet (FCoE) frames to be forwarded over a port until the port is operationally enabled for PFC. VLAN tagging must be enabled on the interface in order to carry the dot1p values through the network.

Example

The following example enables the FIP snooping feature.

```
s1(config)#feature fip-snooping
```

fip-snooping enable

Use the **fip-snooping** command in VLAN Configuration mode to enable snooping of FIP packets on the configured VLANs. FIP snooping is disabled on VLANs by default.

Use the **no** form of the command to return the mode to the default (off).

Syntax

fip-snooping enable

no fip-snooping enable

Default Configuration

The default mode is off (FIP snooping is disabled.)

Command Mode

VLAN Configuration

User Guidelines

Priority Flow Control (PFC) must be operationally enabled before FIP snooping can operate on an interface. VLAN tagging must be enabled on the interface in order to carry the dot1p value through the network.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example

The following example enables FIP snooping on VLANs 2, 3,...8.

```
s1(config)#vlan 2-8
s1(config-vlan)#fip-snooping enable
```

fip-snooping fc-map

Use the **fip-snooping fc-map** command in VLAN Configuration mode to configure the FP-MAP value on a VLAN. The FC map value is used to help in securing the switch against misconfiguration.

Syntax

fip-snooping fc-map ***0x0 – 0xffffff***

no fip-snooping fc-map

Parameter Description

Valid FC map values are in the range of **0x0 to 0xffffff.**

Default Configuration

The default FC map value is 0x0efc00.

Command Mode

VLAN Configuration mode

User Guidelines

When configured using fabric-provided MAC addresses, FCoE devices transmit frames containing the FC map value in the upper 24 bits. Only frames that match the configured FC map value are passed across the VLAN. Frames with MAC addresses that do not match the FC map value are discarded.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example

The following example configures an FC map value of 0x100 on VLAN 208.

```
(config)# vlan 208
(config-vlan)# fip-snooping enable
(config-vlan)# fip-snooping fc-map 0x100
```

fip-snooping port-mode

To relay the FIP packets received from the hosts toward the Fibre Channel Fabric (FCF), the switch needs to know the interfaces to which the FCFs are connected. Use the **fip-snooping port-mode** command in Interface Configuration mode to configure the interface that is connected towards FCF. By default, an interface is configured to be a host-facing interface if it is not configured to be an FCF-facing interface.

Syntax

fip-snooping port-mode fcf

no fip-snooping port-mode

Parameter Description

Parameter	Description
FCF	Fibre Channel Fabric

Default Configuration

The default behavior is configuration as a host-facing interface.

Command Mode

Interface (physical interface and port channel) Configuration

User Guidelines

It is recommended that FCF-facing ports be placed into auto-upstream mode in order to receive DCBX information and propagate it to the CNAs on the downstream (host-facing) ports.

Interfaces enabled for PFC should be configured in trunk or general mode and must be PFC-operationally enabled before FCoE traffic can pass over the port.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example

The following example configures an interface to be connected to an FCF switch.

```
(config)# interface te1/0/1
(config-vlan)# fip-snooping port-mode fcf
```

show fip-snooping

Use the **show fip-snooping sessions** command in User EXEC or Privileged EXEC mode to display information about the global FIP snooping configuration and status.

Syntax

show fip-snooping

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

The following information is displayed.

Parameter	Description
Global Mode	FIP snooping configuration status on the switch. It displays **Enable** when FIP snooping is enabled on the switch and **Disable** when FIP snooping is disabled on the switch.
FCoE VLAN List	List of VLAN IDs on which FIP snooping is enabled.
FCFs	Number of FCFs discovered on the switch.
ENodes	Number of Enodes discovered on the switch.
Sessions	Total virtual sessions on the switch.

Parameter	Description
Max VLANs	Maximum number of VLANs that can be enabled for FIP snooping on the switch.
Max FCFs in VLAN	Maximum number of FCFs supported in a VLAN.
Max ENodes	Maximum number of ENodes supported in the switch.
Max Sessions	Maximum number of Sessions supported in the switch.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC or Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
(switch)# show fip-snooping


Global Mode:   Enable
FCoE VLAN List :   2,4,5-8
FCFs:   2
ENodes:   2
Sessions:   10
Max VLANs:   8
Max FCFs in VLAN:   4
Max ENodes:   312
Max Sessions:   1024
```

show fip-snooping enode

Use the **show fip-snooping enode** command in User EXEC or Privileged EXEC mode to display information about the interfaces connected to ENodes.

Syntax

show fip-snooping enode [**enode-mac**]

Parameter Description

Parameter	Description
enode-mac	MAC address of the enode to display.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

The following information is displayed.

Parameter	Description
Interface	Interface to which the ENode is connected.
VLAN	ID number of the VLAN to which the ENode belongs.
NameID	Name of the ENode.
FIP-MAC	MAC address of the ENode.
FCID	Fiber channel ID number of the virtual port that was created by FCF when the ENode logged into the network.
Sessions Established	Number of successful virtual connections established.

The following additional information is displayed when the optional argument is supplied.

Parameter	Description
Sessions Waiting	Number of virtual connections waiting for FCF acceptance.
Sessions Failed	Number of virtual sessions failed.
Max-FCoE-PDU	Maximum FCoE PDU size the ENode MAC intends to use for FCoE traffic. This is equivalent to the maximum Ethernet frame payload the ENode intends to send.
Time elapsed	Time elapsed since first successful login session snooped from the ENode.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example #1

The following example displays sample output of the command with no optional argument supplied.

```
(switch)# show fip-snooping enode

Interface  VLAN  Name-ID         ENode-MAC      FCFs
Sessions

-------------------------------------------------
1/0/2      1     00000000     00:0c:29:65:82:bc   1
3

1/0/5      100   00000000     00:0d:31:23:53:11   2
5
```

Example #2

The sample output of the command below displays with the optional argument supplied.

```
(switch)# show fip-snooping enode 00:0c:29:65:82:bc


Interface  1/0/2

VLAN  1
```

```
Name-ID     000000
ENode-MAC   00:0c:29:65:82:bc
FCFs Connected1
Sessions Established3
Sessions Waiting 1
Session Failed 0
Max-FCoE-PDU  2158
Time elapsed 0 days, 1 hours, 20 minutes
```

show fip-snooping fcf

Use the **show fip-snooping fcf** command in User EXEC or Privileged EXEC mode to display information about the interfaces connected to FCFs.

Syntax

show fip-snooping fcf [**fcf-mac**]

Parameter Description

Parameter	Description
fcf-mac	MAC address of the FCF.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

The following information is displayed when no FCF mac argument is supplied.

Parameter	Description
Interface	Interface to which the FCF is connected.
VLAN	ID number of the VLAN to which the FCF belongs.
No. of ENodes	Total number of ENodes that are connected to the FCF.
FPMA/SPMA	Type of the MAC address for ENode as negotiated by the FCF.
FCMAP	FCMAP value used by the FCF.
FCF-MAC	MAC address of the FCF.
Fabric Name	Name of the FCF.

Below is additional information regarding the FCF that is displayed when the optional FCF MAC address argument is provided.

Parameter	Description
Sessions	Total number of virtual sessions accepted by FCF in the associated VLAN.
D-bit	This reflects the value of the D-bit provided by the most recently received Discovery Advertisement from the FCF. When D-bit value is zero then FIP snooping bridge verifies the periodic VN_Port FIP Keep Alive frames associated with FCF and Discovery Advertisements sent by FCF. When D-bit is set to 1, switch discards snooped VN_Port FIP Keep Alive frames associated with FCF and does not timeout the FCoE sessions established with the FCF based on FKA_VN_PERIOD*5 interval.
Available for Login	This reflects the value of the A bit provided by the most recently received Discovery Advertisement from the FCF. This provides the information that the transmitting FCF is available for FIP FLOGI/FDISC from ENodes. This is informational and shall have no effect on existing logins.
Priority	The Priority returned from the FCF in the Solicited Discovery Advertisement. This indicates the Priority that has been manually assigned to the FCF.

Parameter	Description
FKA-ADV	FIP keepalive interval (FKA_ADV_PERIOD) in seconds configured on the FCF multiplied by five. For example, if the FKA_ADV period configured on the FCF is 80 seconds, the value of this field is 400.
FCF Expiry Time	This is timer value to monitor the status of the FCF. FCF entry and all its associated virtual sessions will be removed when the value reaches 0. This value is reset to **Configured FKA-ADV** every time a Discovery Advertisement is received from the FCF-MAC.
Time Elapsed	Time since FCF is Discovered.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example #1

The following displays sample output of the command when no optional argument is provided.

```
(config)# show fip-snooping fcf

------------------------------------------------------
-------------------------

Interface VLAN ENodes FPMA/ FC-MAP       FCF-MAC
Name-ID     Fabric-Name
                  SPMA

------------------------------------------------------
-------------------------1/0/11     1   2       FPMA
0e:fc:00 00:0d:ec:b2:2c:80 20:65:00:0d: 20:65:00:0d:


ec:b1:9e:81  ec:97:52:c1

3/0/10     1   1       FPMA 0e:fc:00 00:0d:ec:b2:2c:81
00000000     00000000

3/0/15    100  1       FPMA 0e:fc:10 00:0c:ab:2c:eb:12
00000000     00000000
```

Example #2

The following displays sample output of the command when the optional argument is provided.

```
(switch)# show  fip-snooping   fcf   00:0d:ec:b2:2c:81
Interface 3/0/10
VLAN1
ENodes 1
FPMA/SPMAFPMA
FCF-MAC00:0d:ec:b2:2c:81
FC-MAP0e:fc:00
Name-ID20:65:00:0d:ec:b1:9e:81
Fabric-Name 20:65:00:0d:ec:97:52:c1
Sessions3
D-bit0
Available for Login1
Priority2
FKA-ADV(FKA_ADV_PERIOD*5)       250
FCF Expiry Time219
Time Elapsed0 days, 2 hours, 8 minutes
```

show fip-snooping sessions

Use the **show fip-snooping sessions** command in User EXEC or Privileged EXEC mode to display information about the active FIP snooping sessions.

Syntax

show fip-snooping sessions [[[vlan <vlan-d>] | [interface <interface-id>] | [fcf <fcf-mac> [enode <enode-mac>]]] [detail]]

Parameter Description

Parameter	Description
Interface-id	ID of an interface on which FIP snooping has been enabled.
FCF-MAC	MAC address of the FCF that is part of the session.
ENode-MAC	MAC address of the ENode that is part of the session.
VLAN	ID number of the VLAN that contains the session.
FCoE MAC	Source MAC address of the FCoE packets that are originated by the ENode as part of the session.
FC-ID	Fiber Channel ID of the virtual port that was created by the FCF when the ENode VN_Port did a FLOGI/NPIV/FDISC request.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

The following information is displayed:

Parameter	Description
FCF-MAC	MAC address of the FCF that is part of the session.
ENode-MAC	MAC address of the ENode that is part of the session.
VLAN	ID number of the VLAN that contains the session.
FCoE MAC	Source MAC address of the FCoE packets that are originated by the ENode as part of the session.
FC-ID	Fiber Channel ID of the virtual port that was created by the FCF when the ENode logged into the network.

The command output format is different when the **detail** option is used. The information below is displayed.

Parameter	Description
VLAN	VLAN to which the session belongs.
FC-MAP	FCMAP value used by the FCF.
FCFs	Number of FCFs discovered.
ENodes	Number of ENodes discovered.
Sessions	Total virtual sessions in FCoE VLAN.
FCF Information	
Interface	Interface on which the FCF is discovered.
MAC	MAC address of the FCF.
ENodes	Total number of ENodes that are connected to the FCF.
Sessions	Total number of virtual sessions accepted by FCF in the associated VLAN.
ENode Information	
Interface	Interface to which the ENode is connected.
MAC	MAC address of the ENode.
Sessions	Total number of virtual sessions originated from ENodes to FCF in the VLAN.
Waiting	Total number of virtual connections waiting for FCF acceptance in the VLAN.
Session Information	
FCoE-MAC	Source MAC address of the FCoE packets that are originated by the ENode as part of the session.
Request (FP, SP)	FIP session request type sent by ENode. This can be FLOGI or FDESC (NPIV FDISC). Whereas FP and SP values are the FP bit and the SP bit values in the FLOGI or NPIV FDISC request respectively.

Parameter	Description
Expiry Time	This is virtual connection/session expiry interval. This is used to monitor the status of the session. Session entry is removed when the value reaches 0. This value is reset to 450 secs (5*90 secs) every time an associated VN_Port FKA is received from the ENode. This is ignored (marked as **NA**) if the D-bit is set to one in the FCF Discovery Advertisements.
Mode	This is the addressing mode in use by the VN_Port at ENode. In other words, this is the type of MAC address granted (selected and returned) by FCF. This can be one of the addressing modes, i.e. FPMA or SPMA.
State	This is the state of the virtual session. The state is displayed as **Tentative** during the process of ENode login to FCF (using FLOGI or FDESC). It displays **Active** after ENode and FCF establish a successful virtual connection.
Session-Time	Time elapsed after this successful virtual session is established by ENode with FCF. The value is displayed in **xd**, **yh**, **zm** format where **x** represents number of days, **y** represents hours and **z** represents minutes elapsed following this successful virtual session. This field has no useful information for waiting sessions.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example #1

The following sample command output displays when no arguments are provided.

```
(switch)# show fip-snooping sessions

-----------------------------------------------------
-------------------------

     FCF-MAC            ENode-MAC      VLAN      FCoE-
MAC         FC-ID

-----------------------------------------------------
-------------------------
```

```
00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:00  38:0f:db

00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:01  38:0f:dc

00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:02  38:0f:dd

00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:05  38:0f:e1

00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:07  38:0f:e3

00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:10  38:0f:e6

00:0d:ec:b2:2c:80  00:0c:29:65:82:bc  100
0e:fc:00:ad:00:19  38:0f:ee

00:0e:ad:12:23:53  00:0d:29:12:22:a6  200
0e:fc:11:aa:bb:00  44:23:a4

00:0e:ad:12:23:53  00:0d:29:12:22:a6  200
0e:fc:11:aa:bb:01  44:02:ab

00:0e:ad:12:23:53  00:0d:29:23:14:22  200
0e:fc:11:aa:bb:02  44:35:1b

00:0e:ad:12:23:53  00:0d:29:23:14:22  200
0e:fc:11:aa:bb:03  44:35:2a

00:0e:ad:12:23:53  00:0d:29:23:14:22  200
0e:fc:11:aa:bb:04  44:36:3b
```

Example #2

The sample command output below displays when the detail option is specified.

```
(switch)# show fip-snooping sessions detail
```

```
VLAN: 100   FC-MAP: 0e:fc:00       FCFs:  1   ENodes:
1   Sessions: 7

   <FCF Information>

   Interface: 3/0/15   MAC: 00:0d:ec:b2:2c:80 ENodes:
1   Sessions: 7

      <ENode Information>

      Interface: 2/0/1    MAC: 00:0c:29:65:82:bc
Sessions:  7   Waiting: 0

         <Session Information>

         FCoE-MAC           Request    Expiry  Mode
State      Session-Time

                            (FP,SP)    Time

         0e:fc:00:ad:00:00  FLOGI(1,1) 200     FPMA
ACTIVE     0d, 04h, 20m

         0e:fc:00:ad:00:01  FDESC(1,1) 259     FPMA
ACTIVE     0d, 04h, 19m

         0e:fc:00:ad:00:02  FDESC(1,1) 215     FPMA
ACTIVE     0d, 04h, 18m

         0e:fc:00:ad:00:05  FDESC(1,1) 231     FPMA
ACTIVE     0d, 04h, 10m

         0e:fc:00:ad:00:07  FDESC(1,1) 189     FPMA
ACTIVE     0d, 04h, 01m

         0e:fc:00:ad:00:10  FDESC(1,1) 210     FPMA
ACTIVE     0d, 02h, 07m

         0e:fc:00:ad:00:19  FDESC(1,1) 222     FPMA
ACTIVE     0d, 01h, 20m

-----------------------------------------------------
-------------------------

VLAN: 200   FC-MAP: 0e:fc:11       FCFs:  1   ENodes:
2   Sessions: 5
```

```
   <FCF Information>

   Interface: 3/0/11   MAC: 00:0e:ad:12:23:53 ENodes:
2   Sessions: 5


      <ENode Information>

      Interface: 1/0/10   MAC: 00:0d:29:12:22:a6
Sessions: 2    Waiting: 0

         <Session Information>

       FCoE-MAC        Request   Expiry  Mode State
Session-Time
                              (FP,SP)    Time

         0e:fc:11:ad:00:00 FLOGI(1,1) 242     FPMA
ACTIVE     0d, 02h, 30m

         0e:fc:11:ad:00:01 FDESC(1,1) 245     FPMA
ACTIVE     0d, 02h, 28m

      <ENode Information>

      Interface: 1/0/11   MAC: 00:0d:29:23:14:22
Sessions: 3    Waiting: 1

         <Session Information>

       FCoE-MAC        Request   Expiry  Mode State
Session-Time
                              (FP,SP)    Time

         0e:fc:11:ad:00:02 FLOGI(1,1) 202     FPMA
ACTIVE     0d, 02h, 20m

         0e:fc:11:ad:00:03 FDESC(1,1) 228     FPMA
ACTIVE     0d, 01h, 18m

         0e:fc:11:ad:00:03 FDESC(1,1) 232     FPMA
ACTIVE     0d, 01h, 02m
```

```
         ----------------- FDESC(1,1) ---      FPMA
TENTATIVE  ------------
```

Example #3

The sample command output below displays sessions between specified FCF and ENode.

```
(switch)# show fip-snooping sessions fcf
00:0e:ad:12:23:53 enode 00:0d:29:12:22:a6


-------------------------------------------------------
------------------------
     FCF-MAC            ENode-MAC     VLAN      FCoE-
MAC       FC-ID
-------------------------------------------------------
------------------------
00:0e:ad:12:23:53  00:0d:29:12:22:a6  200
0e:fc:11:aa:bb:00  44:23:a4

00:0e:ad:12:23:53  00:0d:29:12:22:a6  200
0e:fc:11:aa:bb:01  44:02:ab
```

Example #4

The sample command output below displays sessions between specified FCF and ENode with the **detail** option.

```
(switch)# show fip-snooping sessions fcf
00:0e:ad:12:23:53 enode 00:0d:29:12:22:a6 detail


VLAN: 200   FC-MAP: 0e:fc:11       FCFs:  1   ENodes:
2   Sessions: 5


   <FCF Information>
```

```
   Interface: 3/0/11   MAC: 00:0e:ad:12:23:53 ENodes:
2   Sessions: 5


      <ENode Information>

      Interface: 1/0/10   MAC: 00:0d:29:12:22:a6
Sessions: 2    Waiting: 0

         <Session Information>

       FCoE-MAC        Request   Expiry  Mode State
Session-Time

                              (FP,SP)    Time

         0e:fc:11:ad:00:00 FLOGI(1,1) 242     FPMA
ACTIVE     0d, 02h, 30m

         0e:fc:11:ad:00:01 FDESC(1,1) 245     FPMA
ACTIVE     0d, 02h, 28m
```

show fip-snooping statistics

Use the **show fip-snooping statistics** command in User EXEC or Privileged EXEC mode to display the statistics of the FIP packets snooped in the VLAN or on an interface. If the optional (VLAN or interface) argument is not given, this command displays the statistics for all of the FIP snooping enabled VLANs.

Syntax

show fip-snooping statistics [**vlan** *vlan-id*] | [**interface** *interface-id*]

Parameter Description

Parameter	Description
vlan-id	A VLAN on which FIP snooping is enabled.
interface-id	An interface belonging to a VLAN on which FIP snooping is enabled.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

The following table describes the packet counters per FIP Operation.

Packet Counter	Description
VR	Number of VLAN Request messages received on the VLAN.
VN	Number of VLAN Notification messages received on the VLAN.
MDS	Number of Multicast Discovery Solicitation messages snooped on the VLAN.
UDS	Number of Unicast Discovery Solicitation messages snooped on the VLAN.
FLOGI	Number of Fabric Logins snooped on the VLAN.
FDISC	Number of fabric discovery logins snooped on the VLAN.
LOGO	Number of Fabric Logouts on the VLAN.
VNPort-keep-alive	Number of VN_Port keepalive messages snooped on the VLAN.
MDA	Number of Multicast Discovery Advertisement messages snooped on the VLAN.
UDA	Number of Unicast Discovery Advertisement messages snooped on the VLAN.
FLOGI_ACC	Number of Fabric Logins accepted on the VLAN.
FLOGI_RJT	Number of Fabric Logins rejected on the VLAN.
FDISC_ACC	Number of Fabric Discoveries accepted on the VLAN.
FDISC_RJT	Number of Fabric Discoveries rejected on the VLAN.
LOGO_ACC	Number of Fabric Logouts accepted on the VLAN.
LOGO_RJT	Number of Fabric Logouts rejected on the VLAN.

Packet Counter	Description
CVL	Number of Clear Virtual Links actions on the VLAN.

The following table describes the other interface or session-related counters.

Other Counters	Description
Number of Virtual Session Timeouts	Number of Virtual sessions removed due to session timer expiry.
Number of FCF Session Timeouts	Number of ACTIVE sessions timed out due to Discovery Advertisements expiry from FCFs in the VLAN.
Number of Session configuration failures	Number of sessions in the VLAN that failed to be configured in the hardware.
Number of Sessions denied with FCF limit	Number of sessions that are denied to be created for the new FCF as the number of FCFs reached the maximum allowed in the VLAN.
Number of Sessions denied with ENode limit	Number of session create requests that are denied for the new ENode as the number of ENodes reached the maximum allowed in the system.
Number of Sessions denied with System limit	Number of sessions that are denied to be created as the number of sessions reached the maximum allowed in the system.

When an interface is provided as an argument, interface applicable statistics are only displayed. See **Example #3** below for applicable statistics on interface.

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example #1

Below is the sample command usage with no optional arguments supplied.

```
(switch)# show fip-snooping statistics

VLAN: 4
```

```
---------------------------------
FIP-Operation    Number of Pkts
VR               2
VN               2
MDS               2
UDS               2
FLOGI             2
FDISC             2
LOGO              0
VNPort-keep-alive 200
MDA               25
UDA               2
FLOGI_ACC         2
FLOGI_RJT         0
FDISC_ACC         2
FDISC_RJT         0
LOGO_ACC          0
LOGO_RJT          0
CVL               0
---------------------------------
Number of Virtual Session Timeouts:23
Number of FCF Session Timeouts:    6
Number of Session configuration failures: 10
Number of Sessions denied with FCF limit:  10
Number of Sessions denied with ENode limit:  10
Number of Sessions denied with System limit:   12
```

```
VLAN: 200
-------------------------------
FIP-Operation    Number of Pkts
VR               2
VN               2
MDS               5
UDS               4
FLOGI             5
FDISC             5
LOGO              1
VNPort-keep-alive 310
MDA               35
UDA               3
FLOGI_ACC         4
FLOGI_RJT         0
FDISC_ACC         15
FDISC_RJT         0
LOGO_ACC          1
LOGO_RJT          0
CVL               0
-------------------------------

Number of Virtual Session Timeouts:2
Number of FCF Session Timeouts:    0
Number of Session configuration failures: 10
```

```
Number of Sessions denied with FCF limit:  0
Number of Sessions denied with ENode limit:  0
Number of Sessions denied with System limit:   21
```

Example #2

Below is the sample command output with optional VLAN argument supplied.

```
(switch)# show fip-snooping statistics vlan 200


VLAN: 200


-------------------------------
FIP-Operation    Number of Pkts
-------------------------------
VR               2
VN               2
MDS               5
UDS               4
FLOGI             5
FDISC             5
LOGO              1
VNPort-keep-alive 310
MDA               35
UDA               3
FLOGI_ACC         4
FLOGI_RJT         0
FDISC_ACC         15
```

```
FDISC_RJT          0
LOGO_ACC           1
LOGO_RJT           0
CVL                0
-------------------------------


Number of Virtual Session Timeouts:2
Number of FCF Session Timeouts:    0
Number of Session configuration failures: 10
Number of Sessions denied with FCF limit:  0
Number of Sessions denied with ENode limit:  0
Number of Sessions denied with System limit:   21
```

Example #3

Below is the sample command output with optional interface argument supplied.

```
(switch)# show fip-snooping statistics interface
1/0/5


-------------------------------
FIP-Operation    Number of Pkts
-------------------------------
VR               2
VN               2
MDS               5
UDS               1
FLOGI             2
```

```
FDISC              5
LOGO               1
VNPort-keep-alive 310
MDA                35
UDA                3
FLOGI_ACC          4
FLOGI_RJT          0
FDISC_ACC          15
FDISC_RJT          0
LOGO_ACC           1
LOGO_RJT           0
CVL                0
--------------------------------


Number of Virtual Session Timeouts:2
Number of FCF Session Timeouts:    0
Number of Session configuration failures: 10
Number of Sessions denied with FCF limit:  0
Number of Sessions denied with ENode limit:  0
Number of Sessions denied with System limit:   21
```

show fip-snooping vlan

Use the **show fip-snooping vlan** command in User EXEC or Privileged EXEC mode to display the FCoE VLANs information and, additionally, the FIP snooping port status when optional argument is specified.

Syntax

show fip-snooping vlan [**vlan-id**]

Parameter Description

Parameter	Description
vlan-id	A VLAN enabled for FIP snooping.
VLAN	VLAN in which FIP snooping is enabled/operational.
FC-MAP	FCoE mapped address prefix of the FCoE forwarder for the FCoE VLAN.
FCFs	Number of FCFs discovered.
ENodes	Number of ENodes discovered.
Sessions	Total virtual sessions in FCoE VLAN.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

Example

```
console#show fip-snooping vlan 200

VLAN:                          200
FC-MAP:                        0E:FC:00
Number of FCFs discovered:     1
Number of ENodes discovered:   2
Total virtual sessions in VLAN: 3
Active Ports:
Te1/0/2, Te1/0/3,Te1/0/21
```

Inactive Ports:

clear fip-snooping statistics

Use the **clear fip-snooping statistics** command in User EXEC or Privileged EXEC mode to clear the FIP Snooping statistics in the supplied VLAN or on a supplied interface. If the optional (VLAN or interface) argument is not given, this command clears the statistics on all FIP snooping-enabled VLANs.

Syntax

clear fip-snooping statistics [**vlan** *vlan-id*] | [**interface** *interface-id*]

Parameter Description

Parameter	Description
vlan-id	A VLAN on which FIP snooping is enabled.
interface-id	An interface belonging to a VLAN on which FIP snooping is enabled.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command can only be entered after FIP snooping is enabled using the **feature fip-snooping** command. Otherwise, it does not appear in the CLI syntax tree.

40

Priority Flow Control Commands

NOTE: Fiber Channel over Ethernet (FCoE) commands are only supported on the PC8024 and PC8024F switches. CLI commands and Dell OpenManage Switch Administrator pages are not available for other switch models.

Priority Flow Control (PFC) provides a means of pausing frames based on individual priorities on a single physical link. By pausing the congested priority or priorities independently, protocols that are highly loss sensitive can share the same link with traffic that has different loss tolerances with less congestion spreading than standard flow control. The priorities are differentiated by the priority field of the 802.1Q VLAN header. PFC is standardized by the IEEE 802.1Qbb specification.

PFC uses a new control packet defined in 802.1Qbb and therefore is not compatible with standard flow control. An interface that is configured for PFC will be automatically disabled for 802.3x flow control. When PFC is disabled on an interface, the flow control configuration for the interface becomes active. Any flow control frames received on a PFC configured interface are ignored.

Each priority is configured as either drop or no-drop. If a priority that is designated as no-drop is congested, the priority is paused. Drop priorities do not participate in pause. By default there are no priority classifications configured and PFC is not enabled.

While several no-drop priorities may be configured on a supporting system, the actual number of lossless priorities supported on a given system is a function of the switch chips packet buffer, the maximum supported MTU size, pause delay, the media type and the total number of ports enabled for lossless behavior. In order to guarantee lossless behavior, the switch chip must send a pause message prior to exhausting its available packet buffer and have sufficient buffer to absorb the delay. In order to accomplish this, it must reserve enough memory (headroom) to handle the max delay in processing the pause packet.

The maximum number of lossless priorities per interface is two. The headroom is only used for guaranteeing lossless behavior. There must be enough dynamic memory to handle the typical work load of the switch in

addition to the headroom. With two no-drop priorities per interface and static allocations, there is only about 30 percent of the buffer space available for normal forwarding behavior.

The effective default behavior on an interface enabled for PFC without a no-drop priority is that no flow control (legacy or PFC) is enabled. If the user enables PFC but does not create any no-drop priorities, the interface will not be lossless.

Changing the drop and no-drop capabilities on an interface, either in flow control or priority flow control, may require that all ports briefly drop link. The priority to flow control group cannot be changed while traffic is running. When 802.3 link flow control is enabled, all priorities are mapped to a single flow control group. When 802.1Qbb is enabled, the priorities are each mapped into their own flow control group, where lossless groups have additional buffer to handle the round trip delay for flow control. In order to minimize the impact, the link will only be dropped when changing between 802.3 and 802.1Qbb.

Commands in this Chapter

This chapter explains the following commands:

priority-flow-control mode
priority-flow-control priority
clear priority-flow-control statistics
show interfaces priority-flow-control

priority-flow-control mode

Use the **priority-flow-control mode on** command in Datacenter-Bridging Config mode to enable Priority-Flow-Control (PFC) on an interface. To disable Priority-Flow-Control, use the **no** form of the command.

Syntax

priority-flow-control mode on

priority-flow-control mode off

no priority-flow-control mode

Parameter Description

Parameter	Description
on	Enable PFC on the interface.
off	Disable PFC on the interface.

Default Configuration

Priority-flow-control mode is off (disabled) by default.

Command Mode

Datacenter-Bridging Config mode

User Guidelines

PFC must be enabled before FIP snooping can operate over the interface. Use the **no** form of the command to return the mode to the default (off). VLAN tagging (trunk or general mode) must be enabled on the interface in order to carry the dot1p value through the network. Additionally, the dot1mapping to class-of-service must be set to one-to-one.

When PFC is enabled on an interface, the normal PAUSE control mechanism is operationally disabled.

Example

The following example enables PFC on an interface.

```
s1(config)#interface te1/0/1
s1(config-if-Te1/0/1)#datacenter-bridging
s1(config-if-dcb)#priority-flow-control mode on
```

priority-flow-control priority

Use the **priority-flow-control priority** command in Datacenter-Bridging Config mode to enable the priority group for lossless (no-drop) or lossy (drop) behavior on the selected interface. Up to two lossless priorities can be enabled on an interface.

Use the **no** form of the command to return all priorities to their default lossy behavior.

Syntax

priority-flow-control priority *priority-list* {**drop** | **no-drop**}

no **priority-flow-control priority**

Parameter Description

Parameter	Description
drop	Disable lossless behavior on the selected priorities.
no-drop	Enable lossless behavior on the selected priorities.

Default Configuration

The default behavior for all priorities is drop.

Command Mode

Datacenter-Bridging Config mode

User Guidelines

The administrator must configure the same no-drop priorities across the network in order to ensure end-to-end lossless behavior.

Example

The following example sets priority 3 to no drop behavior.

```
s1(config)#interface te1/0/1
s1(config-if-Te1/0/1)#datacenter-bridging
s1(config-if-dcb)#priority-flow-control mode on
s1(config-if-dcb)#priority-flow-control priority 1
no-drop
```

clear priority-flow-control statistics

Use the **clear priority-flow-control statistics command** to clear all or interface Priority-Flow-Control statistics.

Syntax

clear priority-flow-control statistics [**ethernet** *interface*]

- *interface* — A valid Ethernet port.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example #1

```
console#clear priority-flow-control statistics
tengigabitethernet 1/0/1
```

Example #2

```
console#clear priority-flow-control statistics
```

show interfaces priority-flow-control

Use the **show interfaces priority-flow-control** command in Privileged EXEC mode to display the global or interface priority flow control status and statistics.

Syntax

show interfaces interface-id priority-flow-control

Parameter Description

This command uses an optional interface parameter.

Parameter	Description
interface-id	A valid Ethernet port identifier.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Examples

The following examples show the priority flow control status and statistics.

```
s1#show interfaces tengigabitethernet 1/0/1 priority-
flow-control


Interface Detail:                   te1/0/1
PFC Configured State:               Disabled
PFC Operational State:              Enabled
Configured Drop Priorities:         2-7
Operational Drop Priorities:        2-7
Configured No-Drop Priorities:      0-1
Operational No-Drop Priorities:     0-1
Delay Allowance:                    32456 bit times
Peer Configuration Compatible:      True
Compatible Configuration Count:     3
Incompatible Configuration Count:   1

Priority Received PFC Frames  Transmitted PFC Frames
-------- -----------------     ----------------------
```

```
0               0                       0
1               0                       0
2               0                       0
3               0                       0
4               0                       0
5               0                       0
6               0                       0
7               0                       0

console#show interfaces priority-flow-control

Port      Drop            No-Drop         Operational
          Priorities      Priorities      Status
--------  --------------  --------------  ----------
Te1/0/1   0-2,4-7          3               Active
Te1/0/2   0-2,4-7          3               Active
Te1/0/3   0-7                             Inactive
Te1/0/4   0-7                             Inactive
Te1/0/5   0-7                             Inactive
Te1/0/6   0-7                             Inactive
Te1/0/7   0-7                             Inactive
Te1/0/8   0-7                             Inactive
Te1/0/9   0-7                             Inactive
Te1/0/10  0-7                             Inactive
Te1/0/11  0-7                             Inactive
Te1/0/12  0-7                             Inactive
```

```
Te1/0/13  0-7                                 Inactive
Te1/0/14  0-7                                 Inactive
Te1/0/15  0-7                                 Inactive
Te1/0/16  0-7                                 Inactive
Te1/0/17  0-7                                 Inactive
Te1/0/18  0-7                                 Inactive
Te1/0/19  0-7                                 Inactive
--More-- or (q)uit
Te1/0/20  0-7                                 Inactive
Te1/0/21  0-7                                 Inactive
Te1/0/22  0-7                                 Inactive
Te1/0/23  0-2,4-7          3                  Active
Te1/0/24  0-7                                  Inactive
```

41

Layer 3 Commands

The chapters that follow describe commands that conform to the OSI model's Network Layer (Layer 3). Layer 3 commands perform a series of exchanges over various data links to deliver data between any two nodes in a network. These commands define the addressing and routing structure of the Internet.

This section of the document contains the following Layer 3 topics:

ARP Commands	IPv6 Routing Commands
DHCP Server and Relay Agent Commands	Loopback Interface Commands
DHCPv6 Commands	Multicast Commands
DVMRP Commands	OSPF Commands
–	OSPFv3 Commands
IGMP Commands	Router Discovery Protocol Commands
IGMP Proxy Commands	Routing Information Protocol Commands
IP Helper/DHCP Relay Commands	Tunnel Interface Commands
IP Routing Commands	Virtual Router Redundancy Protocol Commands
IPv6 PIM Commands	–

42

ARP Commands

When a host has an IP packet to send on an Ethernet network, it must encapsulate the IP packet in an Ethernet frame. The Ethernet header requires a destination MAC address. If the destination IP address is on the same network as the sender, the sender uses the Address Resolution Protocol (ARP) to determine the MAC address associated with destination IP address. The network device broadcasts an ARP request, identifying the IP address for which it wants a corresponding MAC address. The IP address is called the target IP. If a device on the same physical network is configured with the target IP, it sends an ARP response giving its MAC address. This MAC address is called the target MAC.

If the destination IP address is not on the same network as the sender, the sender generally forwards the packet to a default gateway. The default gateway is a router that forwards the packet to its destination. The host may be configured with a default gateway or may dynamically learn a default gateway.

The router discovery protocol is one method that enables hosts to learn a default gateway. If a host does not know a default gateway, it can learn the first hop to the destination through proxy ARP. Proxy ARP (RFC 1027) is a technique used to make a machine physically located on one network appear to be logically part of a different physical network connected to the same router (may also be a firewall). Typically Proxy ARP hides a machine with a public IP address on a private network behind a router and still allows the machine to appear to be on the public network. The router proxies ARP requests and all network traffic to and from the hidden machine to make this fiction possible.

Proxy ARP is implemented by making a small change to a router's processing of ARP requests. Without proxy ARP, a router only responds to an ARP request if the target IP address is an address configured on the interface where the ARP request arrived. With proxy ARP, the router may also respond if it has a route to the target IP address. The router only responds if all next hops on its route to the destination are through interfaces other than the interface where the ARP request was received.

ARP Aging

Dynamic entries in the ARP cache are aged. When an entry for a neighbor router reaches its maximum age, the system sends an ARP request to the neighbor router to renew the entry. Entries for neighbor routers should remain in the ARP cache as long as the neighbor continues to respond to ARP requests. ARP cache entries for neighbor hosts are renewed more selectively. When an ARP cache entry for a neighbor host reaches its maximum age, the system checks if the cache entry has been used recently to forward data traffic. If so, the system sends an ARP request to the entry's target IP address. If a response is received, the cache entry is retained and its age is reset to 0. By enabling the dynamic renew option, the system administrator can configure ARP to attempt to renew aged ARP entries regardless of their use for forwarding.

If the system learns a new ARP entry but the hardware does not have space to add the new ARP entry, the system attempts to remove entries that have not been used for forwarding recently. This action may create space for new entries in the hardware's ARP table.

Commands in this Chapter

This chapter explains the following commands:

arp	clear arp-cache
arp cachesize	clear arp-cache management
arp purge	ip local-proxy-arp
arp resptime	ip proxy-arp
arp retries	show arp
arp timeout	–

arp

Use the **arp** command in Global Configuration mode to create an Address Resolution Protocol (ARP) entry. Use the **no** form of the command to remove the entry.

Syntax

arp *ip-address hardware-address*

no arp *ip-address*

- *ip-address* — IP address of a device on a subnet attached to an existing routing interface.
- *hardware-address* — A unicast MAC address for that device.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example creates an ARP entry consisting of an IP address and a MAC address.

```
console(config)#arp 192.168.1.2 00A2.64B3.A245
```

arp cachesize

Use the **arp cachesize** command in Global Configuration mode to configure the maximum number of entries in the ARP cache. To return the maximum number ARP cache entries to the default value, use the no form of this command.

Syntax

arp cachesize *integer*

no arp cachesize

- *integer* — Maximum number of ARP entries in the cache. (Range: 256–1024)

Default Configuration

The default integer value is 896.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines an arp cachesize of 500.

```
console(config)#arp cachesize 500
```

arp dynamicrenew

Use the **arp dynamicrenew** command in Global Configuration mode to enable the ARP component to automatically renew dynamic ARP entries when they age out. To disable the automatic renewal of dynamic ARP entries when they age out, use the **no** form of the command.

Syntax

arp dynamicrenew

no arp dynamicrenew

Default Configuration

The default state is disabled.

Command Mode

Global Configuration mode

User Guidelines

When an ARP entry reaches its maximum age, the system must decide whether to retain or delete the entry. If the entry has recently been used to forward data packets, the system will renew the entry by sending an ARP request to the neighbor. If the neighbor responds, the age of the ARP cache

entry is reset to 0 without removing the entry from the hardware. Traffic to the host continues to be forwarded in hardware without interruption. If the entry is not being used to forward data packets, then the entry is deleted from the ARP cache, unless the dynamic renew option is enabled. If the dynamic renew option is enabled, the system sends an ARP request to renew the entry. When an entry is not renewed, it is removed from the hardware and subsequent data packets to the host trigger an ARP request. Traffic to the host is lost until the router receives an ARP reply from the host. Gateway entries, entries for a neighbor router, are always renewed. The dynamic renew option only applies to host entries.

The disadvantage of enabling dynamic renew is that once an ARP cache entry is created, that cache entry continues to take space in the ARP cache as long as the neighbor continues to respond to ARP requests, even if no traffic is being forwarded to the neighbor. In a network where the number of potential neighbors is greater than the ARP cache capacity, enabling dynamic renew could prevent some neighbors from communicating because the ARP cache is full.

Example

```
console#configure
console(config)#arp dynamicrenew
console(config)#no arp dynamicrenew
```

arp purge

Use the **arp purge** command in Privileged EXEC mode to cause the specified IP address to be removed from the ARP cache. Only entries of type dynamic or gateway are affected by this command.

Syntax

arp purge *ip-address*

- *ip-address* — The IP address to be removed from ARP cache.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example removes the specified IP address from arp cache.

```
console#arp purge 192.168.1.10
```

arp resptime

Use the **arp resptime** command in Global Configuration mode to configure the ARP request response timeout. To return the response timeout to the default value, use the no form of this command.

Syntax

arp resptime *integer*

no arp resptime

- *integer* — IP ARP entry response time out. (Range: 1-10 seconds)

Default Configuration

The default value is 1 second.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines a response timeout of 5 seconds.

```
console(config)#arp resptime 5
```

arp retries

Use the **arp retries** command in Global Configuration mode to configure the ARP count of maximum requests for retries. To return to the default value, use the **no** form of this command.

Syntax

arp retries *integer*

no arp retries

- *integer* — The maximum number of requests for retries. (Range: 0-10)

Default Configuration

The default value is 4 retries.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines 6 as the maximum number of retries.

```
console(config)#arp retries 6
```

arp timeout

Use the **arp timeout** command in Global Configuration mode to configure the ARP entry ageout time. Use the no form of the command to set the ageout time to the default.

Syntax

arp timeout *integer*

no arp timeout

- *integer* — The IP ARP entry ageout time. (Range: 15-21600 seconds)

Default Configuration

The default value is 1200 seconds.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines 900 seconds as the timeout.

```
console(config)#arp timeout 900
```

clear arp-cache

Use the **clear arp-cache** command in Privileged EXEC mode to remove all ARP entries of type dynamic from the ARP cache.

Syntax

clear arp-cache [**gateway**]

- **gateway** — Removes the dynamic entries of type **gateway**, as well.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example clears all entries ARP of type dynamic, including gateway, from ARP cache.

```
console#clear arp-cache gateway
```

clear arp-cache management

Use the **clear arp-cache management** command to clear all entries that show as management arp entries in the **show arp** command.

Syntax

clear arp-cache management

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

In the example below, out-of-band management entries are shown, i.e. those from the service port.

```
console#show arp

Age Time (seconds)..... 1200
Response Time (seconds)..... 1
Retries..... 4
Cache Size..... 6144
Dynamic Renew Mode ..... Disable
Total Entry Count Current / Peak ..... 0 / 0
Static Entry Count Configured / Active / Max .. 0 / 0 / 128
```

```
 IP Address       MAC Address     Interface       Type       Age
---------------  -----------------  --------------  --------  -----------
10.27.20.241     001A.A0FF.F662     Management      Dynamic   n/a
10.27.20.243     0019.B9D1.29A3     Management      Dynamic   n/a
console#clear arp-cache management
```

ip local-proxy-arp

Use the **ip local proxy-arp** command in Interface Configuration mode to enable proxying of ARP requests. This allows the switch to respond to ARP requests within a subnet where routing is not enabled.

Syntax

ip local-proxy-arp

no ip local-proxy-arp

Default Configuration

Proxy arp is disabled by default.

Command Mode

Interface Configuration

User Guidelines

This command has no user guidelines.

ip proxy-arp

Use the **ip proxy-arp** command in Interface Configuration mode to enable proxy ARP on a router interface. Without proxy ARP, a device only responds to an ARP request if the target IP address is an address configured on the interface where the ARP request arrived. With proxy ARP, the device may also respond if the target IP address is reachable. The device only responds if all

next hops in its route to the destination are through interfaces other than the interface that received the ARP request. Use the no form of the command to disable proxy ARP on a router interface.

Syntax

ip proxy-arp

no ip proxy-arp

Default Configuration

Enabled is the default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example enables proxy arp for VLAN 15.

```
(config)#interface vlan 15
console(config-if-vlan15)#ip proxy-arp
```

show arp

Use the **show arp** command in Privileged EXEC mode to display all entries in the Address Resolution Protocol (ARP) cache. The displayed results are not the total ARP entries. To view the total ARP entries, the operator should view the show ARP results.

Syntax

show arp [brief]

- brief — Display ARP parameters.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC and Privileged EXEC modes

User Guidelines

The show arp command will display static (user-configured) ARP entries regardless of whether they are reachable over an interface or not.

Example

The following example shows **show arp** command output.

```
console#show arp
Static ARP entries are only active
when the IP address is reachable on a local subnet

Age Time (seconds)..... 1200
Response Time (seconds)..... 1
Retries..... 4
Cache Size..... 6144
Dynamic Renew Mode ..... Disable
Total Entry Count Current / Peak ..... 0 / 0
Static Entry Count Configured / Active / Max .. 1 / 0 / 128

IP Address MAC Address     Interface  Type    Age
---------- --------------  ---------  ------  -------
1.1.1.3    0000.0000.0022  n/a        Static  n/a
```

43

DHCP Server and Relay Agent Commands

DHCP is based on the Bootstrap Protocol (BOOTP). It also captures the behavior of BOOTP relay agents and DHCP participants can inter operate with BOOTP participants.

The host RFC's standardize the configuration parameters which can be supplied by the DHCP server to the client. After obtaining parameters via DHCP, a DHCP client should be able to exchange packets with any other host in the Internet. DHCP is based on a client-server model.

DHCP consists of the following components:

- A protocol for delivering host-specific configuration parameters from a DHCP server to a host.
- A mechanism for allocation of network addresses to hosts.

DHCP offers the following features and benefits:

- It supports the definition of "pools" of IP addresses that can be allocated to clients by the server. Many implementations use the term **scope** instead of **pool**.
- Configuration settings like the subnet mask, default router, DNS server, that are required to make TCP/ IP work correctly can be passed to the client using DHCP.
- DHCP is supported by most TCP/ IP routers this allows it to allocate an IP address according to the subnet the original request came from. This means that a single DHCP server can be used in multiple subnets and that there is no need to reconfigure a client that changed subnets.
- Addresses can be leased out for a specific duration after which they need to be explicitly renewed. This allows DHCP to reclaim expired addresses and put back in the unallocated pool.

- Internet access cost is greatly reduced by using automatic assignment as Static IP addresses are considerably more expensive to purchase than are automatically allocated IP addresses.
- Using DHCP a centralized management policy can be implemented as the DHCP server keeps information about all the subnets. This allows a system operator to update a single server when configuration changes take place.

Commands in this Chapter

This chapter explains the following commands:

ip dhcp pool	dns-server (IP DHCP Pool Config)	ip dhcp ping packets	service dhcp
bootfile	domain-name (IP DHCP Pool Config)	lease	sntp
clear ip dhcp binding	hardware-address	netbios-name-server	show ip dhcp binding
clear ip dhcp conflict	host	netbios-node-type	show ip dhcp conflict
client-identifier	ip dhcp bootp automatic	network	show ip dhcp global configuration
client-name	ip dhcp conflict logging	next-server	show ip dhcp pool
default-router	ip dhcp excluded-address	option	show ip dhcp server statistics

ip dhcp pool

Use the **ip dhcp pool** command in Global Configuration mode to define a DHCP address pool that can be used to supply addressing information to DHCP clients. Upon successful completion, this command puts the user into DHCP Pool Configuration mode. Use the **no** form of the command to remove an address pool definition.

Syntax

ip dhcp pool [*pool-name*]

no ip dhcp pool [*pool-name*]

Parameter Description

Parameter	Description
pool-name	The name of an existing or new DHCP address pool. The pool name can be up to 31 characters in length and can contain the following characters: a-z, A-Z, 0-9, '-', '_', ' '. Enclose the entire pool name in quotes if an embedded blank is to appear in the pool name.

Default Configuration

The command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

PowerConnect supports dynamic, automatic, and manual address assignment. Dynamic address assignment leases an address to the client for a limited period of time. Automatic assignment assigns a permanent address to a client. Manual (static) assignment simply conveys an address assigned by the administrator to the client.

In DHCP Pool Configuration mode, the administrator can configure the address space and other parameters to be supplied to DHCP clients. By default, the DHCP server assumes that all addresses specified are available for assignment to clients. Use the ip dhcp excluded-address command in Global Configuration mode to specify addresses that should never be assigned to DHCP clients.

To configure a dynamic DHCP address pool, configure the following pool properties using the listed DHCP pool commands:

- Address pool subnet and mask – network
- Client domain name – domain-name

- Client DNS server – dns-server
- NetBIOS WINS Server – netbios-name-server
- NetBIOS Node Type – netbios-node-type
- Client default router – default-router
- Client address lease time – lease

Administrators may also configure manual bindings for clients using the **host** command in DHCP Pool Configuration mode. This is the most often used for DHCP clients for which the administrator wishes to reserve an ip address, for example a computer server or a printer. A DHCP pool can contain automatic or dynamic address assignments or a single static address assignment.

To configure a manual address binding, configure the pool properties using the DHCP pool commands listed below. It is only necessary to configure a DHCP client identifier or a BOOTP client MAC address for a manual binding. To configure a manual binding, the client identifier or hardware address must be specified before specifying the host address.

- DHCP client identifier – client-identifier
- BOOTP client MAC address – hardware-address
- Host address – host
- Client name (optional) – client-name

Examples

Example 1 – Manual Address Pool

```
console#ip dhcp pool “Printer LP32 R1-101”

console(config-dhcp-pool)#client-identifier
00:23:12:43:23:54

console(config-dhcp-pool)#host 10.1.1.1
255.255.255.255

console(config-dhcp-pool)#client-name
PRT_PCL_LP32_R1-101
```

Example 2 – Dynamic Address Pool

```
console(config)#ip dhcp pool "Windows PCs"
console(config-dhcp-pool)#network 192.168.21.0 /24
console(config-dhcp-pool)#domain-name power-
connect.com
console(config-dhcp-pool)#dns-server 192.168.22.3
192.168.23.3
console(config-dhcp-pool)#netbios-name-server
192.168.22.2 192.168.23.2
console(config-dhcp-pool)#netbios-node-type h-node
console(config-dhcp-pool)#lease 2 12
console(config-dhcp-pool)#default-router 192.168.22.1
192.168.23.1
```

bootfile

Use the **bootfile** command in DHCP Pool Configuration mode to set the name of the image for the DHCP client to load. Use the no form of the command to remove the bootfile configuration. Use the show ip dhcp pool command to display pool configuration parameters.

Syntax

bootfile *filename*

no bootfile

Parameter Description

Parameter	Description
filename	The name of the file for the DHCP client to load.

Default Configuration

There is no default bootfile filename.

Command Mode

DHCP Pool Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-dhcp-pool)#bootfile ntldr
```

clear ip dhcp binding

Use the **clear ip dhcp binding** command in Privileged EXEC mode to remove automatic DHCP server bindings.

Syntax

clear ip dhcp binding {ip-address | *}

Parameter Description

Parameter	Description
*	Clear all automatic dhcp bindings.
ip-address	Clear a specific binding.

Default Configuration

The command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#clear ip dhcp binding 1.2.3.4
```

clear ip dhcp conflict

Use the **clear ip dhcp conflict** command in Privileged EXEC mode to remove DHCP server address conflicts. Use the show ip dhcp conflict command to display address conflicts detected by the DHCP server.

Syntax

clear ip dhcp conflict {ip-address | *}

Parameter Description

Parameter	Description
*	Clear all dhcp conflicts.
ip-address	Clear a specific address conflict.

Default Configuration

The command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#clear ip dhcp conflict *
```

client-identifier

Use the **client-identifier** command in DHCP Pool Configuration mode to identify a Microsoft DHCP client to be manually assigned an address. Use the **no** form of the command to remove the client identifier configuration.

Syntax

client-identifier *unique-identifier*

no client-identifier

Parameter Description

Parameter	Description
unique-identifier	The identifier of the Microsoft DHCP client. The client identifier is specified as 7 bytes of the form XX:XX:XX:XX:XX:XX:XX where X is a hexadecimal digit.

Default Configuration

This command has no default configuration.

Command Mode

DHCP Pool Configuration mode

User Guidelines

For Microsoft DHCP clients, the identifier consists of the media type followed by the MAC address of the client. The media type 01 indicates Ethernet media.

Use the show ip dhcp pool command to display pool configuration parameters.

Example

```
console(config-dhcp-pool)#client-identifier
01:03:13:18:22:33:11
console(config-dhcp-pool)#host 192.168.21.34 32
```

client-name

Use the **client-name** command in DHCP Pool Configuration mode to specify the host name of a DHCP client. Use the **no** form of the command to remove the client name configuration.

Syntax

client-name *name*

no client-name

Parameter Description

Parameter	Description
name	The name of the DHCP client. The client name is specified as up to 31 printable characters.

Default Configuration

There is no default client name.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the show ip dhcp pool command to display pool configuration parameters. The client name should not include the domain name as it is specified separately by the domain-name (IP DHCP Pool Config) command. It is not recommended to use embedded blanks in client names.

Example

```
console(config-dhcp-pool)#client-identifier
01:03:13:18:22:33:11
console(config-dhcp-pool)#host 192.168.21.34 32
console(config-dhcp-pool)#client-name
Line_Printer_Hallway
```

default-router

Use the **default-router** command in DHCP Pool Configuration mode to set the IPv4 address of one or more routers for the DHCP client to use. Use the **no** form of the command to remove the default router configuration. Use the show ip dhcp pool command to display pool configuration parameters.

Syntax

default-router {*ip-address1*}[*ip address2*]

no default-router

Parameter Description

Parameter	Description
ip-address1	The IPv4 address of the first default router for the DHCP client.
ip-address2	The IPv4 address of the second default router for the DHCP client.

Default Configuration

No default router is configured.

Command Mode

DHCP Pool Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-dhcp-pool)#default-router 192.168.22.1
192.168.23.1
```

dns-server (IP DHCP Pool Config)

Use the **dns-server** command in IP DHCP Pool Configuration mode to set the IP DNS server address which is provided to a DHCP client by the DHCP server. DNS server address is configured for stateless server support.

Syntax

dns-server *ip-address1*

no dns-server

Parameter Description

Parameter	Description
ip-address1	Valid IPv4 address.

Default Configuration

This command has no default configuration.

Command Mode

IP DHCP Pool Configuration mode

User Guidelines

This command has no user guidelines.

domain-name (IP DHCP Pool Config)

Use the **domain-name** command in IP DHCP Pool Configuration mode to set the DNS domain name which is provided to a DHCP client by the DHCP server. The DNS name is an alphanumeric string up to 255 characters in length. Use the **no** form of the command to remove the domain name.

Syntax

domain-name *domain*

no domain-name *domain*

- *domain* — DHCP domain name. (Range: 1–255 characters)

Default Configuration

This command has no default configuration.

Command Mode

IP DHCP Pool Configuration mode

hardware-address

Use the **hardware-address** command in DHCP Pool Configuration mode to specify the MAC address of a client to be manually assigned an address. Use the **no** form of the command to remove the MAC address assignment.

Syntax

hardware-address *hardware-address*

no hardware-address

Parameter Description

Parameter	Description
hardware-address	MAC address of the client. Either the XXXX.XXXX.XXXX or XX:XX:XX:XX:XX:XX form of MAC address may be used where XX is a hexadecimal digit.

Default Configuration

There are no default MAC address manual bindings.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the show ip dhcp pool command to display pool configuration parameters. It may be necessary to use the **no host** command prior to executing the **no hardware-address** command.

Example

```
console(config-dhcp-pool)#hardware-address
00:23:12:43:23:54

console(config-dhcp-pool)#host 192.168.21.131 32
```

host

Use the **host** command in DHCP Pool Configuration mode to specify a manual binding for a DHCP client host. Use the **no** form of the command to remove the manual binding.

Syntax

host ip-address [netmask|prefix-length]

no host

Parameter Description

Parameter	Description
ip-address	IPv4 address to be manually assigned to the host identified by the client identifier.
netmask	An IPv4 address indicating the applicable bits of the address, typically 255.255.255.255.
prefix-length	A decimal number ranging from 1-30.

Default Configuration

The default is a 1 day lease.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the client-identifier or hardware-address command prior to using this command for an address pool. Use the show ip dhcp pool command to display pool configuration parameters.

Example

```
console(config-dhcp-pool)#client-identifier
00:23:12:43:23:54

console(config-dhcp-pool)#host 192.168.21.131 32
```

ip dhcp bootp automatic

Use the **ip dhcp bootp automatic** command in Global Configuration mode to enable automatic BOOTP address assignment. By default, BOOTP clients are not automatically assigned addresses, although they may be assigned a static address. Use the no form of the command to disable automatic BOOTP client address assignment. Use the show ip dhcp global configuration command to display the automatic address assignment configuration.

Syntax

ip dhcp bootp automatic

no ip dhcp bootp automatic

Parameter Description

This command does not require a parameter description.

Default Configuration

Automatic BOOTP client address assignment is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console#ip dhcp bootp automatic
```

ip dhcp conflict logging

Use the **ip dhcp conflict logging** command in Global Configuration mode to enable DHCP address conflict detection. Use the **no** form of the command to disable DHCP conflict logging.

Syntax

ip dhcp conflict logging

no ip dhcp conflict logging

Parameter Description

This command does not require a parameter description.

Default Configuration

Conflict logging is enabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console#ip dhcp conflict logging
```

ip dhcp excluded-address

Use the **ip dhcp excluded-address** command in Global Configuration mode to exclude one or more DHCP addresses from automatic assignment. Use the no form of the command to allow automatic address assignment for the specified address or address range.

Syntax

ip dhcp excluded-address *low-address* {*high-address*}

no ip dhcp excluded-address *low-address* {*high-address*}

Parameter Description

Parameter	Description
Low-address	An IPv4 address indicating the starting range for exclusion from automatic DHCP address assignment.

Parameter	Description
High-address	An IPv4 address indicating the ending range for exclusion from automatic DHCP address assignment. The high-address must be numerically greater than the low-address.

Default Configuration

By default, no IP addresses are excluded from the lists configured by the IP DHCP pool configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console#ip dhcp excluded-address 192.168.20.1
192.168.20.3
```

ip dhcp ping packets

Use the **ip dhcp ping packets** command in Global Configuration mode to configure the number of pings sent to detect if an address is in use prior to assigning an address from the DHCP pool. If neither ping is answered, the DHCP server presumes the address is not in use and assigns the selected IP address.

Syntax

ip dhcp ping packets {0, 2-10}

no ip dhcp ping packets

Parameter Description

Parameter	Description
count	The number of ping packets sent to detect an address in use. The default is 2 packets. Range 0, 2-10. A value of 0 turns off address detection. Use the no form of the command to return the setting to the default value.

Default Configuration

The command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console#ip dhcp ping packets 5
```

lease

Use the **lease** command in DHCP Pool Configuration mode to set the period for which a dynamically assigned DHCP address is valid. Use the infinite parameter to indicate that addresses are to be automatically assigned. Use the **no** form of the command to return the lease configuration to the default. Use the show ip dhcp pool command to display pool configuration parameters. Use the show ip dhcp binding command to display the expiration time of the leased IP address.

Syntax

lease {*days*[*hours*][*minutes*]|**infinite**}

no lease

Parameter Description

Parameter	Description
days	The number of days for the lease duration. Range 0-59. Default is 1.
hours	The number of hours for the lease duration. Range 0-23. There is no default.
minutes	The number of minutes for the lease duration. Range 0-59. There is no default.
infinite	The lease does not expire.

Default Configuration

The default is a 1 day lease.

Command Mode

DHCP Pool Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-dhcp-pool)#lease 1 12 59
```

netbios-name-server

Use the **netbios-name-server** command in DHCP Pool Configuration mode to configure the IPv4 address of the Windows Internet Naming Service (WINS) for a Microsoft DHCP client. Use the no form of the command to remove the NetBIOS name server configuration.

Syntax

netbios-name-server *ip-address* [*ip-address2...ip-address8*]

no netbios-name-server

Parameter Description

Parameter	Description
ip-address	IPv4 address

Default Configuration

There is no default name server configured.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the show ip dhcp pool command to display pool configuration parameters. Up to eight name server addresses may be specified. The NetBIOS WINS information is conveyed in the Option 44 TLV of the DHCP OFFER, DCHP ACK, DHCP INFORM ACK and DHCP BOOTREPLY messages.

Example

```
console(config-dhcp-pool)#netbios-name-server
192.168.21.1 192.168.22.1
```

netbios-node-type

Use the **netbios-node-type** command in DHCP Pool Configuration mode to set the NetBIOS node type for a Microsoft DHCP client. Use the **no** form of the command to remove the netbios node configuration.

Syntax

netbios-node-type *type*

no netbios-node-type

Parameter Description

Parameter	Description
type	The NetBIOS node type can be **b-node**, **h-node**, **m-node** or **p-node**.

Default Configuration

There is no default NetBIOS node type configured.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the show ip dhcp pool command to display pool configuration parameters. The NetBIOS node type information is conveyed in the Option 46 TLV of the DHCP OFFER, DHCP ACK, DHCP INFORM ACK and DHCP BOOTREPLY messages. Supported NetBIOS node types are:

- broadcast (b-node)
- peer-to-peer (p-node)
- mixed (m-node)
- hybrid (h-node)

Example

```
console(config-dhcp-pool)#netbios-node-type h-node
```

network

Use the **network** command in IP DHCP Pool Configuration mode to define a pool of IPv4 addresses for distributing to clients.

Syntax

network *network-number* [*mask* | *prefix-length*]

Parameter Description

Parameter	Description
network-number	A valid IPv4 address
mask	A valid IPv4 network mask with contiguous left-aligned bits.
prefix-length	An integer indicating the number of leftmost bits in the network-number to use as a prefix for allocating cells.

Default Configuration

This command has no default configuration.

Command Mode

IP DHCP Pool Configuration mode

next-server

Use the **next-server** command in DHCP Pool Configuration mode to set the IPv4 address of the TFTP server to be used during auto-install. Use the **no** form of the command to remove the next server configuration.

Syntax

next-server *ip-address*

no next-server

Parameter Description

Parameter	Description
ip-address	The IPv4 address of the TFTP server to use during auto-configuration.

Default Configuration

There is no default IPv4 next server configured.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the show ip dhcp pool command to display pool configuration parameters. The IPv4 address is conveyed in the SIADDR field of the DHCP OFFER, DHCP ACK, DHCP INFORM ACK and DHCP BOOTREPLY messages.

Example

```
console(config-dhcp-pool)#next-server 192.168.21.2
```

option

Use the **option** command in DHCP Pool Configuration mode to supply arbitrary configuration information to a DHCP client. Use the **no** form of the command to remove the option configuration. Use the show ip dhcp pool command to display pool configuration parameters.

Syntax

option code {ascii string1 | hex[*string1...string8*] | ip[*ip-address1...ip-address8]}

no option code

Parameter Description

Parameter	Description
code	The DHCP TLV option code.
ascii string1	An ASCII character string. Strings with embedded blanks must be wholly contained in quotes.
hex string1	A hexadecimal string containing the characters [0-9A-F]. The string should not begin with 0x. A hex string consists of two characters which are parsed to fill a single byte. Multiple values are separated by blanks.
ip-address1	An IPv4 address in dotted decimal notation.

Default Configuration

There is no default option configured.

Command Mode

DHCP Pool Configuration mode

User Guidelines

The option information must match the selected option type and length. Options cannot be longer than 255 characters in length. The option information is conveyed in the TLV specified by the code parameter in the DHCP OFFER, DHCP ACK, DHCP INFORM ACK and DHCP BOOTREPLY messages.

Figure 43-1 lists the options that can be configured and their fixed length, minimum length, and length multiple requirements.

Figure 43-1. Option Codes and Lengths

Option Code	Fixed Length	Minimum Length	Multiple Of
2 (Time Offset)	4	–	–
4 (Time Server)	–	4	4
7 (Log Server)	–	4	4
8 (Cookie Server)	–	4	4
9 (LPR Server)	–	4	4
10 (Impress Server)	–	4	4
11 (Resource Location Server)	–	4	4
12 (Host Name)	–	1	–
13 (Boot File Size)	2	–	–
14 (Merit File Dump)	–	1	–
16 (Swap Server)	4	–	–
17 (Root Path)	–	1	–
18 (Extensions Path)	–	1	–
19 (IP Forwarding Enable)	1	–	–
20 (Non-local Source Routing)	1	–	–

Figure 43-1. Option Codes and Lengths *(continued)*

Option Code	Fixed Length	Minimum Length	Multiple Of
21 (Policy Filter)	–	8	8
22 (Max Datagram Reassembly)	2	–	–
23 (IP TTL)	1	–	–
24 (Path MTU Aging)	4	–	–
25 (Path MTU Plateau)	–	2	2
26 (Interface MTU)	2	–	–
27 (Subnets are local)	1	–	–
28 (Broadcast Address)	4	–	–
29 (Perform Mask)	1	–	–
30 (Mask Supplier)	1	–	–
31 (Perform Router Discovery)	1	–	–
32 (Router Solicitation Address)	4	–	–
33 (Static Router Option)	–	8	8
34 (Trailer Encapsulation)	1	–	–
35 (ARP Cache Timeout)	4	–	–
36 (Ethernet Encapsulation)	1	–	–
37 (TCP TTL)	1	–	–
38 (TCP Keepalive Interval)	4	–	–
39 (TCP Keepalive Garbage)	1	–	–
40 (Network Information Service)	–	1	–
41 (Network Information Servers)	–	4	4

Figure 43-1. Option Codes and Lengths *(continued)*

Option Code	Fixed Length	Minimum Length	Multiple Of
42 (NTP Servers)	–	4	4
43 (Vendor Specific Information)	1	–	–
45 (NetBIOS Datagram Distribution)	–	4	4
47 (Netbois Scope)	–	1	–
48 (X-Windows Font Server)	–	4	4
49 (X-Windows Display Manager)	–	4	4
58 (Renewal Time T1)	4	–	–
59 (Rebinding Time T2)	4	–	–
60 (Vendor Class)	–	1	–
64 (NIS Domain)	–	1	–
65 (NIS Servers)	–	4	4
66 (TFTP Server)	–	1	–
68 (Mobile IP Home Agent)	–	0	4
69 (SMTP Server)	–	4	4
70 (POP3 Server)	–	4	4
71 (NNTP Server)	–	4	4
72 (WWW Server)	–	4	4
73 (Finger Server)	–	4	4
74 (IRC Server)	–	4	4
75 (Streettalk Server)	–	4	4
76 (STDA Server)	–	4	4

Options 19, 20, 27, 29, 30, 31, 34, 36, and 39 only accept hex 00 or hex 01 values.

Example

```
console(config-dhcp-pool)#option 4 ascii
"ntpservice.com  "
console(config-dhcp-pool)#option 42 ip 192.168.21.1
console(config-dhcp-pool)#option 29 hex 01
console(config-dhcp-pool)#option 59 hex 00 00 10 01
console(config-dhcp-pool)#option 25 hex 01 ff
```

service dhcp

Use the **service dhcp** command in Global Configuration mode to enable local IPv4 DHCP server on the switch. Use the **no** form of the command to disable the DHCPv4 service.

Syntax

service dhcp

no service dhcp

Default Configuration

The service is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

sntp

Use the **sntp** command in DHCP Pool Configuration mode to set the IPv4 address of the NTP server to be used for time synchronization of the client. Use the **no** form of the command to remove the NTP server configuration.

Syntax

sntp *ip-address*

no sntp

Parameter Description

Parameter	Description
ip-address	The IPv4 address of the NTP server to use for time services.

Default Configuration

There is no default IPv4 NTP server configured.

Command Mode

DHCP Pool Configuration mode

User Guidelines

Use the show ip dhcp pool command to display pool configuration parameters. The IPv4 address of the NTP server is conveyed in the Option 42 TLV of the DHCP OFFER, DHCP ACK, DHCP INFORM ACK and DHCP BOOTREPLY messages.

Example

```
console(config-dhcp-pool)#sntp 192.168.21.2
```

show ip dhcp binding

Use the **show ip dhcp binding** command in Privileged EXEC mode to display the configured DHCP bindings.

Syntax

show ip dhcp binding [address]

Parameter Description

Parameter	Description
address	A valid IPv4 address

Default Configuration

The command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console(config)# show ip dhcp binding

IP address     Hardware Address    Expires    Type   client-
DUID
-----------    -----------------   ---------  -----  ------
----------------------------------
10.10.10.3     00:0e:c6:88:0e:98   00:23:56    Auto
00:01:01:02:03:04:05:06:00:0e:c6:88:0e:98
```

show ip dhcp conflict

Use the **show ip dhcp conflict** command in User EXEC mode to display DHCP address conflicts for all relevant interfaces or a specified interface. If an interface is specified, the optional statistics parameter is available to view statistics for the specified interface.

Syntax

show ip dhcp conflict [*address*]

Parameter Description

Parameter	Description
address	A valid IPv4 address for which the conflict information is desired.

Default Configuration

The command has no default configuration.

Command Mode

Privileged EXEC modes

User Guidelines

This command has no user guidelines.

show ip dhcp global configuration

Use the **show ip dhcp global configuration** command in Privileged EXEC mode to display the DHCP global configuration.

Syntax

show ip dhcp server statistics

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip dhcp server statistics
```

show ip dhcp pool

Use the **show ip dhcp pool** command in User EXEC or Privileged EXEC mode to display the configured DHCP pool or pools. If no pool name is specified, information about all pools is displayed.

Syntax

show ip dhcp pool [**all** | *poolname*]

Parameter Description

Parameter	Description
poolname	Name of the pool. (Range: 1-32 characters)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

show ip dhcp server statistics

Use the **show ip dhcp server statistics** command in Privileged EXEC mode to display the DHCP server binding and message counters.

Syntax

show ip dhcp server statistics

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip dhcp server statistics
Automatic Bindings.............................. 100
Expired Bindings................................ 32
Malformed Bindings.............................. 0

Messages                                        Received
----------                                     ----------
DHCP DISCOVER................................... 132
DHCP REQUEST.................................... 132
DHCP DECLINE.................................... 0
DHCP RELEASE.................................... 32
DHCP INFORM..................................... 0

Messages                                          Sent
----------                                        ------
DHCP OFFER...................................... 132
```

```
DHCP ACK..................................... 132
DHCP NACK.................................... 0
```

44

DHCPv6 Commands

This chapter explains the following commands:

clear ipv6 dhcp	service dhcpv6
dns-server (IPv6 DHCP Pool Config)	show ipv6 dhcp
domain-name (IPv6 DHCP Pool Config)	show ipv6 dhcp binding
ipv6 dhcp pool	show ipv6 dhcp interface (User EXEC)
ipv6 dhcp relay	show ipv6 dhcp interface (Privileged EXEC)
ipv6 dhcp server	show ipv6 dhcp pool
prefix-delegation	show ipv6 dhcp statistics

clear ipv6 dhcp

Use the **clear ipv6 dhcp** command in Privileged EXEC mode to clear DHCPv6 statistics for all interfaces or for a specific interface.

Syntax

clear ipv6 dhcp {**statistics** | **interface vlan** *vlan-id* **statistics**}

- *vlan-id* — Valid VLAN ID.
- **statistics** — Indicates statistics display if VLAN is specified.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following examples clears DHCPv6 statistics for VLAN 11.

```
console#clear ipv6 dhcp interface vlan 11 statistics\
```

dns-server (IPv6 DHCP Pool Config)

Use the **dns-server** command in IPv6 DHCP Pool Configuration mode to set the IPv6 DNS server address which is provided to a DHCPv6 client by the DHCPv6 server. DNS server address is configured for stateless server support.

Syntax

dns-server *ipv6-address*

no dns-server *ipv6-address*

Parameter Description

Parameter	Description
ipv6-address	Valid IPv6 address.

Default Configuration

This command has no default configuration.

Command Mode

IPv6 DHCP Pool Configuration mode

User Guidelines

This command has no user guidelines.

domain-name (IPv6 DHCP Pool Config)

Use the **domain-name** command in IPv6 DHCP Pool Configuration mode to set the DNS domain name which is provided to a DHCPv6 client by the DHCPv6 server. DNS domain name is configured for stateless server support.

Syntax

domain-name *domain*

no domain-name *domain*

- *domain* — DHCPv6 domain name. (Range: 1–255 characters)

Default Configuration

This command has no default configuration.

Command Mode

IPv6 DHCP Pool Configuration mode

User Guidelines

DHCPv6 pool can have multiple number of domain names with maximum of 8.

Example

The following example sets the DNS domain name "test", which is provided to a DHCPv6 client by the DHCPv6 server.

```
console(config)#ipv6 dhcp pool addrpool
console(config-dhcp6s-pool)#domain-name test
console(config-dhcp6s-pool)#no domain-name test
```

ipv6 dhcp pool

Use the **ipv6 dhcp pool** command in Global Configuration mode to enter IPv6 DHCP Pool Configuration mode. DHCPv6 pools are used to specify information for DHCPv6 server to distribute to DHCPv6 clients. These pools are shared between multiple interfaces over which DHCPv6 server capabilities are configured.

Syntax

ipv6 dhcp pool *pool-name*

no ipv6 dhcp pool *pool-name*

- *pool-name* — DHCPv6 pool name. (Range: 1-31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enters IPv6 DHCP Pool Configuration mode.

```
console(config)#ipv6 dhcp pool addrpool
console(config-dhcp6s-pool)#
```

ipv6 dhcp relay

Use the **ipv6 dhcp relay** command in Interface Configuration mode to configure an interface for DHCPv6 relay functionality.

Syntax

ipv6 dhcp relay {**destination** *relay-address* [**interface vlan** *vlan-id*] | **interface vlan** *vlan-id*} [**remote-id** {**duid-ifid** | *user-defined-string*}]

- **destination** — Keyword that sets the relay server IPv6 address.
- *relay-address* — An IPv6 address of a DHCPv6 relay server.
- **interface** — Sets the relay server interface.
- *vlan-id* — A valid VLAN ID.
- [remote-id {duid-ifid | *user-defined-string*}] — The Relay Agent Information Option "remote ID" sub-option to be added to relayed messages. This can either be the special keyword duid-ifid, which causes the "remote ID" to be derived from the DHCPv6 server DUID and the relay interface number, or it can be specified as a user-defined string.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel) mode

User Guidelines

If *relay-address* is an IPv6 global address, then *relay-interface* is not required. If *relay-address* is a link-local or multicast address, then *relay-interface* is required. Finally, a value for *relay-address* is not specified, then a value for *relay-interface* must be specified and the DHCPV6-ALLAGENTS multicast address (i.e. FF02::1:2) is used to relay DHCPv6 messages to the relay server. An IP interface (VLAN) can be configured in DHCP relay mode or DHCP server mode. Configuring an interface in DHCP relay mode overwrites the DHCP server mode and vice-versa.

An IP interface configured in relay mode cannot be configured as a DHCP client (ip address dhcp).

Example

The following example configures VLAN 15 for DHCPv6 relay functionality.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ipv6 dhcp relay destination
2020:1::1
```

ipv6 dhcp server

Use the **ipv6 dhcp server** command in Interface Configuration mode to configure DHCPv6 server functionality on an interface. For a particular interface DHCPv6 server and DHCPv6 relay functions are mutually exclusive.

Syntax

ipv6 dhcp server *pool-name* [**rapid-commit**] [**preference** *pref-value*]

- *pool-name* — The name of the DHCPv6 pool containing stateless and/or prefix delegation parameters

- **rapid-commit** — Is an option that allows for an abbreviated exchange between the client and server.
- *pref-value* — Preference value—used by clients to determine preference between multiple DHCPv6 servers. (Range: 0-4294967295)

Default Configuration

The default preference value is 20. Rapid commit is not enabled by default.

Command Mode

Interface Configuration (VLAN, Tunnel) mode

User Guidelines

An IP interface (VLAN) can be configured in DHCP relay mode or DHCP server mode. Configuring an interface in DHCP server mode overwrites the DHCP relay mode configuration and vice-versa.

An interface in server mode cannot be configured as a DHCP client (ip address dhcp).

Example

The following example configures DHCPv6 server functionality.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 dhcp server pool
```

prefix-delegation

Use the **prefix-delegation** command in IPv6 DHCP Pool Configuration mode to define multiple IPv6 prefixes within a pool for distributing to specific DHCPv6 Prefix delegation clients.

Syntax

prefix-delegation *ipv6-prefix/prefix-length client-DUID* [**name** *hostname*] [**valid-lifetime** {*valid-lifetime* | **infinite**}] [**preferred-lifetime** {*preferred-lifetime* | **infinite**}]

no prefix-delegation ipv6-prefix/prefix-length

Parameter Description

Parameter	Description
prefix/prefix-length	Delegated IPv6 prefix.
client-DUID	Client DUID (e.g. 00:01:00:09:f8:79:4e:00:04:76:73:43:76').
hostname	Client hostname used for logging and tracing. (Range: 0-31 characters.) The command allows spaces in the host name when specified in double quotes. For example, `console(config)#snmp-server host "host name"`
valid-lifetime	Valid lifetime for delegated prefix. (Range: 0-4294967295 seconds) or use the keyword **infinite**. Using the value 0 for the valid-lifetime sets the value to the default.
preferred-lifetime	Preferred lifetime for delegated prefix. (Range: 0-4294967295 seconds) or use the keyword **infinite**. Using the value 0 for the preferred-lifetime sets the value to the default.

Default Configuration

604800 seconds (30 days) is the default value for *preferred-lifetime*. 2592000 seconds (7 days) is the default value for *valid-lifetime*.

Command Mode

IPv6 DHCP Pool Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines a Multiple IPv6 prefix and client DUID within a pool for distributing to specific DHCPv6 Prefix delegation clients.

```
console(config)#ipv6 dhcp pool addrpool

console(config-dhcp6s-pool)#prefix-delegation
2020:1::1/64 00:01:00:09:f8:79:4e:00:04:76:73:43:76
```

The following example defines a unique local address prefix with the MAC address 00:1D:BA:06:37:64 converted to EUI-64 format and a preferred lifetime of 5 days.

```
console(config-dhcp6s-pool)#prefix-delegation
fc00::/7 00:1D:BA:FF:FE:06:37:64 preferred-lifetime
43200
```

service dhcpv6

Use the **service dhcpv6** command in Global Configuration mode to enable local IPv6 DHCP server on the switch. Use the **no** form of the command to disable the DHCPv6 service.

Syntax

service dhcpv6

no service dhcpv6

Default Configuration

The service dhcpv6 is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables DHCPv6 globally.

```
console#configure
console(config)#service dhcpv6
console(config)#no service dhcpv6
```

show ipv6 dhcp

Use the **show ipv6 dhcp** command in Privileged EXEC mode to display the DHCPv6 server name and status.

Syntax

show ipv6 dhcp

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the DHCPv6 server name and status.

```
console#show ipv6 dhcp
DHCPv6 is disabled
Server DUID:
```

show ipv6 dhcp binding

Use the **show ipv6 dhcp binding** command in Privileged EXEC mode to display the configured DHCP pool.

Syntax

show ipv6 dhcp binding [*ipv6-address*]

- *ipv6-address* — Valid IPv6 address.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC and User EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the configured DHCP pool based on the entered IPv6 address.

```
console#show ipv6 dhcp binding 2020:1::
```

show ipv6 dhcp interface (User EXEC)

Use the **show ipv6 dhcp interface** command in User EXEC mode to display DHCPv6 information for all relevant interfaces or for the specified interface. If an interface is specified, the optional statistics parameter is available to view statistics for the specified interface.

Syntax

show ipv6 dhcp interface [type number] [statistics]

Syntax Description

Parameter	Description
type number	Tunnel tunnel-id (Range: 0-7) or VLAN vlan-id (Valid VLAN id)
statistics	Enables statistics display if interface is specified.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

Statistics are shown depending on the interface mode (relay, server, or client).

Examples

The following examples display DHCPv6 information for VLAN 11 when configured in relay mode.

```
console> show ipv6 dhcp interface vlan 11
IPv6 Interface.............................. vlan11
Mode........................................ Relay
Relay Address............................... 2020:1::1
Relay Interface Number...................... Relay
Relay Remote ID.............................
Option Flags.................................

console> show ipv6 dhcp interface vlan 11 statistics
DHCPv6 Interface vlan11 Statistics
-----------------------------------
DHCPv6 Solicit Packets Received.............. 0
DHCPv6 Request Packets Received.............. 0
DHCPv6 Confirm Packets Received.............. 0
DHCPv6 Renew Packets Received................ 0
DHCPv6 Rebind Packets Received............... 0
DHCPv6 Release Packets Received.............. 0
DHCPv6 Decline Packets Received.............. 0
DHCPv6 Inform Packets Received............... 0
DHCPv6 Relay-forward Packets Received........ 0
DHCPv6 Relay-reply Packets Received.......... 0
```

```
DHCPv6 Malformed Packets Received.............. 0
Received DHCPv6 Packets Discarded.............. 0
Total DHCPv6 Packets Received.................. 0
DHCPv6 Advertisement Packets Transmitted....... 0
DHCPv6 Reply Packets Transmitted............... 0
DHCPv6 Reconfig Packets Transmitted............ 0
DHCPv6 Relay-reply Packets Transmitted......... 0
DHCPv6 Relay-forward Packets Transmitted....... 0
Total DHCPv6 Packets Transmitted............... 0
```

show ipv6 dhcp interface (Privileged EXEC)

Use the **show ipv6 dhcp interface** command in Privileged EXEC mode to display configuration and status information about an IPv6 DHCP interface or all interfaces.

Syntax

show ipv6 dhcp interface [*interface-id*]{statistics}

Syntax Description

Parameter	Description
interface-id	Any valid IP interface. See Interface Naming Conventions for interface representation.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command shows the DHCP status. Information displayed depends on the mode.

The command output provides the following information for an interface configured in client mode. Not all fields will be shown for an inactive client.

Term	Description
Mode	Displays whether the specified interface is in Client, Relay, or Server mode.
State	State of the DHCPv6 Client on this interface. The valid values are: INACTIVE, SOLICIT, REQUEST, ACTIVE, RENEW, REBIND, RELEASE.
Server DUID	DHCPv6 Unique Identifier of the DHCPv6 Server on this interface.
T1 Time	The T1 (in seconds) time as indicated by the DHCPv6 Server. T1 value indicates the time interval after which the address is requested for renewal.
T2 Time	The T2 (in seconds) time as indicated by the DHCPv6 Server. T2 value indicates the time interval after which the Client sends Rebind message to the Server in case there are no replies to the Renew messages.
Interface IAID	An identifier for an identity association chosen by this Client.
Leased Address	The IPv6 address leased by the DHCPv6 Server for this interface.
Preferred Lifetime	The preferred life time (in seconds) of the IPv6 Address leased by the DHCPv6 Server.
Valid Lifetime	The valid life time (in seconds) of the IPv6 Address leased by the DHCPv6 Server.
Renew Time	The time remaining (in seconds) to send a DHCPv6 Renew request to DHCPv6 Server for the leased address.
Expiry Time	The time (in seconds) when the DHCPv6 leased address expires.

Example

The following example shows the output from this command when the device has leased an IPv6 address from the DHCPv6 server on interface 1/0/1.

NOTE: Note that the interface is in client mode.

```
console#show ipv6 dhcp interface vlan 2
IPv6 Interface.............................. Vl2
Mode........................................ Client
State....................................... ACTIVE
Server DUID.................................
00:03:00:01:00:13:c4:db:6c:00
T1 Time..................................... 0 days 12 hrs 0 mins 0 secs
T2 Time..................................... 0 days 19 hrs 12 mins 0 secs
Interface IAID.............................. 20
Leased Address.............................. 2017::309D:161:4EF1:DBB1/128
Preferred Lifetime.......................... 1 days 0 hrs 0 mins 0 secs
Valid Lifetime.............................. 2 days 0 hrs 0 mins 0 secs
Renew Time.................................. 0 days 11 hrs 55 mins 28 secs
Expiry Time................................. 1 days 23 hrs 55 mins 28 secs

console#show ipv6 dhcp interface vlan 10

IPv6 Interface.............................. Vl10
Mode........................................ Relay
Relay Address............................... 3030::3
Relay Interface Number...................... Relay
Relay Remote ID.............................
Option Flags.............................

console#show ipv6 dhcp interface vlan 10

IPv6 Interface.............................. Vl10
Mode........................................ Server
Pool Name................................... asd
Server Preference........................... 20
Option Flags.............................

console#show ipv6 dhcp interface vlan 10 statistics

DHCPv6 Server Interface Vl10 Statistics
```

```
DHCPv6 Solicit Packets Received..... 0
DHCPv6 Request Packets Received..... 0
DHCPv6 Confirm Packets Received..... 0
DHCPv6 Renew Packets Received..... 0
DHCPv6 Rebind Packets Received..... 0
DHCPv6 Release Packets Received..... 0
DHCPv6 Decline Packets Received..... 0
DHCPv6 Inform Packets Received..... 0
DHCPv6 Relay-forward Packets Received..... 0
DHCPv6 Relay-reply Packets Received..... 0
DHCPv6 Malformed Packets Received..... 0
Received DHCPv6 Packets Discarded..... 0
Total DHCPv6 Packets Received..... 0
DHCPv6 Advertisement Packets Transmitted..... 0
DHCPv6 Reply Packets Transmitted..... 0
DHCPv6 Reconfig Packets Transmitted..... 0
DHCPv6 Relay-reply Packets Transmitted..... 0
DHCPv6 Relay-forward Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 0

console#show ipv6 dhcp interface vlan 10 statistics

DHCPv6 Client Interface Vl10 Statistics
-------------------------------------------------------
DHCPv6 Advertisement Packets Received..... 0
DHCPv6 Reply Packets Received..... 0
Received DHCPv6 Advertisement Packets Discarded..... 0
Received DHCPv6 Reply Packets Discarded..... 0
DHCPv6 Malformed Packets Received..... 0
Total DHCPv6 Packets Received..... 0

DHCPv6 Solicit Packets Transmitted..... 0
DHCPv6 Request Packets Transmitted..... 0
DHCPv6 Renew Packets Transmitted..... 0
DHCPv6 Rebind Packets Transmitted..... 0
DHCPv6 Release Packets Transmitted..... 0
 Total DHCPv6 Packets Transmitted..... 0
```

show ipv6 dhcp pool

Use the **show ipv6 dhcp pool** command in Privileged EXEC mode to display the configured DHCP pool.

Syntax

show ipv6 dhcp pool *poolname*

- *poolname* — Name of the pool. (Range: 1-32 characters)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the configured DHCP pool.

```
console#show ipv6 dhcp pool test

DHCPv6 Pool: test
```

show ipv6 dhcp statistics

Use the **show ipv6 dhcp statistics** command in User EXEC mode to display the global DHCPv6 server and relay statistics.

Syntax

show ipv6 dhcp statistics

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the DHCPv6 server name and status.

```
console> show ipv6 dhcp statistics
DHCPv6 Interface Global Statistics
-----------------------------------
DHCPv6 Solicit Packets Received..... 0
DHCPv6 Request Packets Received..... 0
DHCPv6 Confirm Packets Received..... 0
DHCPv6 Renew Packets Received..... 0
DHCPv6 Rebind Packets Received..... 0
DHCPv6 Release Packets Received..... 0
DHCPv6 Decline Packets Received..... 0
DHCPv6 Inform Packets Received..... 0
DHCPv6 Relay-forward Packets Received..... 0
DHCPv6 Relay-reply Packets Received..... 0
DHCPv6 Malformed Packets Received..... 0
Received DHCPv6 Packets Discarded..... 0
Total DHCPv6 Packets Received..... 0
DHCPv6 Advertisement Packets Transmitted..... 0
DHCPv6 Reply Packets Transmitted..... 0
DHCPv6 Reconfig Packets Transmitted..... 0
DHCPv6 Relay-reply Packets Transmitted..... 0
DHCPv6 Relay-forward Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 0
```

45

DVMRP Commands

Distance Vector Multicast Routing Protocol (DVMRP) is a dense mode multicast protocol and is most appropriate for use in networks where bandwidth is relatively plentiful and there is at least one multicast group member in each subnet. DVMRP assumes that all hosts are part of a multicast group until it is informed of multicast group changes. When the dense-mode multicast router is informed of a group membership change, the multicast delivery tree is pruned. DVMRP uses a distributed routing algorithm to build per-source-group multicast trees. It is also called Broadcast and Prune Multicasting protocol. It dynamically generates per-source-group multicast trees using Reverse Path Multicasting. Trees are calculated and updated dynamically to track membership of individual groups.

Commands in this Chapter

This chapter explains the following commands:

ip dvmrp	show ip dvmrp neighbor
ip dvmrp metric	show ip dvmrp nexthop
show ip dvmrp	show ip dvmrp prune
show ip dvmrp interface	show ip dvmrp route

ip dvmrp

Use the **ip dvmrp** command to set the administrative mode of DVMRP in the router to active. IGMP must be enabled before DVMRP can be enabled.

Syntax

ip dvmrp

no ip dvmrp

Default Configuration

Disabled is the default configuration.

Command Mode

Global Configuration

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets VLAN 15's administrative mode of DVMRP to active.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip dvmrp
```

ip dvmrp metric

Use the **ip dvmrp metric** command in Interface Configuration mode to configure the metric for an interface. This value is used in the DVMRP messages as the cost to reach this network.

Syntax

ip dvmrp metric *metric*

no ip dvmrp metric

- *metric* — Cost to reach the network. (Range: 1-31)

Default Configuration

1 the default value.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures a metric of 5 for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip dvmrp metric 5
```

show ip dvmrp

Use the **show ip dvmrp** command in Privileged EXEC mode to display the system-wide information for DVMRP.

Syntax

show ip dvmrp

Default Configuration

This command has no default condition.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays system-wide information for DVMRP.

```
console(config)#show ip dvmrp
Admin Mode.............................. Disable
Version................................. 3
Total Number of Routes.................. 0
Reachable Routes ....................... 0
```

```
            DVMRP INTERFACE STATUS
Interface   Interface Mode   Protocol State
---------   --------------   --------------
```

show ip dvmrp interface

Use the **show ip dvmrp interface** command in Privileged EXEC mode to display the interface information for DVMRP on the specified interface.

Syntax

show ip dvmrp interface vlan *vlan-id*

- *vlan-id* — Valid VLAN ID.

Default Configuration

This command has no default condition.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays interface information for VLAN 11 DVMRP.

```
console(config)#show ip dvmrp interface vlan 11
Interface Mode............................. Disable
```

show ip dvmrp neighbor

Use the **show ip dvmrp neighbor** command in Privileged EXEC mode to display the neighbor information for DVMRP.

Syntax

show ip dvmrp neighbor

Default Configuration

This command has no default condition.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the neighbor information for DVMRP.

```
console(config)#show ip dvmrp neighbor
No neighbors available.
```

show ip dvmrp nexthop

Use the **show ip dvmrp nexthop** command in Privileged EXEC mode to display the next hop information on outgoing interfaces for routing multicast datagrams.

Syntax

show ip dvmrp nexthop

Default Configuration

This command has no default condition.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the next hop information on outgoing interfaces for routing multicast datagrams.

```
console(config)#show ip dvmrp nexthop
                                    Next Hop
Source IP       Source Mask     Interface  Type
--------------  --------------  ---------  ------
```

show ip dvmrp prune

Use the **show ip dvmrp prune** command in Privileged EXEC mode to display the table that lists the router's upstream prune information.

Syntax

show ip dvmrp prune

Default Configuration

This command has no default condition.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the table that lists the router's upstream prune information.

```
console(config)#show ip dvmrp prune
                                                  Expiry
Group           IP Source       IP Source Mask  Time(secs)
--------------  --------------  --------------  -----------
```

show ip dvmrp route

Use the **show ip dvmrp route** command in Privileged EXEC mode to display the multicast routing information for DVMRP.

Syntax

show ip dvmrp route

Default Configuration

This command has no default condition.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the multicast routing information for DVMRP.

```
console#show ip dvmrp route
               Upstream                   Expiry     Up Time
Source Address Neighbor Interface Metric Time(secs) (secs)
-------------- -------- ---------------- ----------  ------
```

46

IGMP Commands

Internet Group Management Protocol (IGMP) is the multicast group membership discovery protocol used for IPv4 multicast groups. Three versions of IGMP exist. Versions one and two are widely deployed. Since IGMP is used between end systems (often desktops) and the multicast router, the version of IGMP required depends on the end-user operating system being supported. Any implementation of IGMP must support all earlier versions.

The following list describes the basic operation of IGMP, common to all versions. A multicast router can act as both an IGMP host and an IGMP router and as a result can respond to its own IGMP messages. The PowerConnect implementation of IGMPv3 supports the multicast router portion of the protocol (that is, not the host portion). It is backward compatible with IGMPv1 and IGMPv2.

- One router periodically broadcasts IGMP Query messages onto the network.
- Hosts respond to the Query messages by sending IGMP Report messages indicating their group memberships.
- All routers receive the Report messages and note the memberships of hosts on the network.
- If a router does not receive a Report message for a particular group for a period of time, the router assumes there are no more members of the group on the network.

All IGMP messages are raw IP data grams and are sent to multicast group addresses, with a time to leave (TTL) of 1. Since raw IP does not provide reliable transport, some messages are sent multiple times to aid reliability.

IGMPv3 is a major revision of the protocol and provides improved group membership latency. When a host joins a new multicast group on an interface, it immediately sends an unsolicited IGMP Report message for that group.

IGMPv2 introduced a Leave Group message, which is sent by a host when it leaves a multicast group for which it was the last host to send an IGMP Report message. Receipt of this message causes the Querier possibly to reduce the remaining lifetime of its state for the group, and to send a group-specific IGMP Query message to the multicast group.The Leave Group message is not used with IGMPv3, since the source address filtering mechanism provides the same functionality.

IGMPv3 also allows hosts to specify the list of hosts from which they want to receive traffic. Traffic from other hosts is blocked inside the network. It also allows hosts to block packets for all sources sending unwanted traffic. IGMPv3 adds the capability for a multicast router to learn which sources are of interest to neighboring systems for packets sent to any particular multicast address. This information gathered by IGMP is provided to the multicast routing protocol (that is, DVMRP, PIM-DM, and PIM-SM) that is currently active on the router in order to ensure multicast packets are delivered to all networks where there are interested receivers.

Commands in this Chapter

This chapter explains the following commands:

ip igmp	ip igmp version
ip igmp last-member-query-count	show ip igmp
ip igmp last-member-query-interval	show ip igmp groups
ip igmp query-interval	show ip igmp interface
ip igmp query-max-response-time	show ip igmp membership
ip igmp robustness	show ip igmp interface stats
ip igmp startup-query-count	–
ip igmp startup-query-interval	–

ip igmp

Use the **ip igmp** command in Global Configuration mode to set the administrative mode of IGMP in the system to active. IGMP only operates over VLAN interfaces.

Syntax

ip igmp

no ip igmp

Default Configuration

Disabled is the default state.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example globally enables IGMP.

```
console(config)#ip igmp
```

ip igmp last-member-query-count

Use the **ip igmp last-member-query-count** command in Interface Configuration mode to set the number of Group-Specific Queries sent before the router assumes that there are no local members on the interface.

Syntax

ip igmp last-member-query-count *lmqc*

no ip igmp last-member-query-count

- *lmqc* — Query count. (Range: 1-20)

Default Configuration

The default last member query count is 2.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets 10 as the number of VLAN 2 Group-Specific Queries.

```
console#configure

console(config)#interface vlan 2

console(config-if-vlan2)#ip igmp last-member-query-
count 10

console(config-if-vlan2)#no ip igmp last-member-
query-count
```

ip igmp last-member-query-interval

Use the **ip igmp last-member-query-interval** command in Interface Configuration mode to configure the Maximum Response Time inserted in Group-Specific Queries which are sent in response to Leave Group messages.

Syntax

ip igmp last-member-query-interval *tenthsofseconds*

no ip igmp last-member-query-interval

- *tenthsofseconds* — Maximum Response Time in tenths of a second (Range: 0-255)

Default Configuration

The default Maximum Response Time value is ten (in tenths of a second).

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures 2 seconds as the Maximum Response Time inserted in VLAN 15's Group-Specific Queries.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp last-member-query-
interval 20
```

ip igmp query-interval

Use the **ip igmp query-interval** command in Interface Configuration mode to configure the query interval for the specified interface. The query interval determines how fast IGMP Host-Query packets are transmitted on this interface.

Syntax

ip igmp query-interval *seconds*

no ip igmp query-interval

- *seconds* — Query interval. (Range: 1-3600)

Default Configuration

The default query interval value is 125 seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures a 10-second query interval for VLAN 15.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp query-interval 10
```

ip igmp query-max-response-time

Use the **ip igmp query-max-response-time** command in Internet Configuration mode to configure the maximum response time interval for the specified interface. It is the maximum query response time advertised in IGMPv2 queries on this interface. The time interval is specified in seconds.

Syntax

ip igmp query-max-response-time *seconds*

no ip igmp query-max-response-time

- *seconds* — Maximum response time. (Range: 0-25 seconds)

Default Configuration

The default maximum response time value is 10 seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures a maximum response time interval of one second for VLAN 15.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp query-max-response-
time 10
```

ip igmp robustness

Use the **ip igmp robustness** command in Interface Configuration mode to configure the robustness that allows tuning of the interface, that is, tuning for the expected packet loss on a subnet. If a subnet is expected to have significant loss, the robustness variable may be increased for the interface.

Syntax

ip igmp robustness *robustness*

no ip igmp robustness

- *robustness* — Robustness variable. (Range: 1-255)

Default Configuration

The default robustness value is 2.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures a robustness value of 10 for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip igmp robustness 10
```

ip igmp startup-query-count

Use the **ip igmp startup-query-count** command in Interface Configuration mode to set the number of queries sent out on startup—at intervals equal to the startup query interval for the interface.

Syntax

ip igmp startup-query-count *count*

no ip igmp startup-query-count

- *count* — The number of startup queries. (Range: 1-20)

Default Configuration

The default count value is 2.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets for VLAN 15 the number of queries sent out on startup at 10.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp startup-query-count
10
```

ip igmp startup-query-interval

Use the **ip igmp startup-query-interval** command in Interface Configuration mode to set the interval between general queries sent at startup on the interface.

Syntax

ip igmp startup-query-interval *seconds*

no ip igmp startup-query-interval

- *seconds* — Startup query interval. (Range: 1-300 seconds)

Default Configuration

The default interval value is 31 seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets at 10 seconds the interval between general queries sent at startup for VLAN 15.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp startup-query-
interval 10
```

ip igmp version

Use the **ip igmp version** command in Interface Configuration mode to configure the version of IGMP for an interface.

Syntax

ip igmp version *version*

- *version* — IGMP version. (Range: 1-3)

Default Configuration

The default version is 3.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example configures version 2 of IGMP for VLAN 15.

```
console#interface vlan 15

console(config-if-vlan15)#ip igmp version 2
```

show ip igmp

Use the **show ip igmp** command in Privileged EXEC mode to display system-wide IGMP information.

Syntax

show ip igmp

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays system-wide IGMP information.

```
console#show ip igmp

IGMP Admin Mode.............................. Enabled
IGMP Router-Alert check..................... Disabled

IGMP INTERFACE STATUS
Interface Interface-Mode Operational-Status
--------- -------------- ----------------
vlan 3    Enabled        Non-Operational
```

show ip igmp groups

Use the **show ip igmp groups** command in User EXEC or Privileged EXEC modes to display the registered multicast groups on the interface. If **detail** is specified, this command displays the registered multicast groups on the interface in detail.

Syntax

show ip igmp groups [interface-type interface-number] [detail]

Syntax Description

Parameter	Description
interface-type interface-number	Interface type of VLAN and a valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the registered multicast groups for VLAN 1.

```
console#show ip igmp groups interface vlan 3 detail

                 REGISTERED MULTICAST GROUP DETAILS
                                                        Version1  Version2  Group
Multicast        Last           Up        Expiry    Host      Host      Compat
IP Address       Reporter       Time       Time      Timer      Timer     Mode
---------------  ------------ ----------  ---------  -------   -------- -----
225.0.0.5        1.1.1.5       00:00:05  00:04:15   ------      00:04:15  v2
```

show ip igmp interface

Use the **show ip igmp interface** command in Privileged EXEC mode to display the IGMP information for the specified interface.

Syntax

show ip igmp interface [interface-type interface-number]

Syntax Description

Parameter	Description
interface-type interface-number	Interface type of VLAN and a valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays IGMP information for VLAN 11.

```
console#show ip igmp vlan 11
Interface..................................... 11
IGMP Admin Mode............................... Enable
Interface Mode................................ Enable
IGMP Version.................................. 3
Query Interval (secs)......................... 125
Query Max Response Time (1/10 of a second).... 100
Robustness.................................... 2
Startup Query Interval (secs) ................ 31
Startup Query Count........................... 2
Last Member Query Interval (1/10 of a second).. 10
Last Member Query Count....................... 2
```

show ip igmp membership

Use the **show ip igmp membership** command in Privileged EXEC mode to display the list of interfaces that have registered in the multicast group. If **detail** is specified, this command displays detailed information about the listed interfaces.

Syntax

show ip igmp membership [*groupaddr*] [detail]

- *groupaddr* — Group IP address

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Examples

The following examples display the list of interfaces that have registered in the multicast group at IP address 224.5.5.5, the latter in detail mode.

```
console#show ip igmp interface membership 224.5.5.5

console(config)#show ip igmp interface membership 224.5.5.5 detail
```

show ip igmp interface stats

Use the **show ip igmp interface stats** command in User EXEC mode to display the IGMP statistical information for the interface. The statistics are only displayed when the interface is enabled for IGMP.

Syntax

show ip igmp interface stats vlan *vlan-id*

- *vlan-id* — Valid VLAN ID

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Examples

The following example displays the IGMP statistical information for VLAN 7.

```
console#show ip igmp interface stats vlan 7
Querier Status.............................. Querier
Querier IP Address.......................... 7.7.7.7
Querier Up Time (secs) ..................... 55372
Querier Expiry Time (secs) ................. 0
Wrong Version Queries....................... 0
Number of Joins............................. 7
Number of Groups............................ 1
```

47

IGMP Proxy Commands

IGMP Proxy is used by the router on IPv4 systems to enable the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP router interfaces, thus acting as proxy to all its hosts residing on its router interfaces.

PowerConnect supports IGMP Version 3, Version 2 and Version 1. Version 3 adds support for source filtering [SSM] and needs to be interoperable with Versions 1 and 2. Version 2 supports the group membership terminations to be quickly reported to overcome leave latency and is designed to be interoperable with Version 1.

Commands in this Chapter

This chapter explains the following commands:

ip igmp-proxy	show ip igmp-proxy interface
ip igmp-proxy reset-status	show ip igmp-proxy groups
ip igmp-proxy unsolicited-report-interval	show ip igmp-proxy groups detail
show ip igmp-proxy	

ip igmp-proxy

Use the **ip igmp-proxy** command in Interface Configuration mode to enable the IGMP Proxy on the router. To enable the IGMP Proxy on the router, multicast forwarding must be enabled and there must be no multicast routing protocols enabled on the router.

Syntax

ip igmp-proxy

no ip igmp-proxy

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example enables the IGMP Proxy on the VLAN 15 router.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip igmp-proxy
```

ip igmp-proxy reset-status

Use the **ip igmp-proxy reset-status** command in Interface Configuration mode to reset the host interface status parameters of the IGMP Proxy router. This command is valid only when IGMP Proxy is enabled on the interface.

Syntax

ip igmp-proxy reset-status

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example resets the host interface status parameters of the IGMP Proxy router.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp-proxy reset-status
```

ip igmp-proxy unsolicited-report-interval

Use the **ip igmp-proxy unsolicited-report-interval** command in Interface Configuration mode to set the unsolicited report interval for the IGMP Proxy router. This command is valid only if IGMP Proxy on the interface is enabled.

Syntax

ip igmp-proxy unsolicited-report-interval *seconds*

- *seconds* — Unsolicited report interval. (Range: 1-260 seconds)

Default Configuration

The default configuration is 1 second.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets 10 seconds as the unsolicited report interval for the IGMP Proxy router.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip igmp-proxy unsolicited-
report-interval 10
```

show ip igmp-proxy

Use the **show ip igmp-proxy** command in Privileged EXEC mode to display a summary of the host interface status parameters. It displays status parameters only when IGMP Proxy is enabled.

Syntax

show ip igmp-proxy

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a summary of the host interface status parameters.

```
console#show ip igmp-proxy

Interface Index.............................. vlan13

Admin Mode.................................... Enable

Operational Mode.............................. Enable

Version....................................... 3

Number of Multicast Groups.................... 0

Unsolicited Report Interval................... 1

Querier IP Address on Proxy Interface......... 0.0.0.0

Older Version 1 Querier Timeout.............. 0

Older Version 2 Querier Timeout.............. 0
```

```
Proxy Start Frequency..................... 1
```

show ip igmp-proxy interface

Use the **show ip igmp-proxy interface** command in Privileged EXEC mode to display a detailed list of the host interface status parameters. It displays status parameters only when IGMP Proxy is enabled.

Syntax

show ip igmp-proxy interface

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example fails to display status parameters because IGMP Proxy is not enabled.

```
console#show ip igmp-proxy interface
Interface Index.............................. vlan13
Ver  Query Rcvd  Report Rcvd  Report Sent  Leave Rcvd  Leave Sent
-----------------------------------------------------------------
1         0            0            0        -----       -----
2         0            0            0          0           0
3         0            0            0        -----       -----
```

show ip igmp-proxy groups

Use the **show ip igmp-proxy groups** command in Privileged EXEC mode to display a table of information about multicast groups that IGMP Proxy reported. It displays status parameters only when IGMP Proxy is enabled.

Syntax

show ip igmp-proxy groups

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example attempts to display a table of information about multicast groups that IGMP Proxy reported.

```
console#show ip igmp-proxy groups
Interface Index.............................. vlan13
Group Address  Last Reporter    Up Time   Member State Filter Mode Sources
-------------  ---------------  -------   ------------ ----------- ------
225.0.1.1        13.13.13.1     7         DELAY-MEMBER Exclude       0
225.0.1.2        13.13.13.1    48         DELAY-MEMBER Exclude       0
```

show ip igmp-proxy groups detail

Use the **show ip igmp-proxy groups detail** command in Privileged EXEC mode to display complete information about multicast groups that IGMP Proxy has reported.

Syntax

show ip igmp-proxy groups detail

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays complete information about multicast groups that IGMP Proxy has reported.

```
console#show ip igmp-proxy groups detail
Interface Index.............................. vlan13
Group Address  Last Reporter    Up Time   Member State Filter Mode Sources
-------------  ---------------  -------   ------------ ----------- -------
225.0.1.1        13.13.13.1       26      DELAY-MEMBER Exclude      0
225.0.1.2        13.13.13.1       67      DELAY-MEMBER Exclude      0
```

48

IP Helper/DHCP Relay Commands

The IP Helper feature provides the ability for a router to forward configured UDP broadcast packets to a particular IP address. This allows applications to reach servers on non-local subnets. This is possible even when the application is designed to assume a server is always on a local subnet or when the application uses broadcast packets to reach the server (with the limited broadcast address 255.255.255.255, or a network directed broadcast address).

Network administrators can configure relay entries globally and on routing interfaces. Each relay entry maps an ingress interface and destination UDP port number to a single IPv4 address (the helper address). Multiple relay entries may be configured for the same interface and UDP port, in which case the relay agent relays matching packets to each server address. Interface configuration takes priority over global configuration. If the destination UDP port for a packet matches any entry on the ingress interface, the packet is handled according to the interface configuration. If the packet does not match any entry on the ingress interface, the packet is handled according to the global IP helper configuration.

Network administrators can configure discard relay entries. Discard entries are used to discard packets received on a specific interface when those packets would otherwise be relayed according to a global relay entry. Discard relay entries may be configured on interfaces, but are not configured globally.

Additionally, administrators can configure which UDP ports are forwarded. Certain UDP port numbers can be specified by name in the UI, but network administrators can configure a relay entry with any UDP port number. Administrators may configure relay entries that do not specify a destination UDP port. The relay agent assumes that these entries match packets with the UDP destination ports listed in Table 48-1.

Table 48-1. UDP Destination Ports

Protocol	UDP Port Number
IEN-116 Name Service	42

Protocol	UDP Port Number
DNS	53
NetBIOS Name Server	137
NetBIOS Datagram Server	138
TACACS Server	49
Time Service	37
DHCP	67
Trivial File Transfer Protocol	69

Certain preexisting configurable DHCP relay options do not apply to relay of other protocols. These options are unchanged. The user may optionally set a DHCP maximum hop count or minimum wait time.

The relay agent relays DHCP packets in both directions. It relays broadcast packets from the client to one or more DHCP servers, and relays packets to the client that the DHCP server unicasts back to the relay agent. For other protocols, the relay agent only relays broadcast packets from the client to the server. Packets from the server back to the client are assumed to be unicast directly to the client. Because there is no relay in the return direction for protocols other than DHCP, the relay agent retains the source IP address from the original client packet. The relay agent uses a local IP address as the source IP address of relayed DHCP client packets.
When a switch receives a broadcast UDP packet on a routing interface, the relay agent verifies that the interface is configured to relay to the destination UDP port. If so, the relay agent unicasts the packet to the configured server IP addresses. Otherwise, the relay agent verifies that there is a global configuration for the destination UDP port. If so, the relay agent unicasts the packet to the configured server IP addresses. Otherwise the packet is not relayed.

The relay agent only relays packets that meet the following conditions:

- The destination MAC address must be the all-ones broadcast address (FF:FF:FF:FF:FF:FF).
- The destination IP address must be the limited broadcast address (255.255.255.255) or a directed broadcast address for the receive interface.
- The IP time-to-live (TTL) must be greater than 1.

- The protocol field in the IP header must be UDP (17).
- The destination UDP port must match a configured relay entry.

DHCP relay cannot be enabled and disabled globally. IP helper can be enabled or disabled globally. Enabling IP helper enables DHCP relay.

Commands in this Chapter

This chapter explains the following commands:

bootpdhcprelay maxhopcount	ip helper-address (global configuration)
bootpdhcprelay minwaittime	ip helper-address (interface configuration)
clear ip helper statistics	ip helper enable
ip dhcp relay information check	show ip helper-address
ip dhcp relay information check-reply	show ip dhcp relay
ip dhcp relay information option	show ip helper statistics
ip dhcp relay information option-insert	

bootpdhcprelay maxhopcount

Use the **bootpdhcprelay maxhopcount** command in Global Configuration mode to configure the maximum allowable relay agent hops for BootP/DHCP Relay on the system. Use the no form of the command to set the maximum hop count to the default value.

Syntax

bootpdhcprelay maxhopcount *integer*

no bootpdhcprelay maxhopcount

- *integer* — Maximum allowable relay agent hops for BootP/DHCP Relay on the system. (Range: 1-16)

Default Configuration

The default *integer* configuration is 4.

Command Mode

Global Configuration mode

User Guidelines

Enable DHCP Relay using the ip helper enable command.

Example

The following example defines a maximum hopcount of 6.

```
console(config)#bootpdhcprelay maxhopcount 6
```

bootpdhcprelay minwaittime

Use the **bootpdhcprelay minwaittime** command in Global Configuration mode to configure the minimum wait time in seconds for BootP/DHCP Relay on the system. When the BOOTP relay agent receives a BOOTREQUEST message, it might use the seconds-sinceclient- began-booting field of the request as a factor in deciding whether to relay the request or not. Use the no form of the command to set the minimum wait time to the default value.

Syntax

bootpdhcprelay minwaittime *integer*

no bootpdhcprelay minwaittime

- *integer* — Minimum wait time for BootP/DHCP Relay on the system. (Range: 0-100 seconds)

Default Configuration

0 is the default *integer* configuration.

Command Mode

Global Configuration mode

User Guidelines

Enable DHCP Relay using the **ip helper enable** command.

Example

The following example defines a minimum wait time of 10 seconds.

```
console(config)#bootpdhcprelay minwaittime 10
```

clear ip helper statistics

Use the **clear ip helper statistics** command to reset to 0 the statistics displayed in show ip helper statistics.

Syntax

clear ip helper statistics

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear ip helper statistics
```

ip dhcp relay information check

Use the **ip dhcp relay information check** command to enable DHCP Relay to check that the relay agent information option in forwarded BOOTREPLY messages is valid. If an invalid message is received, the relay agent drops it. This information check will take effect, though enabled, only when the relay agent interface is enabled to insert the sub-options.

Syntax

ip dhcp relay information check

no ip dhcp relay information check

Parameter Description

This command has no arguments or keywords.

Default Configuration

This is enabled by default for a DHCP relay agent.

Command Mode

Global Configuration mode

User Guidelines

Enable DHCP Relay using the **ip helper enable** command. Interface configuration takes precedence over global configuration. However if there is no interface configuration then global configuration is followed.

This check is enabled by default. The administrator has to ensure that the relay should be configured such that only it should insert option-82 fields and no other device near the client has the facility to insert options.

Example

The following example enables relay information check globally:

```
console(config)#ip dhcp relay information check
```

ip dhcp relay information check-reply

Use the **ip dhcp relay information check-reply** command to enable DHCP Relay to check that the relay agent information option in forwarded BOOTREPLY messages is valid. If an invalid message is received, the relay agent drops it. This information check will take effect, though enabled, only when the relay agent interface is enabled to insert the sub-options.

Syntax

ip dhcp relay information check-reply [**none**]

no ip dhcp relay information check-reply

Parameter Description

Parameter	Description
none	(Optional) Disables the command function.

Default Configuration

This check is enabled by default.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

Enable DHCP Relay using the **ip helper enable** command. Use the global configuration command **ip dhcp relay information option** command to enable processing of DHCP circuit ID and remote agent ID options. DHCP replies are checked by default. The network administrator should ensure that only one switch in the path between the DHCP client and server processes DHCP information options.

Example

The following example enables relay information check on the interface:

```
console(config)#interface vlan 10
console(config-if-vlan10)#ip dhcp relay information check
```

ip dhcp relay information option

Use the **ip dhcp relay information option** command in Global Configuration mode to enable the circuit ID option and remote agent ID mode for BootP/DHCP Relay on the system (also called option 82). Use the **no** form of the command to disable the circuit ID option and remote agent ID mode for BootP/DHCP Relay.

Syntax

ip dhcp relay information option

no ip dhcp relay information option

Default Configuration

Disabled is the default configuration.

Command Mode

Global Configuration mode

User Guidelines

Enable DHCP Relay using the **ip helper enable** command.

Example

The following example enables the circuit ID and remote agent ID options.

```
console(config)#ip dhcp relay information option
```

ip dhcp relay information option-insert

Use the **ip dhcp relay information option-insert** command in Interface Configuration mode to enable the circuit ID option and remote agent ID mode for BootP/DHCP Relay on the interface (also called option 82). Use the **no** form of the command to return the option insert configuration to the default.

Syntax

ip dhcp relay information option-insert [**none**]

no ip dhcp relay information option-insert

Parameter Description

Parameter	Description
none	Use to disable insertion of circuit id and remote agent id options into DHCP messages.

Default Configuration

Disabled is the default configuration.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

Enable DHCP Relay using the **ip helper enable** command. The interface configuration always takes precedence over global configuration. However, if there is no interface configuration, then global configuration is followed.

Example

The following example enables the circuit ID and remote agent ID options on vlan 10.

```
console(config)#interface vlan 10
console(config-if-vlan10)#ip dhcp relay information option-insert
```

ip helper-address (global configuration)

Use the **ip helper-address (global configuration)** command to configure the relay of certain UDP broadcast packets received on any interface. To delete an IP helper entry, use the no form of this command.

Syntax

ip helper-address *server-address* [*dest-udp-port* | **dhcp** | **domain** | **isakmp** | **mobile-ip** | **nameserver** | **netbios-dgm** | **netbios-ns** | **ntp** | **pim-auto-rp** | **rip** | **tacacs** | **tftp** | **time**]

no ip helper-address [*server-address*] [*dest-udp-port* | **dhcp** | **domain** | **isakmp** | **mobile-ip** | **nameserver** | **netbios-dgm** | **netbios-ns** | **ntp** | **pim-auto-rp** | **rip** | **tacacs** | **tftp** | **time**]

- *server-address* — The IPv4 unicast or directed broadcast address to which relayed UDP broadcast packets are sent. The server address cannot be an IP address configured on any interface of the local router.
- *dest-udp-port* — A destination UDP port number from 0 to 65535.
- *port-name* — The destination UDP port may be optionally specified by its name. Whether a port is specified by its number or its name has no effect on behavior. The names recognized are as follows: **dhcp** (port 67), **domain**

(port 53), **isakmp** (port 500), **mobile-ip** (port 434), **nameserver** (port 42), **netbios-dgm** (port 138), **netbios-ns** (port 137), **ntp** (port 123), **pim-auto-rp** (port 496), **rip** (port 520), **tacacs** (port 49), **tftp** (port 69), and **time** (port 37). Other ports must be specified by number.

Default Configuration

No helper addresses are configured.

Command Mode

Global Configuration mode.

User Guidelines

This command can be invoked multiple times, either to specify multiple server addresses for a given port number or to specify multiple port numbers handled by a specific server.

The command no ip helper-address with no arguments clears all global IP helper addresses.

Example

To relay DHCP packets received on any interface to two DHCP servers, 10.1.1.1 and 10.1.2.1, use the following commands:

```
console#config
console(config)#ip helper-address 10.1.1.1 dhcp
console(config)#ip helper-address 10.1.2.1 dhcp
```

To relay UDP packets received on any interface for all default ports (see Table 48-1) to the server at 20.1.1.1, use the following commands:

```
console#config
console(config)#ip helper-address 20.1.1.1
```

ip helper-address (interface configuration)

Use the **ip helper-address (interface configuration)** command to configure the relay of certain UDP broadcast packets received on a specific interface. To delete a relay entry on an interface, use the no form of this command.

Syntax

ip helper-address { server-address | **discard** } [dest-udp-port | **dhcp** | **domain** | **isakmp** | **mobile ip** | **nameserver** | **netbios-dgm** | **netbios-ns** | **ntp** | **pim-auto-rp** | **rip** | **tacacs** | **tftp** | **time**]

no ip helper-address [*server-address* | **discard**] [*dest-udp-port* | **dhcp** | **domain** | **isakmp** | **mobile-ip** | **nameserver** | **netbios-dgm** | **netbios-ns** | **ntp** | **pim-auto-rp** | **rip** | **tacacs** | **tftp** | **time**]

- *server-address* — The IPv4 unicast or directed broadcast address to which relayed UDP broadcast packets are sent. The server address cannot be an IP address configured on any interface of the local router.
- **discard** — Matching packets should be discarded rather than relayed, even if a global ip helper-address configuration matches the packet.
- *dest-udp-port* — A destination UDP port number from 0 to 65535.
- *port-name* — The destination UDP port may be optionally specified by its name. Whether a port is specified by its number or its name has no effect on behavior. The names recognized are as follows: **dhcp** (port 67), **domain** (port 53), **isakmp** (port 500), **mobile-ip** (port 434), **nameserver** (port 42), **netbios-dgm** (port 138), **netbios-ns** (port 137), **ntp** (port 123), **pim-auto-rp** (port 496), **rip** (port 520), **tacacs** (port 49), **tftp** (port 69), and **time** (port 37). Other ports must be specified by number.

Default Configuration

No helper addresses are configured.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command can be invoked multiple times on routing interface, either to specify multiple server addresses for a given port number or to specify multiple port numbers handled by a specific server.

The command no ip helper-address with no arguments clears all helper addresses on the interface.

Example

```
To relay DHCP packets received on vlan 5 to two DHCP
servers, 192.168.10.1 and 192.168.20.1, use the
following commands:

console#config

console(config)#interface vlan 5

console(config-if-vlan5)#ip helper-address
192.168.10.1 dhcp

console(config-if-vlan5)#ip helper-address
192.168.20.1 dhcp
```

To relay both DHCP and DNS packets to 192.168.30.1, use the following commands:

```
console#config

console(config)#interface vlan 5

console(config-if-vlan5)#ip helper-address
192.168.30.1 dhcp

console(config-if-vlan5)#ip helper-address
192.168.30.1 dns


This command takes precedence over an ip helper-
address command given in global configuration mode.
With the following configuration, the relay agent
relays DHCP packets received on any interface other
than vlan 5 and vlan 6 to 192.168.40.1, relays DHCP
```

```
and DNS packets received on vlan 5 to 192.168.40.2,
relays SNMP traps (port 162) received on interface
vlan 6 to 192.168.23.1, and drops DHCP packets
received on vlan 6:

console#config

console(config)#ip helper-address 192.168.40.1 dhcp

console(config)#interface vlan 5

console(config-if-vlan5)#ip helper-address
192.168.40.2 dhcp

console(config-if-vlan5)#ip helper-address
192.168.40.2 domain

console(config-if-vlan5)#exit

console(config)#interface 2/6

console(config-if-vlan6)#ip helper-address
192.168.23.1 162

console(config-if-vlan6)#ip helper-address discard
dhcp
```

ip helper enable

Use the **ip helper enable** command to enable relay of UDP packets. To disable relay of all UDP packets, use the "no" form of this command.

Syntax

ip helper enable

no ip helper enable

Default Configuration

IP helper is enabled by default.

Command Mode

Global Configuration mode.

User Guidelines

This command can be used to temporarily disable IP helper without deleting all IP helper addresses.

This command replaces the bootpdhcprelay enable command, but affects not only relay of DHCP packets, but also relay of any other protocols for which an IP helper address has been configured.

Example

```
console(config)#ip helper enable
```

show ip helper-address

Use the **show ip helper-address** command to display the IP helper address configuration.

Syntax

show ip helper-address [*interface*]

- *interface* — Optionally specify an interface to limit the output to the configuration of a single interface. The interface is identified as vlan vlan-id.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

Field	Description
Interface	The relay configuration is applied to packets that arrive on this interface. This field is set to “any” for global IP helper entries.

UDP Port	The relay configuration is applied to packets whose destination UDP port is this port. Entries whose UDP port is identified as "any" are applied to packets with the destination UDP ports listed in Table 48-1.
Discard	If "Yes", packets arriving on the given interface with the given destination UDP port are discarded rather than relayed. Discard entries are used to override global IP helper address entries which otherwise might apply to a packet.
Hit Count	The number of times the IP helper entry has been used to relay or discard a packet.
Server Address	The IPv4 address of the server to which packets are relayed.

Example

```
show ip helper-address

IP helper is enabled

Interface   UDP Port     Discard   Hit Count   Server Address
--------------  -----------  --------  ----------  ---------------
      vlan  100          dhcp        No          10     10.100.1.254
                                                        10.100.2.254
      vlan  101          any         Yes           2
            any          dhcp        No            0    10.200.1.254
```

show ip dhcp relay

Use the **show ip dhcp relay** command in User EXEC mode to display the BootP/DHCP Relay information.

Syntax

show ip dhcp relay

Parameter Description

This command has no arguments or keywords.

Default Configuration

The command has no default configuration.

Command Mode

User EXEC and Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example defines the Boot/DHCP Relay information.

```
console#show ip dhcp relay

Maximum Hop Count.............................. 4
Minimum Wait Time(Seconds)..................... 0
Circuit Id Option Mode..................... Disable
Circuit Id Option Check Mode................. Enable
```

show ip helper statistics

Use the **show ip helper statistics** command to display the number of DHCP and other UDP packets processed and relayed by the UDP relay agent.

Syntax

show ip helper statistics

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

Field	Description
DHCP client messages received	The number of valid messages received from a DHCP client. The count is only incremented if IP helper is enabled globally, the ingress routing interface is up, and the packet passes a number of validity checks, such as having a TTL > 1 and having valid source and destination IP addresses.
DHCP client messages relayed	The number of DHCP client messages relayed to a server. If a message is relayed to multiple servers, the count is incremented once for each server.
DHCP server messages received	The number of DHCP responses received from the DHCP server. This count only includes messages that the DHCP server unicasts to the relay agent for relay to the client.
DHCP server messages relayed	The number of DHCP server messages relayed to a client.
UDP client messages received	The number of valid UDP packets received. This count includes DHCP messages and all other protocols relayed. Conditions are similar to those for the first statistic in this table.
UDP client messages relayed	The number of UDP packets relayed. This count includes DHCP messages relayed as well as all other protocols. The count is incremented for each server to which a packet is sent.
DHCP message hop count exceeded max	The number of DHCP client messages received whose hop count is larger than the maximum allowed. The maximum hop count is a configurable value listed in show ip dhcp relay. A log message is written for each such failure. The DHCP relay agent does not relay these packets.
DHCP message with secs field below min	The number of DHCP client messages received with secs fields that are less than the minimum value. The minimum secs value is a configurable value and is displayed in show ip dhcp relay. A log message is written for each such failure. The DHCP relay agent does not relay these packets.
DHCP message with giaddr set to local address	The number of DHCP client messages received whose gateway address, giaddr, is already set to an IP address configured on one of the relay agent's own IP addresses. In this case, another device is attempting to spoof the relay agent's address. The relay agent does not relay such packets. A log message gives details for each occurrence.

Packets with expired TTL	The number of packets received with TTL of 0 or 1 that might otherwise have been relayed.
Packets that matched a discard entry	The number of packets ignored by the relay agent because they match a discard relay entry.

Example

```
console#show ip helper statistics


DHCP client messages received..................  8
DHCP client messages relayed...................  2
DHCP server messages received..................  2
DHCP server messages relayed...................  2
UDP client messages received...................  8
UDP client messages relayed....................  2
DHCP message hop count exceeded max............  0
DHCP message with secs field below min.........  0
DHCP message with giaddr set to local address..  0
Packets with expired TTL.......................  0
Packets that matched a discard entry...........  0
```

49

IP Routing Commands

The Routing Module provides the base Layer 3 support for Local Area Network (LAN) and Wide Area Network (WAN) environments. The PowerConnect switches allows the network operator to build a complete Layer 3+ configuration with advanced functionality. As the PowerConnect defaults to Layer 2 switching functionality, routing must be explicitly enabled on the PowerConnect to perform Layer 3 forwarding. For PowerConnect switches, routing is only supported on VLAN and Loopback interfaces for in-band ports. It is not possible to route packets to for from the service port.

Static Routes/ECMP Static Routes

The operator is able to configure static and default routes with multiple next hops to any given destination. Permitting the additional routes creates several options for the PowerConnect network operator.

1. The operator configures multiple next hops to a given destination, intending for the router to load share across the next hops.
2. The operator configures multiple next hops to a given destination, intending for the router to use the primary next hops and only use the other next hops if the primary next hops are unusable.

The operator distinguishes static routes by specifying a route preference value. A static route with a lower preference value is a more preferred static route. Next hops with the same preference are grouped into a single ECMP route. A less preferred static route is used if the more preferred static route is unusable. (The link is down or the next hop IP address cannot be resolved to a MAC address.)

In PowerConnect, the operator deletes an individual next hop from a static route or deletes an entire static route at once. The cost of a static route is always 0.

The addition of a preference option has a side benefit. The preference option allows the operator to control the preference of individual static routes relative to routes learned from other sources (such as OSPF). When routes from different sources have the same preference, PowerConnect routing prefers a static route over a dynamic route.

Static Reject Routes

To administratively control the traffic destined to a particular network so that it is not forwarded through the router, PowerConnect enables configuring a static reject route for that network on the router. Such traffic is discarded and the ICMP destination unreachable message is sent back to the source. Static reject routes are typically used to prevent routing loops.

Default Routes

PowerConnect routing provides a preference option for the configuration of default routes. A configured default route is treated exactly like a static route. Therefore, default routes and static routes have the same default preference.

Commands in this Chapter

This chapter explains the following commands:

encapsulation	show ip brief
ip address	show ip interface
ip mtu	show ip protocols
ip netdirbcast	show ip route
ip route	show ip route configured
ip route default	show ip route summary
ip route distance	show ip traffic
ip routing	show ip vlan
routing	

encapsulation

Use the **encapsulation** command in Interface Configuration (VLAN) mode to configure the Link Layer encapsulation type for the packet. Routed frames are always ethernet-encapsulated when a frame is routed to a VLAN.

Syntax

encapsulation {**ethernet** | **snap**}

- **ethernet** — Specifies Ethernet encapsulation.
- **snap** — Specifies SNAP encapsulation.

Default Configuration

Ethernet encapsulation is the default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example applies SNAP encapsulation for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#encapsulation snap
```

ip address

Use the **ip address** command in Interface Configuration mode to configure an IP address on an interface. Also use this command to configure one or more secondary IP addresses on the interface. The ip address none command sets the IP address to "none". The **no ip address** command sets the IP address to the default (whatever the default is). Use the **show ip interface** command to display the configured IP addresses.

Syntax

ip address *ip-address* {*subnet-mask* | *prefix-length*} [**secondary**]

no ip address *ip-address* {*subnet-mask* | *prefix-length*} [**secondary**]

- *ip-address* — IP address of the interface.
- *subnet-mask* — Subnet mask of the interface
- *prefix-length* — Length of the prefix. Must be preceded by a forward slash (/). (Range: 1-30 bits)
- **secondary** — Indicates the IP address is a secondary address.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN, Loopback) mode

User Guidelines

This command also implicitly enables the VLAN or loopback interface for routing (i.e. as if the user had issued the 'routing' interface command). By default, configuring an IP address on a VLAN enables in-band management for interfaces configured with that VLAN. Setting up an IP address on VLAN 1 enables switch management on all in-band interfaces except for those where VLAN 1 is specifically excluded.

Example

The following example defines the IP address and subnet mask for VLAN 15 and enables the VLAN for routing.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip address 192.168.10.10
255.255.255.0
```

ip mtu

Use the **ip mtu** command in Interface Configuration mode to set the IP Maximum Transmission Unit (MTU) on a routing interface. The IP MTU is the size of the largest IP packet that can be transmitted on the interface without fragmentation. Packets forwarded in hardware ignore the IP MTU. Packets forwarded in software are dropped if they exceed the IP MTU of the outgoing interface.

Packets originated on the router, such as OSPF packets, may be fragmented by the IP stack. The IP stack uses its default IP MTU and ignores the value set using the **ip mtu** command. OSPF advertises the IP MTU in the Database Description packets it sends to its neighbors during database exchange. If two OSPF neighbors advertise different IP MTUs, they will not form an adjacency (unless OSPF has been instructed to ignore differences in IP MTU with the **ip ospf mtuignore** command).

Syntax

ip mtu [*bytes*]

no ip mtu

Parameter Description

Parameter	Description
bytes	Specifies the maximum transmission size of an IP frame. (Range: 68-9198)

Default Configuration

1500 bytes is the default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example defines 1480 as the MTU for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip mtu 1480
```

ip netdirbcast

Use the **ip netdirbcast** command in Interface Configuration mode to enable the forwarding of network-directed broadcasts. When enabled, network directed broadcasts are forwarded. When disabled they are dropped. Use the no form of the command to disable the broadcasts.

Syntax

ip netdirbcast

no ip netdirbcast

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example defines the IP address and subnet mask for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip netdirbcast
```

ip route

Use the **ip route** command in Global Configuration mode to configure a static route. Use the no form of the command to delete the static route. The IP route command sets a value for the route preference. Among routes to the same destination, the route with the lowest preference value is the route entered into the forwarding database. Specifying the preference of a static route controls whether a static route is more or less preferred than routes from dynamic routing protocols. The preference also controls whether a static route is more or less preferred than other static routes to the same destination.

Syntax

ip route *ip addr* {*subnetmask* | *prefix length* } *nextHopRtr* [*preference*]

no ip route *ip addr* {*subnetmask* | *prefix length*} *nextHopRtr* [*preference*]

- *ip-address* — IP address of destination interface.
- *subnet-mask* — Subnet mask of destination interface.
- *prefix-length* — Length of prefix. Must be preceded with a forward slash (/). (Range: 0-32 bits)
- *nextHopRtr* — IP address of the next hop router.
- *preference* — Specifies the preference value, a.k.a. administrative distance, of an individual static route. (Range: 1-255)

Default Configuration

Default value of preference is 1.

Command Mode

Global Configuration mode

User Guidelines

For the static routes to be visible, you must:

- Enable ip routing globally.
- Enable ip routing for the interface.
- Confirm that the associated link is also up.

Example

The following example identifies the *ip-address subnet-mask, next-hop-ip* and a preference value of 200.

```
console(config)#ip route 192.168.10.10 255.255.255.0
192.168.20.1 metric 200
```

ip route default

Use the **ip route default** command in Global Configuration mode to configure the next hop address of the default route. Use the no form of the command to delete the default route.

Syntax

ip route default *next-hop-ip* [*preference*]

no ip route default *next-hop-ip* [*preference*]

- *next-hop-ip* — IP address of the next hop router.
- *preference* — Specifies the preference value, a.k.a administrative distance, of an individual static route. (Range: 1-255)

Default Configuration

Default value of preference is 1.

Command Mode

Global Configuration mode

User Guidelines

For routed management traffic:

1. Router entries are checked for applicable destinations.
2. The globally assigned default-gateway is consulted.

If DHCP is enabled on multiple in-band interfaces and the system learns a different default gateway on each, the system retains the first default gateway it learns and ignores any others. If the first default gateway is lost, the system does not revert to an alternate default gateway until it renews its IP address.

Using this command, the administrator may manually configure a single, global default gateway. The switch installs a default route for a configured default gateway with a preference of 253, making it more preferred than the default gateways learned via DHCP, but less preferred than a static default route. The preference of these routes is not configurable.

The switch installs a default route for the default gateway whether or not routing is globally enabled. When the user displays the routing table (e.g. show ip route), the display identifies the default gateway, if one is known.

Use the **show ip route static all** command to display the configured static routes and preferences.

Example

The following example identifies the *next-hop-ip* and a preference value of 200.

```
console(config)#ip route default 192.168.10.1.200
```

ip route distance

Use the **ip route distance** command in Global Configuration mode to set the default distance (preference) for static routes. Lower route preference values are preferred when determining the best route. The **ip route** and **ip route default** commands allow optional setting of the distance of an individual static route. The default distance is used when no distance is specified in these commands. Changing the default distance does not update the distance of existing static routes, even if they were assigned the original default distance. The new default distance are applied to static routes created after invoking the **ip route distance** command.

Syntax

ip route distance *integer*

no ip route distance *integer*

- *integer* — Specifies the distance (preference) of an individual static route. (Range 1-255)

Default Configuration

Default value of distance is 1.

Command Mode

Global Configuration mode

User Guidelines

Lower route distance values are preferred when determining the best route.

Example

The following example sets the default route metric to 80.

```
console(config)#ip route distance 80
```

ip routing

To globally enable IPv4 routing on the router, use the "ip routing" command in Global Configuration mode. To disable IPv4 routing globally, use the **no** form of this command.

NOTE: Enabling or disabling routing will cause in-band management connections to be reset.

Syntax

ip routing

no ip routing

Default Configuration

The ip routing default configuration is disabled.

Command Mode

Global Configuration mode

User Guidelines

Use this command to globally enable IPv4 routing.

Example

```
console(config)#ip routing
```

routing

Use the **routing** command in Interface Configuration mode to enable IPv4 and IPv6 routing for an interface. View the current value for this function with the **show ip brief** command. The value is labeled Routing Mode in the output display. Use the no form of the command to disable routing for an interface.

Syntax

routing

no routing

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example enables IPv4 and IPv6 routing for VLAN 15

```
console(config)#interface vlan 15
console(config-if-vlan15)#routing
```

show ip brief

Use the **show ip brief** command in Privileged EXEC mode to display all the summary information of the IP.

Syntax

show ip brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays IP summary information.

```
console#show ip brief
Default Time to Live..................... 30
Routing Mode............................. Disabled
IP Forwarding Mode....................... Enabled
Maximum Next Hops........................ 2
```

show ip interface

Use the **show ip interface** command in Privileged EXEC mode to display information about one or more IP interfaces. The output shows how each IP address was assigned.

Syntax

show ip interface [type number]

Syntax Description

Parameter	Description
type	Interface type (loopback, out-of-band, or vlan)
number	Interface number. Valid only for loopback and VLAN types.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

The Method field contains one of the following values.

Field	Description
DHCP	The address is leased from a DHCP server.
Manual	The address is manually configured.

ds

The following examples display all IP information and information specific to VLAN 2.

```
console#show ip interface
Default Gateway..................... 0.0.0.0
Burned In MAC Address................ 001E.C9AA.AC84

Routing Interfaces:

Interface    State   IP Address      IP Mask         Method
----------   -----   --------------- --------------- -------
Vl1          Down    0.0.0.0         0.0.0.0         None
```

The Method field contains one of the following values:

- DHCP — The address is leased from a DHCP server.
- Manual — The address is manually configured.

The **Method** field is also added to the long form.

```
console#show ip interface vlan2

Routing Interface Status..... Up
Primary IP Address.....192.168.75.1/255.255.255.0
Method..... DHCP
Routing Mode..... Enable
Administrative Mode..... Enable
Forward Net Directed Broadcasts.... Disable
Proxy ARP..... Enable
Local Proxy ARP..... Disable
Active State..... Active
Link Speed Data Rate..... 100 Half
MAC address..... 00:11:88:2A:3C:B3
Encapsulation Type..... Ethernet
IP MTU..... 1500
Bandwidth..... 100000 kbps
Destination Unreachables..... Enabled
ICMP Redirects..... Enabled

console#show ip interface out-of-band

IP Address..... 10.131.11.66
Subnet Mask..... 255.255.255.0
Default Gateway..... 10.131.11.1
Configured IPv4 Protocol.....DHCP
```

```
Burned In MAC Address.............. 001E.C9AA.AD1C
```

show ip protocols

Use the **show ip protocols** command in User EXEC or Privileged EXEC mode to display the parameters and current state of the active routing protocols.

Syntax

show ip protocols

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays parameters and current state of active routing protocols.

```
console#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds
Invalid after 180 seconds, hold down 120, flushed after 300
Redistributing: RIP, Static, OSPF
Default version control: send version 1, receive version 1
Interfaces:
Interface Send Receive Key-chain
```

```
-------- --------- ----------- ----------
176.1.1.1 1 1 flowers
176.2.1.1 passive 2
Routing Information Sources:
Gateway Last Update
176.1.1.2 0:00:17
Preference: 60
Routing Protocol is "ospf"
Redistributing: OSPF, External direct, Static, RIP
Interfaces:
Interface Metric Key-chain
-------- --------- ----------- ----------
176.1.1.1 10 flowers
176.2.1.1 1
Routing Information Sources:
Gateway State
176.1.1.2 Full
External Preference: 60
Internal Preference: 20
```

show ip route

Use the **show ip route** command in Privileged EXEC mode to display the current state of the routing table. The output of the command also displays the IPv4 address of the default gateway and the default route associated with the gateway.

Syntax

show ip route [ip-address [mask | prefix-length] [longer-prefixes] | protocol]

Syntax Description

Parameter	Description
ip-address	Specifies the network for which the route is to be displayed and displays the best matching best-route for the address.
mask	Subnet mask of the IP address.
prefix-length	Length of prefix, in bits. Must be preceded with a forward slash (/). (Range: 0-32 bits.)
longer-prefixes	Indicates that the *ip-address* and *subnet-mask* pair becomes the prefix, and the command displays the routes to the addresses that match that prefix.
protocol	Specifies the protocol that installed the routes. (Range: **connected, ospf, rip static**)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the IPv4 address of the default gateway and the default route associated with the gateway.

```
console#show ip route
Route Codes: R - RIP Derived, O - OSPF Derived, C -
Connected, S - Static
B - BGP Derived, IA - OSPF Inter Area
E1 - OSPF External Type 1, E2 - OSPF External Type 2
N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA External Type
2
```

```
S 0.0.0.0/0 [254/0] via 10.1.20.1
C 10.1.20.0/24 [0/1] directly connected, Vl2
C 4.4.0.0/16 [0/1] directly connected,  Lo1
C 20.1.20.0/24 [0/1] directly connected, Vl4
```

show ip route configured

Use the **show ip route** configured command in Privileged EXEC mode to display the configured routes, whether they are reachable or not.

Syntax

show ip route configured

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ip route configured


Route Codes: R - RIP Derived, O - OSPF Derived, C -
Connected, S - Static
       B - BGP Derived, IA - OSPF Inter Area
       E1 - OSPF External Type 1, E2 - OSPF External
Type 2
       N1 - OSPF NSSA External Type 1, N2 - OSPF NSSA
External Type 2
```

```
Default Gateway is not configured


S      10.0.0.0/8 [1/0] via 1.2.3.5
```

show ip route preferences

Use the **show ip route preferences** command in Privileged EXEC mode displays detailed information about the route preferences. Route preferences are used in determining the best route. Lower router preference values are preferred over higher router preference values.

The user can configure a global default gateway using the ip default-gateway command, creating a default route with a preference of 253. The **show ip route preferences** command lists the new preference value. The **show** command also displays the preference of default routes learned from a DHCP server.

Syntax

show ip route preferences

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays IP route preferences.

```
console#show ip route preferences
```

```
Local..................................... 0
Static.................................... 1
OSPF Intra................................ 110
OSPF Inter................................ 110
OSPF External............................. 110
RIP....................................... 120
Configured Default Gateway................ 253
DHCP Default Gateway...................... 254
```

show ip route summary

Use the **show ip route summary** command in Privileged EXEC mode to display the routing table summary, including best and non-best routes.

Syntax

show ip route summary [**best**]

Parameter Description

Parameter	Description
best	Shows the number of best routes. To include the number of all routes, do not use this optional parameter.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the IP route summary.

```
console#show ip route summary
Connected Routes.............................. 0
Static Routes................................. 0
RIP Routes.................................... 0
OSPF Routes................................... 0
Intra Area Routes............................. 0
Inter Area Routes............................. 0
External Type-1 Routes........................ 0
External Type-2 Routes........................ 0
Total routes.................................. 0
```

show ip traffic

Use the **show ip traffic** command in User EXEC mode to display IP statistical information. Refer to RFC 1213 for more information about the fields that are displayed.

Syntax

show ip traffic

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays IP route preferences.

```
console>show ip traffic
IpInReceives..................................... 24002
IpInHdrErrors.................................... 1
IpInAddrErrors................................... 925
IpForwDatagrams.................................. 0
IpInUnknownProtos................................ 0
IpInDiscards..................................... 0
IpInDelivers..................................... 18467
IpOutRequests.................................... 295
IpOutDiscards.................................... 0
IpOutNoRoutes.................................... 0
IpReasmTimeout................................... 0
IpReasmReqds..................................... 0
IpReasmOKs....................................... 0
IpReasmFails..................................... 0
IpFragOKs........................................ 0
IpFragFails...................................... 0
IpFragCreates.................................... 0
IpRoutingDiscards................................ 0
IcmpInMsgs....................................... 3
IcmpInErrors..................................... 0
IcmpInDestUnreachs............................... 0
```

```
IcmpInTimeExcds.............................. 0
IcmpInParmProbs.............................. 0
IcmpInSrcQuenchs............................. 0
IcmpInRedirects.............................. 0
IcmpInEchos.................................. 3
IcmpInEchoReps............................... 0
IcmpInTimestamps............................. 0
IcmpInTimestampReps.......................... 0
IcmpInAddrMasks.............................. 0
IcmpInAddrMaskReps........................... 0
IcmpOutMsgs.................................. 3
IcmpOutErrors................................ 0
IcmpOutDestUnreachs.......................... 0
IcmpOutTimeExcds............................. 0
IcmpOutParmProbs............................. 0
IcmpOutSrcQuenchs............................ 0
IcmpOutRedirects............................. 0
IcmpOutEchos................................. 3
IcmpOutEchoReps.............................. 3
IcmpOutTimestamps............................ 0
IcmpOutTimestampReps......................... 0
IcmpOutAddrMasks............................. 0
```

show ip vlan

Use the **show ip vlan** command in Privileged EXEC mode to display the VLAN routing information for all VLANs with routing enabled.

Syntax

show ip vlan

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays VLAN routing information.

```
console#show ip vlan

MAC Address used by Routing VLANs: 00:00:00:01:00:02

VLAN ID IP Address      Subnet Mask

------- --------------- ---------------

10      0.0.0.0         0.0.0.0

20      0.0.0.0         0.0.0.0
```

50

IPv6 PIM Commands

This chapter explains the following commands:

ipv6 pim	ipv6 pim join-prune-interval	show ipv6 pim bsr-router
ipv6 pim sparse (Global config)	ipv6 pim register-rate-limit	show ipv6 pim interface
ipv6 pim dense	ipv6 pim rp-address	show ipv6 pim neighbor
ipv6 pim bsr-border	ipv6 pim rp-candidate	show ipv6 pim rp hash
ipv6 pim bsr-candidate	ipv6 pim spt-threshold	show ipv6 pim rp mapping
ipv6 pim dr-priority	ipv6 pim ssm	
ipv6 pim hello-interval	show ipv6 pimsm	

ipv6 pim

Use the **ipv6 pim** command to administratively configure PIM mode for IPv6 Multicast routing on a VLAN interface. Use the **no** form of this command to disable PIM on the interface.

Syntax

ipv6 pim

no ipv6 pim

Default Configuration

PIM is disabled on interfaces by default.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(if-vlan-10)#ipv6 pim
```

ipv6 pim sparse (Global config)

Use the **ipv6 pim sparse** command to administratively configure PIM sparse mode for multicast routing. Use the **no** form of this command to disable PIM sparse mode.

Syntax

ipv6 pim sparse

no ipv6 pim sparse

Default Configuration

IPv6 PIM is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

Only one of sparse or dense mode can be configured on a router.

Example

```
console(config)#ipv6 pim sparse
```

ipv6 pim dense

Use the **ipv6 pim dense** command in Global configuration mode to administratively configure PIM dense mode for IPv6 multicast routing. Use the **no** form of this command to disable PIM dense mode.

Syntax

ipv6 pim dense

no ipv6 pim dense

Default Configuration

PIM is disabled by default.

Command Mode

Global Configuration mode

User Guidelines

Only one of sparse or dense mode can be configured on a router.

Example

```
console(config)#ipv6 pim dense
```

ipv6 pim bsr-border

Use the **ipv6 pim bsr-border** command to administratively disable bootstrap router (BSR) messages from being sent or received through an interface. Use the **no** form of this command to return the configuration to the default.

Syntax

ipv6 pim bsr-border

no ipv6 pim bsr-border

Default Configuration

BSR messages are enabled on the interface by default.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only has an effect if sparse mode is enabled. Lower values are preferred.

Example

```
console(if-vlan-10)#ipv6 pim bsr-border
```

ipv6 pim bsr-candidate

Use the **ipv6 pim bsr-candidate** command to configure the router to advertise itself as a bootstrap router (BSR). Use the **no** form of this command to return to the default configuration.

Syntax

ipv6 pim bsr-candidate vlan {*vlan-id hash-mask-len bsr-priority* [**interval** *interval*]}

no ipv6 pim bsr-candidate vlan {*vlan-id*}

Parameter Description

Parameter	Description
vlan-id	A valid VLAN identifier with multicast routing enabled.
hash-mask-len	The length of the BSR hash to be AND'ed with the multicast group address. Range 0-32. Default 0.
bsr-priority	The advertised priority of the bsr-candidate. Range: 0–255. Default 0.
interval	(Optional) Indicates the BSR candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.

Default Configuration

None - The router does not advertise itself as an BSR candidate.

Command Mode

Global Configuration mode

User Guidelines

All multicast groups with the same hash value correspond to the same RP. Lower priority values are preferred.

Example

```
console(config)#ipv6 pim bsr-candidate vlan 10 16 0
interval 30
```

ipv6 pim dr-priority

Use the **ipv6 pim dr-priority** command to administratively configure the advertised designated router (DR) priority. Use the **no** form of this command to return the configuration to the default.

Syntax

ipv6 pim dr-priority *priority*

no ipv6 pim dr-priority

Parameter Description

Parameter	Description
priority	The administratively configured priority. Range: 0–2147483647.

Default Configuration

The default election priority is 1.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only has an effect if sparse mode is enabled. Lower values are preferred.

Example

```
console(if-vlan-10)#ipv6 pim dr-priority 32768
```

ipv6 pim hello-interval

Use the **ipv6 pim hello-interval** command to administratively configure the frequency of PIM Hello messages for the specified interface. Use the **no** form of this command to return the configuration to the default.

Syntax

ipv6 pim hello-interval *interval*

no ipv6 pim hello-interval

Parameter Description

Parameter	Description
interval	The number of seconds between successive hello transmissions. Range 0-18000. Default 30.

Default Configuration

The default hello interval is 30 seconds.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(if-vlan-10)#ipv6 pim hello-interval 20
```

ipv6 pim join-prune-interval

Use the **ipv6 pim join-prune-interval** command to administratively configure the frequency of join/prune messages on the specified interface. Use the **no** form of this command to return the join/prune interval to the default.

Syntax

ipv6 pim join-prune-interval *interval*

no ipv6 pim join-prune-interval

Parameter Description

Parameter	Description
interval	The number of seconds between successive join-prune transmissions. Range 0-18000 seconds. Default 60 seconds.

Default Configuration

The join/prune interval defaults to 60 seconds.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only has an effect if sparse mode is enabled.

Example

```
console(if-vlan-10)#ipv6 pim join-prune-interval 30
```

ipv6 pim register-rate-limit

Use the **ipv6 pim register-rate-limit** command to set a limit on the maximum number of PIM register messages sent per second for each (S,G) entry. Use the **no** form of this command to return the limit to its default value (0).

Syntax

ipv6 pim register-rate-limit *register-rate-limit*

no ipv6 pim register-rate-limit

Parameter Description

Parameter	Description
register-rate-limit	The PIM register message limit in kilobytes per second. Range 0–2000 Kbps.

Default Configuration

The default threshold is 0. This indicates that the register limit is infinite.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pim register-rate-limit 10
```

ipv6 pim rp-address

Use the **ipv6 pim rp-address** command to define the address of a PIM Rendezvous Point (RP) for a specific multicast group range. Use the **no** form of this command to remove a configured RP.

Syntax

ipv6 pim rp-address {*rp-address group-address group-mask* [**override**]}

no ipv6 pim rp-address {*rp-address group-address group-mask*}

Parameter Description

Parameter	Description
rp-address	The valid IPv6 address for the Rendezvous Point.
group-address	A valid multicast group address to be sourced from the Rendezvous Point.
group-mask	A mask indicating the range of multicast groups sourced from the RP.
override	A flag indicating that a static entry should override dynamically learned entries for the configured multicast group.

Default Configuration

None - There are no static multicast groups configured for an RP.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pim rp-address
2001:db8:85a3:0:0:8a2e:370:7334 ffe8::0 /16 override
```

ipv6 pim rp-candidate

Use the **ipv6 pim rp-candidate** command to configure the router to advertise itself to the bootstrap router (BSR) as a PIM candidate Rendezvous Point (RP) for a specific multicast group range. Use the **no** form of this command to return to the default configuration.

Syntax

ipv6 pim rp-candidate vlan {*vlan-id group-address group-mask* [**interval** *interval*]}

no ipv6 pim rp-candidate vlan {*vlan-id group-address group-mask*}

Parameter Description

Parameter	Description
vlan-id	A valid VLAN identifier with multicast routing enabled.
group-address	A valid Multicast group address.
group-mask	A mask indicating the range of multicast groups for which the router should advertise itself as an RP-candidate.
interval	(Optional) Indicates the RP candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.

Default Configuration

None - The router does not advertise itself as an RP candidate by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
Console(config)# ipv6 pim rp-candidate vlan 10
239.1.0.0 255.255.0.0 interval 30
```

ipv6 pim spt-threshold

Use the **ipv6 pim spt-threshold** command to set the multicast traffic threshold rate for the last-hop router to switch to the shortest path on the router. Use the **no** form of this command to return the threshold to its default value (0).

Syntax

ipv6 pim spt-threshold *spt-threshold*

no ipv6 pim spt-threshold

Parameter Description

Parameter	Description
spt-threshold	The multicast traffic threshold rate in kilobytes per second. Range: 0–2000 Kbps.

Default Configuration

The default threshold rate is 0. This indicates that the multicast router should always switch to the multicast source tree.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pim spt-threshold 1000
```

ipv6 pim ssm

Use the **ipv6 pim ssm** command to administratively configure PIM Source Specific Multicast (SSM) range of addresses for IPv6 multicast routing. Use the no form of this command to removed configured ranges of addresses from the router.

Syntax

ipv6 pim ssm { default | *group-address group-mask*}

no ipv6 pim ssm { default | *group-address group-mask*}

Parameter Description

Parameter	Description
default	Defines the SSM range access list to 232/8.
group-address	An IPv6 multicast group address.
group-mask	An IPv6 mask in /prefix form.

Default Configuration

There are no group addresses configured by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pim ssm ffe8::01::00:00:00 /96
```

show ipv6 pimsm

Use the **show ipv6 pimsm** command to display global status of IPv6 PIMSM and its IPv6 routing interfaces.

Syntax

show ipv6 pimsm

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ipv6 pimsm


Admin Mode..................................... Enabled
Data Threshold Rate (Kbps)..................... 1000
Register Threshold Rate (Kbps)................. 250


          SSM RANGE TABLE
       Group Address/Prefix Length
-------------------------------------
```

```
FF1E::/64
  PIM-SM INTERFACE STATUS
Interface  Interface-Mode  Operational-Status
---------  --------------  ----------------
vlan 3     Enabled         Operational
vlan 6     Enabled         Operational
vlan 9     Enabled         Operational
```

show ipv6 pim bsr-router

Use the **show ipv6 pim bsr-router** command to display the bootstrap router (BSR) information.

Syntax

show ipv6 pimsm bsr

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

There are no user guidelines for this command. Field descriptions are shown in the following table.

Field	Description
BSR Address	Address of the BSR
BSR Priority	Configured BSR priority
BSR Hash Mask Length	Configured hash mask length

Field	Description
Next Bootstrap Message	Remaining time until a BSR message is sent
Next Candidate RP Advertisement	Time remaining until the next RP advertisement is sent.

Example

```
console#show ipv6 pim bsr-router candidate
BSR Address..................... 2001:0db8:0:badc::1
  BSR Priority.............................. 0
  BSR Hash Mask Length...................... 32
  C-BSR Advertisement Interval (secs)....... 60
  Next Bootstrap message (hh:mm:ss)......... 00:00:02
```

If no configured/elected BSR's exist on the router, the following message is displayed:

```
No BSR's exist/learned on this router.
```

show ipv6 pim interface

Use the **show ipv6 pim interface** command to display the PIM interface status parameters. If the interface number is not specified, this command displays the status parameters of all the PIM-enabled interfaces.

Syntax

show ipv6 pim interface [**vlan** *vlan-id*]

Parameter Description

Parameter	Description
vlan-id	A valid VLAN ID for which multicast routing has been enabled.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

There are no user guidelines for this command. Field descriptions are shown in the table below.

Field	Description
Mode	Active PIM protocol
Interface	Interface number
Hello Interval	Hello interval value
Join-prune Interval	Join-prune interval value
DR Priority	DR priority configured on this interface
BSR Border	Whether or not this interface is configured as a BSR border
Neighbor Count	Number of PIM neighbors learned on this interface
Designated-Router	IPv6 address of the elected DR on the interface

Example

```
(console) #show ipv6 pim


Interface                     VLAN0010
  Mode                        Sparse
  Hello Interval (secs)       30
  Join Prune Interval (secs)  60
  DR Priority                 1
  BSR Border                  Disabled
  Neighbor Count                 1
  Designated Router    2001:db8:85a3:0:0:8a2e:370:7334
```

```
Interface                          VLAN0001
  Mode                             Sparse
  Hello Interval (secs)            30
  Join Prune Interval (secs)       60
  DR Priority                      1
  BSR Border                       Disabled
  Neighbor Count                   1
  Designated Router    2001:db8:85a3:0:0:8a2e:370:7334
```

If none of the interfaces are enabled for PIM, the following message is displayed:

```
None of the routing interfaces are enabled for PIM
```

show ipv6 pim neighbor

Use the **show ipv6 pim neighbor** command to display IPv6 PIM neighbors discovered by PIMv2 Hello messages. If the interface number is not specified, this command displays the neighbors discovered on all the PIM-enabled interfaces.

Syntax

show ipv6 pim neighbor [**vlan** *vlan-id*]

Parameter	Description
vlan-id	A valid VLAN ID for which multicast routing has been enabled.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

There are no user guidelines for this command. Field descriptions are shown in the table below.

Field	Description
Neighbor Addr	IPv6 address of the PIM neighbor
Interface	Interface number
Uptime	Time since the neighbor was learned
Expiry Time	Time remaining for the neighbor to expire

Example

```
(console) # show ipv6 pim neighbor vlan 10

Neighbor Addr              Interface    Uptime    Expiry Time
                                       (HH:MM::SS)(HH:MM::SS)
---------------            --------- ----------- -----------
2001:db8:85a3:0:0:8a2e:370:7334 VLAN0010 00:02:55 00:01:15

(FASTPATH) #show ipv6 pim neighbor
Neighbor Addr              Interface    Uptime    Expiry Time
                                       (HH:MM::SS)(HH:MM::SS)
---------------            --------- ----------- -----------
2001:db8:85a3:0:0:8a2e:370:7334 VLAN0001 00:02:55 00:01:15
2001:db8:85a3:0:0:8a2e:370:7334 VLAN0010 00:03:50 00:02:10
```

If no neighbors are learned on any of the interfaces, the following message is displayed:

```
No neighbors are learned on any interface.
```

show ipv6 pim rp hash

Use the **show ipv6 pim rp hash** command to display the rendezvous point (RP) selected for the specified group address.

Syntax

show ipv6 pim rp hash {*group-address*}

Parameter Description

Parameter	Description
group-address	A valid group IP address supported by RP.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

There are no user guidelines for this command. Field descriptions are shown in the following table.

Field	Description
RP Address	Address of the RP
Type	Origin from where this group mapping is learned

Example

```
(console) # show ipv6 pim rp-hash ff1e:abcd:fed1::0


RP Address       2001:0db8:0:abcd::1
   Type          Static
```

If no RP Group mapping exist on the router, the following message is displayed:

```
No RP-Group mappings exist/learnt on this router.
```

show ipv6 pim rp mapping

Use the **show ipv6 pim rp mapping** command to display the mappings for the PIM group to the active Rendezvous Points (RPs).

Syntax

show ipv6 pim rp mapping [*rp-address*]

Parameter Description

Parameter	Description
rp-address	IP address of the RP

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

There are no user guidelines for this command. Field descriptions are shown in the following table.

Field	Description
RP Address	Address of the RP
Group Address	Address of the multicast group
Origin	Origin from where this group mapping is learned

Example

```
(console) # show ipv6 pim rp mapping candidate
```

RP Address..... 2001:db8:85a3:0:0:8a2e:370:7334

Group Address..... ff1e:abcd:def1::0

Group Mask..... /24

Origin..... BSR

C-RP Advertisement Interval (secs)..... 60

Next Candidate RP Advertisement (hh:mm:ss)... 00:00:15

If no RP Group mapping exist on the router, the following message is displayed:

```
No RP-Group mappings exist on this router.
```

51

IPv6 Routing Commands

The IPv6 version of the routing table manager provides a repository for IPv6 routes learned by dynamic routing protocols or static configuration. RTO6 manages dynamic and static IPv6 routes, redistributes routes to registered protocols, supports ECMP routes, and supports multiple routes to the same destination, sorted by preference. IPv6 routing only operates over VLAN interfaces.

IPv6 Limitations & Restrictions

The following limitations apply:

- IPSec support is not available.
- The DHCPv6 server does not support stateful address configuration.
- Automated router renumbering is not supported.
- IPv6 is not supported on the service port.

Commands in this Chapter

This chapter explains the following commands:

clear ipv6 neighbors	ipv6 mld query-max-response-time	ipv6 route	show ipv6 mld-proxy groups detail
clear ipv6 statistics	ipv6 mld router	ipv6 route distance	show ipv6 mld-proxy interface
ipv6 address	ipv6 mtu	ipv6 unicast-routing	show ipv6 mld traffic
ipv6 enable	ipv6 nd dad attempts	ping ipv6	show ipv6 neighbors
ipv6 hop-limit	ipv6 nd managed-config-flag	ping ipv6 interface	show ipv6 route
ipv6 host	ipv6 nd ns-interval	show ipv6 brief	show ipv6 route preferences

ipv6 mld last-member-query-count	ipv6 nd other-config-flag	show ipv6 interface	show ipv6 route summary
ipv6 mld last-member-query-interval	ipv6 nd prefix	show ipv6 interface management statistics	show ipv6 traffic
ipv6 mld-proxy	ipv6 nd ra-interval	show ipv6 mld groups	show ipv6 vlan
ipv6 mld-proxy reset-status	ipv6 nd ra-lifetime	show ipv6 mld interface	traceroute ipv6
ipv6 mld-proxy unsolicit-rprt-interval	ipv6 nd reachable-time	show ipv6 mld-proxy	
ipv6 mld query-interval	ipv6 nd suppress-ra	show ipv6 mld-proxy groups	

clear ipv6 neighbors

Use the **clear ipv6 neighbors** command in Privileged EXEC mode to clear all entries in the IPv6 neighbor table or an entry on a specific interface.

Syntax

clear ipv6 neighbors [**vlan** *vlan-id*]

- *vlan-id* — Valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example clears all entries in the IPv6 neighbor table.

```
console(config)#clear ipv6 neighbors
```

clear ipv6 statistics

Use the **clear ipv6 statistics** command in Privileged EXEC mode to clear IPv6 statistics for all interfaces or for a specific interface, including loopback and tunnel interfaces. IPv6 statistics display in the output of the **show ipv6 traffic** command.

Syntax

clear ipv6 statistics [**vlan** *vlan-id* | **tunnel** *tunnel-id* | **loopback** *loopback-id*]

- *vlan-id* — Valid VLAN ID.
- *tunnel-id* — Tunnel identifier. (Range: 0-7)
- *loopback-id* — Loopback identifier. (Range: 0-7)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example clears IPv6 statistics for VLAN 11.

```
console(config)#clear ipv6 statistics vlan 11
```

ipv6 address

Use the **ipv6 address** command in Interface Configuration mode to configure an IPv6 address on an interface (including tunnel and loopback interfaces) and to enable IPv6 processing on this interface. Multiple globally reachable addresses can be assigned to an interface by using this command. There is no need to assign a link-local address by using this command since one is automatically created. IPv6 addresses can be expressed in eight blocks. Also of note is that instead of a period, a colon separates each block. For simplification, leading zeros of each 16-bit block can be omitted. One sequence of 16-bit blocks containing only zeros can be replaced with a double colon "::", but not more than one at a time (otherwise it is no longer a unique representation).

Dropping zeros: 3ffe:ffff:100:f101:0:0:0:1 becomes 3ffe:ffff:100:f101::1

Local host: 0000:0000:0000:0000:0000:0000:0000:0001 becomes ::1

Any host: 0000:0000:0000:0000:0000:0000:0000:0000 becomes ::

The hexadecimal letters in the IPv6 addresses are not case-sensitive. An example of an IPv6 prefix and prefix length is 3ffe:1::1234/64.

Syntax

ipv6 address *prefix/prefix-length* [**eui64**]

no ipv6 address [*prefix/prefix-length*] [**eui64**]

- *prefix* — Consists of the bits of the address to be configured.
- *prefix-length* — Designates how many of the high-order contiguous bits of the address make up the prefix.
- **eui64** — The optional eui-64 field designates that IPv6 processing on the interfaces is enabled using an EUI-64 interface ID in the low order 64 bits of the address. If this option is used, the value of *prefix_length* must be 64 bits.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures an IPv6 address and enables IPv6 processing.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 address 2020:1::1/64
```

ipv6 enable

Use the **ipv6 enable** command in Interface Configuration mode to enable IPv6 routing on an interface (including tunnel and loopback interfaces) that has not been configured with an explicit IPv6 address. Command execution automatically configures the interface with a link-local address. The command is not required if an IPv6 global address is configured on the interface.

Syntax

ipv6 enable

no ipv6 enable

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example enables IPv6 routing, which has not been configured with an explicit IPv6 address.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 enable
```

ipv6 hop-limit

Use the **ipv6 hop-limit** command to configure the hop limit used in IPv6 PDUs originated by the router. Use the **no** form of the command to return the hop limit to the default setting.

Syntax

ipv6 hop-limit *count*

no ipv6 hop-limit

Parameter Description

Parameter	Description
count	The number of hops before the PDU expires (Range 0-255).

Default Configuration

The default count is 64 hops.

Command Mode

Global Configuration

ipv6 host

The **ipv6 host** command is used to define static host name-to- ipv6 address mapping in the host cache.

Syntax

ipv6 host *name ipv6-address*

no ipv6 host *name*

- *name* — Host name.
- *ipv6-address* — IPv6 address of the host.

Default Configuration

No IPv6 hosts are defined.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config)#ipv6 host Dell 2001:DB8::/32
```

ipv6 mld last-member-query-count

The **ipv6 mld last-member-query-count** command sets the number of listener-specific queries sent before the router assumes that there are no local members on the interface. Use the "no" form of this command to set the last member query count to the default.

Syntax

ipv6 mld last-member-query-count *last-member-query-count*

no ipv6 mld last-member-query-count

- *last-member-query-count* — Query count (Range: 1–20).

Default Configuration

The default last member query count is 2.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld last-member-query-
count 5
```

ipv6 mld last-member-query-interval

The **ipv6 mld last-member-query-interval** command sets the last member query interval for the MLD interface, which is the value of the maximum response time parameter in the group-specific queries sent out of this interface. Use the "no" form of this command to set the last member query interval to the default.

Syntax

ipv6 mld last-member-query-interval *last-member-query-interval*

no ipv6 mld last-member-query-interval

- *last-member-query-interval* — The last member query interval (Range: 0–65535 milliseconds).

Default Configuration

The default last member query interval is 1 second.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld last-member-query-
interval 5000
```

ipv6 mld-proxy

Use the **ipv6 mld-proxy** command to enable MLD Proxy on the router. To enable MLD Proxy on the router, you must also enable multicast forwarding. Also, ensure that there are no other multicast routing protocols enabled on the router. Use the "no" form of this command to disable MLD Proxy.

Syntax

ipv6 mld-proxy

no ipv6 mld-proxy

Default Configuration

MLD Proxy is disabled by default.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld-proxy
```

ipv6 mld-proxy reset-status

Use the **ipv6 mld-proxy reset-status** command to reset the host interface status parameters of the MLD Proxy router. This command is only valid when MLD Proxy is enabled on the interface.

Syntax

ipv6 mld-proxy reset-status

Command Mode

Interface Configuration (VLAN) mode.

Default Configuration

There is no default configuration for this command.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld-proxy reset-status
```

ipv6 mld-proxy unsolicit-rprt-interval

Use the **ipv6 mld-proxy unsolicit-rprt-interval** command to set the unsolicited report interval for the MLD Proxy router. This command is only valid when MLD Proxy is enabled on the interface. Use the "no" form of this command to reset the MLD Proxy router's unsolicited report interval to the default value.

Syntax

ipv6 mld-proxy unsolicited-report-interval *interval*

no ipv6 mld-proxy unsolicited-report-interval

- *interval*—The interval between unsolicited reports (Range: 1–260 seconds).

Default Configuration

The unsolicited report interval is 1 second by default.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines

Example

```
console(config-if-vlan3)#ipv6 mld-proxy unsolicit-
rprt-interval 10
```

ipv6 mld query-interval

The **ipv6 mld query-interval** command sets the MLD router's query interval for the interface. The query-interval is the amount of time between the general queries sent when the router is querying on that interface. Use the "no" form of this command to set the query interval to the default.

Syntax

ipv6 mld query-interval *query-interval*

no ipv6 mld query-interval

- *query-interval* — Query interval (Range: 1–3600).

Default Configuration

The default query interval is 125 seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld query-interval 130
```

ipv6 mld query-max-response-time

The **ipv6 mld query-max-response-time** command sets MLD query maximum response time for the interface. This value is used in assigning the maximum response time in the query messages that are sent on that interface. Use the "no" form of this command to set the maximum query response time to the default.

Syntax

ipv6 mld query-max-response-time *query-max-response-time*

no ipv6 mld query-max-response-time

- *query-max-response-time* — Maximum query response time (Range: 1–65535 milliseconds).

Default Configuration

The default query maximum response time is 10 seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld query-max-response-
time 4500
```

ipv6 mld router

The **ipv6 mld router** command is used to enable MLD in the router in global configuration mode and for a specific interface in interface configuration mode. Use the "no" form of this command to disable MLD.

Syntax

ipv6 mld router

no ipv6 mld router

Default Configuration

MLD is disabled by default.

Command Mode

Global Configuration mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 mld router
```

ipv6 mtu

Use the **ipv6 mtu** command in Interface Configuration mode to set the maximum transmission unit (MTU) size, in bytes, of IPv6 packets on an interface. This command replaces the default MTU with a new MTU value. The IPv6 MTU is only observed for packets originating on the switch. Packets forwarded by the hardware ignore the IPv6 MTU.

Syntax

ipv6 mtu <*bytes*>

no ipv6 mtu

Parameter Description

Parameter	Description
bytes	The maximum transmission size of an IPv6 frame. (Range: 1280-1500)

Default Configuration

The default MTU is 1500.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the maximum transmission unit (MTU) size, in bytes, of IPv6 packets.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 mtu 1300
```

ipv6 nd dad attempts

Use the **ipv6 nd dad attempts** command in Interface Configuration mode to set the number of duplicate address detection probes transmitted while doing neighbor discovery. Duplicate address detection verifies that an IPv6 address on an interface is unique.

Syntax

ipv6 nd dad attempts <*value*>

no ipv6 nd dad attempts

Parameter Description

Parameter	Description
value	Probes transmitted. (Range: 0-600)

Default Configuration

The default value for attempts is 1.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets at 10 the number of duplicate address detection probes transmitted while doing neighbor discovery.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd dad attempts 10
```

ipv6 nd managed-config-flag

Use the **ipv6 nd managed-config-flag** command in Interface Configuration mode to set the "managed address configuration" flag in router advertisements. When the value is true,

end nodes use DHCPv6. When the value is false, end nodes automatically configure addresses.

Syntax

ipv6 nd managed-config-flag

no ipv6 nd managed-config-flag

Default Configuration

False is the default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

In the following example, the end node uses DHCPv6.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd managed-config-flag
```

ipv6 nd ns-interval

Use the **ipv6 nd ns-interval** command in Interface Configuration mode to set the interval between router advertisements for advertised neighbor solicitations. An advertised value of 0 means the interval is unspecified.

Syntax

ipv6 nd ns-interval *milliseconds*

no ipv6 nd ns-interval

- *milliseconds* — Interval duration. (Range: 0, 1000–4294967295)

Default Configuration

0 is the default value for *milliseconds*.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the interval between router advertisements for advertised neighbor solicitations at 5000 ms.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd ns-interval 5000
```

ipv6 nd other-config-flag

Use the **ipv6 nd other-config-flag** command in Interface Configuration mode to set the "other stateful configuration" flag in router advertisements sent from the interface.

Syntax

ipv6 nd other-config-flag

no ipv6 nd other-config-flag

Default Configuration

False is the default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets to true the "other stateful configuration" flag in router advertisements

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd other-config-flag
```

ipv6 nd prefix

Use the **ipv6 nd prefix** command to configure parameters associated with prefixes that the router advertises in its router advertisements.

Syntax

ipv6 nd prefix *ipv6-prefix/prefix-length* [{valid-lifetime | infinite} {preferred-lifetime | infinite}] [no-autoconfig] [off-link]

no ipv6 nd prefix *ipv6-prefix/prefix-length*

Syntax Description

Parameter	Description
ipv6-prefix	IPv6 prefix.
prefix-length	IPv6 prefix length.
valid-lifetime	Valid lifetime of the router in seconds. (Range: 0–4294967295 seconds.)
infinite	Indicates lifetime value is infinite.
preferred-lifetime	Preferred-lifetime of the router in seconds. (Range: 0–4294967295 seconds.)
no-autoconfig	Do not use Prefix for autoconfiguration.
off-link	Do not use Prefix for onlink determination.

Default Configuration

604800 seconds is the default value for valid-lifetime, 2592000 seconds for preferred lifetime.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

The router advertises its global IPv6 prefixes in its router advertisements (RAs). An RA only includes the prefixes of the IPv6 addresses configured on the interface where the RA is transmitted. Addresses are configured using the ipv6 address interface configuration command. Each prefix advertisement includes information about the prefix, such as its lifetime values and whether hosts should use the prefix for on-link determination or address auto-configuration. Use the **ipv6 nd prefix** command to configure these values.

The ipv6 nd prefix command will allow you to preconfigure RA prefix values before you configure the associated interface address. In order for the prefix to be included in RAs, you must configure an address that matches the prefix using the **ipv6 address** command. Prefixes specified using ipv6 nd prefix without an associated interface address will not be included in RAs and will not be committed to the device configuration.

Example

The following example sets the IPv6 prefixes to include in the router advertisement.

```
console(config)#interface vlan 11
console(config-if-vlan11)#ipv6 nd prefix 2020:1::1/64
```

ipv6 nd ra-interval

Use the **ipv6 nd ra-interval** command in Interface Configuration mode to set the transmission interval between router advertisements.

Syntax

ipv6 nd ra-interval *maximum minimum*

no ipv6 nd ra-interval

- *maximum* — The maximum interval duration (Range: 4–1800 seconds).
- *minimum* — The minimum interval duration (Range: 3 – (0.75 * maximum) seconds).

Default Configuration

600 is the default value for *seconds*.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

The minimum interval cannot be larger than 75% of the maximum interval.

Example

The following example sets the transmission interval between router advertisements at 1000 seconds.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd ra-interval 1000
```

ipv6 nd ra-lifetime

Use the **ipv6 nd ra-lifetime** command in Interface Configuration mode to set the value that is placed in the Router Lifetime field of the router advertisements sent from the interface.

Syntax

ipv6 nd ra-lifetime *seconds*

no ipv6 nd ra-lifetime

- *seconds* — Lifetime duration. The value must be zero, or it must be an integer between the value of the router advertisement transmission interval and 9000 seconds. A value of zero means this router is not to be used as the default router. (Range: 0-9000)

Default Configuration

1800 is the default value for *seconds*.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets at 1000 seconds the value that is placed in the Router Lifetime field of the router advertisements.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd ra-lifetime 1000
```

ipv6 nd reachable-time

Use the **ipv6 nd reachable-time** command in Interface Configuration mode to set the router advertisement time to consider a neighbor reachable after neighbor discovery confirmation.

Syntax

ipv6 nd reachable-time milli*seconds*

no ipv6 nd reachable-time

- *milliseconds* — Reachable-time duration. A value of zero means the time is unspecified by the router. (Range: 0-3600000 milliseconds)

Default Configuration

The default value for neighbor discovery reachable times is 0 milliseconds.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the router advertisement time at 5000 milliseconds to consider a neighbor reachable after neighbor discovery confirmation.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd reachable-time 5000
```

ipv6 nd suppress-ra

Use the **ipv6 nd suppress-ra** command in Interface Configuration mode to suppress router advertisement transmission on an interface.

Syntax

ipv6 nd suppress-ra

no ipv6 nd suppress-ra

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example suppresses router advertisement transmission.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 nd suppress-ra
```

ipv6 route

Use the **ipv6 route** command in Global Configuration mode to configure an IPv6 static route. Use the **no** form of the command to remove a preference, an individual next hop, or all next hops for a route. Using the **no ipv6 route distance** form causes the system to use the system default administrative distance.

Syntax

ipv6 route *distance*

ipv6 route ***ipv6-prefix/prefix-length*** {ipv6-address | *interface-type* ipv6-address} [***preference***]

no ipv6 route ***ipv6-prefix/prefix-length ipv6-address preference***

no ipv6 route ***ipv6-prefix/prefix-length interface-type ipv6-address***

no ipv6 route ***ipv6-prefix/prefix-length interface***

Syntax Description

Parameter	Description
distance	The default administrative distance for static routes. (Range 1-255)
ipv6-prefix	An IPv6 prefix representing the subnet that can be reached via the next-hop neighbor.

Parameter	Description
prefix-length	The length of the IPv6 prefix — a decimal value (usually 0-64) that shows how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must separate the prefix from the prefix-length with no spaces on either side of the slash mark.
interface-type	Distinguishes direct static routes from point-to-point and broadcast interfaces, and must be specified when using a link-local address as the next hop. Interface-type can be Null or vlan plus vlan-id or tunnel plus tunnel-id.
ipv6-address	The IPv6 address of the next hop neighbor.
preference	The administrative distance the router uses to compare this route with routes from other route sources that have the same destination. (Range: 1-255)

Default Configuration

1 is the default value for *preference*.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configure an IPv6 static route.

```
console(config)#ipv6 route 2020:1::1/64 2030:1::2
```

ipv6 route distance

Use the **ipv6 route distance** command in Global Configuration mode to set the default distance (preference) for static routes. Lower route preference values are preferred when determining the best route. The **ipv6 route** and **ipv6 route default** commands allow optional setting of the distance of an individual static route. The default distance is used when no distance is specified in these commands. Changing the default distance does not update

the distance of existing static routes, even if they were assigned the original default distance. The new default distance is applied to static routes created after invoking the **ipv6 route distance** command.

Syntax

ipv6 route distance *integer*

no ipv6 route distance *integer*

- *integer* — Specifies the distance (preference) of an individual static route. (Range 1-255)

Default Configuration

Default value of *integer* is 1.

Command Mode

Global Configuration mode

User Guidelines

Lower route distance values are preferred when determining the best route.

Example

The following example sets the default distance to 80.

```
console(config)#ipv6 route distance 80
```

ipv6 unicast-routing

Use the **ipv6 unicast-routing** command in Global Configuration mode to enable forwarding of IPv6 unicast datagrams.

Syntax

ipv6 unicast-routing

no ipv6 unicast-routing

Default Configuration

Disabled is the default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example globally enables Ipv6 unicast datagram forwarding.

```
console(config)#ipv6 unicast-routing
console(config)#no ipv6 unicast-routing
```

ping ipv6

Use ping ipv6 command in Privileged EXEC mode to determine whether another computer is on the network. To use the command, configure the switch for network (in-band) connection. The source and target devices must have the ping utility enabled and running on top of TCP/IP. The switch can be pinged from any IP workstation with which the switch is connected through the default VLAN (VLAN 1), as long as there is a physical path between the switch and the workstation. The terminal interface sends three pings to the target station.

Syntax

ping ipv6 {*ip-address* | *hostname*} [size *size*]

- *ipv6-address* — Target IPv6 address to ping.
- *hostname* — Hostname to ping (contact). (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes. For example, `console(config)#ping ipv6 "host name"`
- *size* — Size of the datagram. (Range: 48–2048 bytes)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example determines whether another computer is on the network at the IPv6 address specified.

```
console#ping ipv6 2030:1::1/64

Send count=3, Receive count=0 from 2030:1::1/64

Average round trip time = 0.00 ms
```

ping ipv6 interface

Use **ping ipv6 interface** command in the Privileged EXEC mode to determine whether another computer is on the network. To use the command, configure the switch for network (in-band) connection. The source and target devices must have the ping utility enabled and running on top of TCP/IP. The switch can be pinged from any IP workstation with which the switch is connected through the default VLAN (VLAN 1), as long as there is a physical path between the switch and the workstation. The terminal interface sends three pings to the target station. Use the **interface** keyword to ping an interface by using the link-local address or the global IPv6 address of the interface. The source can be a loopback, tunnel, or logical interface.

Syntax

ping ipv6 interface {**vlan** *vlan-id* | **tunnel** *tunnel-id*} | **loopback** *loopback-id*} *link-local-address* [**size** *datagram-size*]

- *vlan-id* — Valid VLAN ID.
- *tunnel-id* — Tunnel identifier. (Range: 0-7)
- *loopback-id* — Loopback identifier. (Range: 0-7)
- *link-local-address* — IPv6 address to ping.
- *datagram-size* — Size of the datagram. (Range: 48-2048 bytes)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example determines whether another computer is on the network at the IPv6 address specified.

```
console(config)#ping ipv6 interface loopback 1
FE80::202:BCFF:FE00:3068/128

Send count=3, Receive count=0 from
FE80::202:BCFF:FE00:3068/128

Average round trip time = 0.00 ms
```

show ipv6 brief

Use the **show ipv6 brief** command in Privileged EXEC mode to display the IPv6 status of forwarding mode and IPv6 unicast routing mode.

Syntax

show ipv6 brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the IPv6 status of forwarding mode and IPv6 unicast routing mode.

```
console#show ipv6 brief
IPv6 Unicast Routing Mode..................... Enable
IPv6 Hop Limit................................ Unconfigured
ICMPv6 Rate Limit Error Interval.............. 1000 msec
ICMPv6 Rate Limit Burst Size.................. 100 messages
```

show ipv6 interface

Use the **show ipv6 interface** command in Privileged EXEC mode to show the usability status of IPv6 interfaces. The output of the command includes the method of assignment for each IPv6 address that is either autoconfigured or leased from a DHCP server. Global addresses with no annotation are assumed to be manually configured.

Syntax

show ipv6 interface [brief] [loopback loopback-id | tunnel tunnel-id | vlan vlan-id [prefix]]

Syntax Description

Parameter	Description
loopback-id	Valid loopback interface ID
tunnel-id	Valid tunnel interface ID
vlan-id	Valid VLAN ID
prefix	Display IPv6 Interface Prefix Information.

Default Configuration

Displays all IPv6 interfaces.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

The Method field contains one of the following values.

Field	Description
Auto	The IPv6 address is automatically generated using IPv6 auto address configuration (RFC 2462).
Config	The IPv6 address is manually configured.
DHCP	The IPv6 address is leased from a DHCP server.

The long form of the command includes the same annotations and shows whether address autoconfiguration or DHCP client are enabled on the interface. When the interface acts as a host interface, the output also shows the default gateway on the interface, if one exists.

Examples

The following example shows the method of assignment for each IPv6 address that is either autoconfigured or leased from a DHCP server.

```
console#show ipv6 interface
        Oper.
Interface  Mode     IPv6 Address/Length
---------- -------- ---------------------------------
Vl3        Enabled  FE80::211:88FF:FE2A:3E3C/128
                    2033::211:88FF:FE2A:3E3C/64
Vl5        Enabled  FE80::211:88FF:FE2A:3E3C/128
                    2017::A42A:26DB:1049:43DD/128          [DHCP]
Vl7        Enabled  FE80::211:88FF:FE2A:3E3C/128
                    2001::211:88FF:FE2A:3E3C/64          [AUTO]
Vl9        Disabled FE80::211:88FF:FE2A:3E3C/128              [TENT]
```

The Method column shows one of the following values:

- Auto – The IPv6 address was automatically generated using IPv6 auto address configuration (RFC 2462)
- Config – The IPv6 address was manually configured.
- DHCP – The IPv6 address was leased from a DHCP server.

The following example displays the long form of the command, and indicates whether address autoconfiguration or DHCP client are enabled on the interface. When the interface acts as a host interface, the output also shows the default gateway on the interface, if one exists.

```
console#show ipv6 interface vlan2

IPv6 is enabled

IPv6 Prefix is ..............................
FE80::211:88FF:FE2A:3E3C/128

2017::A42A:26DB:1049:43DD/128 [DHCP]
Routing Mode................................... Enabled
Administrative Mode............................ Enabled
IPv6 Routing Operational Mode.................. Enabled
Bandwidth...................................... 100000  kbps
Interface Maximum Transmit Unit................ 1500
Router Duplicate Address Detection Transmits... 1
Address Autoconfigure Mode..................... Disabled
Address DHCP Mode.............................. Enabled
Router Advertisement NS Interval............... 0
Router Advertisement Lifetime.................. 1800
Router Advertisement Reachable Time............ 0
Router Advertisement Interval.................. 600
Router Advertisement Managed Config Flag....... Disabled
Router Advertisement Other Config Flag......... Disabled
Router Advertisement Router Preference......... medium
Router Advertisement Suppress Flag............. Disabled
IPv6 Destination Unreachables.................. Enabled
IPv6 Default Router............................
fe80::213:c4ff:fedb:6c42
```

show ipv6 interface management statistics

Use the **show ipv6 interface management statistics** command in Privileged EXEC mode to show the DCHPv6 client statistics.

Syntax

show ipv6 interface management statistics

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show ipv6 interface management statistics


DHCPv6 Client Statistics
-------------------------
DHCPv6 Advertisement Packets Received..... 0
DHCPv6 Reply Packets Received............. 0
Received DHCPv6 Advertisement Packets Discard.. 0
Received DHCPv6 Reply Packets Discarded..... 0
DHCPv6 Malformed Packets Received.......... 0
Total DHCPv6 Packets Received............. 0
DHCPv6 Solicit Packets Transmitted......... 0
DHCPv6 Request Packets Transmitted......... 0
DHCPv6 Renew Packets Transmitted........... 0
DHCPv6 Rebind Packets Transmitted.......... 0
```

```
DHCPv6 Release Packets Transmitted..... 0
Total DHCPv6 Packets Transmitted..... 0
```

show ipv6 mld groups

The **show ipv6 mld groups** command is used to display information about multicast groups that MLD reported. The information is displayed only when MLD is enabled on at least one interface. If MLD was not enabled on any interfaces, there is no group information to be displayed.

Syntax

show ipv6 mld groups { *group-address* | **vlan** *vlan-id* }

- *group-address* — The group address to display.
- *vlan-id* — A valid VLAN id.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

The following fields are displayed as a table when **vlan** *vlan-id* is specified:

Field	Description
Number of (*, G) entries	Displays the number of groups present in the MLD Table.
Number of (S, G) entries	Displays the number of include and exclude mode sources present in the MLD Table.
Group Address	The address of the multicast group.
Interface	Interface through which the multicast group is reachable.
Uptime	Time elapsed in seconds since the multicast group has been known.

Expiry Time	Time left in seconds before the entry is removed from the MLD membership table.

If **vlan** *vlan-id* is not specified, the following fields are displayed for each multicast group and each interface:

Field	Description
Group Address	The address of the multicast group.
Interface	Interface through which the multicast group is reachable.
Uptime	Time elapsed in seconds since the multicast group has been known.
Expiry Time	Time left in seconds before the entry is removed from the MLD membership table of this interface.
Last Reporter	The IP Address of the source of the last membership report received for this multicast group address on that interface.
Filter Mode	The filter mode of the multicast group on this interface. The values it can take are INCLUDE and EXCLUDE.
Compatibility Mode	The compatibility mode of the multicast group on this interface. The values it can take are MLDv1 and MLDv2.
Version 1 Host Timer	The time remaining until the router assumes there are no longer any MLD version-1 Hosts on the specified interface.

The following table is displayed to indicate all the sources associated with this group:

Field	Description
Source Address	The IP address of the source.
Uptime	Time elapsed in seconds since the source has been known.
Expiry Time	Time left in seconds before the entry is removed.

Example

```
console#show ipv6 mld groups ff1e::5
```

```
Interface..................................... vlan 6
Group Address.............................. FF1E::5
Last Reporter.................. FE80::200:FF:FE00:22
Up Time (hh:mm:ss)........................... 00:03:43
Expiry Time (hh:mm:ss)........................ -----
Filter
Mode.....................................Include
Version1 Host Timer........................... -----
Group compat mode.............................. v2
Source Address    ExpiryTime
-----------------  -----------
  4001::6         00:03:15
  4001::7         00:03:15
  4001::8         00:03:15

console#show ipv6 mld groups vlan 6

Group Address.............................. FF1E::1
Interface..................................... vlan 6
Up Time (hh:mm:ss)........................... 00:04:23
Expiry Time (hh:mm:ss)....................... ------

Group Address.............................. FF1E::2
Interface..................................... vlan 6
Up Time (hh:mm:ss)........................... 00:04:23
Expiry Time (hh:mm:ss)....................... ------
```

```
Group Address.............................. FF1E::3
Interface.................................. vlan 6
Up Time (hh:mm:ss)......................... 00:04:23
Expiry Time (hh:mm:ss)..................... ------

Group Address.............................. FF1E::4
Interface.................................. vlan 6
Up Time (hh:mm:ss)......................... 00:04:23
Expiry Time (hh:mm:ss)..................... ------
```

show ipv6 mld interface

The **show ipv6 mld interface** command is used to display MLD related information for an interface.

Syntax

show ipv6 mld interface { **vlan** *vlan-id* | all }

- *vlan-id* — A valid VLAN id.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

The following information is displayed for the specified interface:

Field	Description
Interface	The interface number in unit/slot/port format.

MLD Global Admin Mode	This field displays the configured global administrative status of MLD.
MLD Interface Admin Mode	This field displays the configured interface administrative status of MLD.
MLD Operational Mode	The operational status of MLD on the interface.
MLD Version	This field indicates the version of MLD configured on the interface.
Query Interval	This field indicates the configured query interval for the interface.
Query Max Response Time	This field indicates the configured maximum query response time (in seconds) advertised in MLD queries on this interface.
Robustness	This field displays the configured value for the tuning for the expected packet loss on a subnet attached to the interface.
Startup Query Interval	This value indicates the configured interval between General Queries sent by a Querier on startup.
Startup Query Count	This value indicates the configured number of Queries sent out on startup, separated by the Startup Query Interval.
Last Member Query Interval	This value indicates the configured Maximum Response Time inserted into Group-Specific Queries sent in response to Leave Group messages.
Last Member Query Count	This value indicates the configured number of Group-Specific Queries sent before the router assumes that there are no local members.

The following information is displayed if the operational mode of the MLD interface is enabled:

Field	Description
Querier Status	This value indicates whether the interface is a MLD querier or non-querier on the subnet with which it is associated.
Querier Address	The IP address of the MLD querier on the subnet the interface with which it is associated.
Querier Up Time	Time elapsed in seconds since the querier state has been updated.

Querier Expiry Time	Time left in seconds before the Querier losses its title as querier.
Wrong Version Queries	Indicates the number of queries received whose MLD version does not match the MLD version of the interface.
Number of Joins	The number of times a group membership has been added on this interface.
Number of Leaves	The number of times a group membership has been removed on this interface.
Number of Groups	The current number of membership entries for this interface.

Example

```
console#show ipv6 mld interface vlan 2


Interface..................................... vlan 2
MLD Global Admin Mode......................... Enabled
MLD Interface Admin Mode...................... Disabled
MLD Operational Mode.......................... Disabled
MLD Version................................... 2
Query Interval (secs)......................... 100
Query Max Response Time(milli-secs) ........ 1111
Robustness.................................... 2
Startup Query Interval (secs) ............... 31
Startup Query Count........................... 2
Last Member Query Interval (milli-secs)..... 1111
Last Member Query Count....................... 2
```

show ipv6 mld-proxy

Use the **show ipv6 mld-proxy** command to display a summary of the host interface status parameters.

Syntax

show ipv6 mld-proxy

Command Mode

Privileged EXEC mode

Default Configuration

There is no default configuration for this command.

User Guidelines

The command displays the following parameters only when you enable MLD Proxy:

Field	Description
Interface Index	The interface number of the MLD Proxy interface.
Admin Mode	Indicates whether MLD Proxy is enabled or disabled. This is a configured value.
Operational Mode	Indicates whether MLD Proxy is operationally enabled or disabled. This is a status parameter.
Version	The present MLD host version that is operational on the proxy interface.
Number of Multicast Groups	The number of multicast groups that are associated with the MLD-Proxy interface.
Unsolicited Report Interval	The time interval at which the MLD-Proxy interface sends unsolicited group membership reports.
Querier IP Address on Proxy Interface	The IP address of the Querier, if any, in the network attached to the upstream interface (MLD-Proxy interface).
Older Version 1 Querier Timeout	The interval used to timeout the older version 1 queriers.
Proxy Start Frequency	The number of times the MLD-Proxy has been stopped and started.

Example

```
console#show ipv6 mld-proxy
```

```
Interface Index.............................. vlan 10
Admin Mode................................... Enabled
Operational Mode............................. Enabled
Version...................................... 3
Num of Multicast Groups...................... 0
Unsolicited Report Interval.............. 1
Querier IP Address on Proxy Interface..... fe80::1:2:5
Older Version 1 Querier Timeout.......... 00:00:00
Proxy Start Frequency.....................1
```

show ipv6 mld-proxy groups

Use the **show ipv6 mld-proxy groups** command to display information about multicast groups that the MLD Proxy reported.

Syntax

show ipv6 mld-proxy groups

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

The following parameters are displayed by this command:

Field	Description
Interface	The MLD Proxy interface.
Group Address	The IP address of the multicast group.

Last Reporter	The IP address of the host that last sent a membership report for the current group on the network attached to the MLD-Proxy interface (upstream interface).
Up Time (in secs)	The time elapsed in seconds since last created.
Member State	Possible values are: • Idle_Member—The interface has responded to the latest group membership query for this group. • Delay_Member—The interface is going to send a group membership report to respond to a group membership query for this group.
Filter Mode	Possible values are Include or Exclude.
Sources	The number of sources attached to the multicast group.

Example

```
console#show ipv6 mld-proxy groups
Interface.............................. vlan 10
Group Address Last Reporter  Up Time    Member State      Filter Mode  Sources
------------- -------------- ---------- ----------------- ------------ -----
--
FF1E::1       FE80::100:2.3  00:01:40   DELAY_MEMBER      Exclude        2
FF1E::2       FE80::100:2.3  00:02:40   DELAY_MEMBER      Include        1
FF1E::3       FE80::100:2.3  00:01:40   DELAY_MEMBER      Exclude        0
FF1E::4       FE80::100:2.3  00:02:44   DELAY_MEMBER      Include        4
```

show ipv6 mld-proxy groups detail

Use the **show ipv6 mld-proxy groups detail** command to display information about multicast groups that MLD Proxy reported.

Syntax

show ipv6 mld-proxy groups detail

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

The following parameters are displayed by this command:

Field	Description
Interface	The interface number of the MLD-Proxy.
Group Address	The IP address of the multicast group.
Last Reporter	The IP address of the host that last sent a membership report for the current group on the network attached to the MLD Proxy interface (upstream interface).
Up Time (in secs)	The time elapsed in seconds since last created.
Member State	Possible values are: • Idle_Member—The interface has responded to the latest group membership query for this group. • Delay_Member—The interface is going to send a group membership report to respond to a group membership query for this group.
Filter Mode	Possible values are Include or Exclude.
Sources	The number of sources attached to the multicast group.
Group Source List	The list of IP addresses of the sources attached to the multicast group.
Expiry Time	The time left for a source to get deleted.

Example

```
console#show ipv6 igmp-proxy groups
Interface.............................. vlan 10

Group Address Last Reporter    Up Time   Member State      Filter Mode
Sources
------------- --------------- --------- ----------------- ------------- ---
----
FF1E::1       FE80::100:2.3      244     DELAY_MEMBER      Exclude        2
```

```
Group Source List          Expiry Time
------------------         ---------------
2001::1                    00:02:40
2001::2                    --------

FF1E::2       FE80::100:2.3      243     DELAY_MEMBER      Include        1

Group Source List          Expiry Time
------------------         ---------------
3001::1                    00:03:32
3002::2                    00:03:32

FF1E::3       FE80::100:2.3      328     DELAY_MEMBER      Exclude        0
FF1E::4       FE80::100:2.3      255     DELAY_MEMBER      Include        4

Group Source List          Expiry Time
------------------         ---------------
4001::1                    00:03:40
5002::2                    00:03:40
4001::2                    00:03:40
5002::2                    00:03:40
```

show ipv6 mld-proxy interface

Use the **show ipv6 mld-proxy interface** command to display a detailed list of the host interface status parameters.

Syntax

show ipv6 mld-proxy interface

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC

User Guidelines

The following parameters are displayed only when MLD Proxy is enabled:

Parameter	Description
Interface	The MLD Proxy interface.

The column headings of the table associated with the interface are as follows:

Parameter	Description
Ver	The MLD version.
Query Rcvd	Number of MLD queries received.
Report Rcvd	Number of MLD reports received.
Report Sent	Number of MLD reports sent.
Leaves Rcvd	Number of MLD leaves received. Valid for version 2 only.
Leaves Sent	Number of MLD leaves sent on the Proxy interface. Valid for version 2 only.

Example

```
console#show ipv6 mld-proxy interface

Interface.............................. vlan 10

Ver Query Rcvd Report Rcvd Report Sent Leave Rcvd Leave Sent
-------------------------------------------------------------------
1     2          0           0           0          2
2     3          0           4         -----      -----
```

show ipv6 mld traffic

The **show ipv6 mld traffic** command is used to display MLD statistical information for the router.

Syntax

show ipv6 mld traffic

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

The following fields are displayed:

Field	Description
Valid MLD Packets Received	The number of valid MLD packets received by the router.
Valid MLD Packets Sent	The number of valid MLD packets sent by the router.
Queries Received	The number of valid MLD queries received by the router.
Queries Sent	The number of valid MLD queries sent by the router.
Reports Received	The number of valid MLD reports received by the router.
Reports Sent	The number of valid MLD reports sent by the router.
Leaves Received	The number of valid MLD leaves received by the router.
Leaves Sent	The number of valid MLD leaves sent by the router.
Bad Checksum MLD Packets	The number of bad checksum MLD packets received by the router.
Malformed MLD Packets	The number of malformed MLD packets received by the router.

Example

```
console#show ipv6 mld traffic

Valid MLD Packets Received..................... 52
Valid MLD Packets Sent......................... 7
Queries Received............................... 0
Queries Sent................................... 7
Reports Received............................... 52
```

```
Reports Sent.................................. 0
Leaves Received............................... 0
Leaves Sent................................... 0
```

show ipv6 neighbors

Use the **show ipv6 neighbors** command in Privileged EXEC mode to display information about the IPv6 neighbors.

Syntax

show ipv6 neighbors

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays information about the IPv6 neighbors.

```
console(config)#show ipv6 neighbors
Neighbor Last
IPv6 Address         MAC Address       isRtr  State   Updated
                                                       Interface
-------------------- ----------------- -----  ------- ---------
```

show ipv6 route

Use the **show ipv6 route** command in User EXEC or Privileged EXEC mode to display the IPv6 routing table. The output of the command also displays the IPv6 address of the default gateway and the default route associated with the gateway.

Syntax

show ipv6 route [ipv6-address | ipv6-prefix/prefix-length | protocol | interface-type interface-number] [best]

Syntax Description

Parameter	Description
ipv6-address	Specifies an IPv6 address for which the best-matching route would be displayed.
protocol	Specifies the protocol that installed the routes. Is one of the following keywords: connected, ospf, static.
ipv6-prefix/ prefix-length	Specifies an IPv6 network for which the matching route would be displayed.
interface-type interface-number	Valid IPv6 interface. Specifies that the routes with next-hops on the selected interface be displayed. Supported interface types are VLAN, Tunnel, and Loopback.
best	Specifies that only the best routes are displayed. If the connected keyword is selected for protocol, the best option is not available because there are no best or non-best connected routes.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the IPv6 address of the default gateway and the default route associated with the gateway.

```
console(config)#show ipv6 route

IPv6 Routing Table - 0 entries

Route Codes: C - connected, S - static

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF Ext 1, OE2
- OSPF Ext 2

ON1 - OSPF NSSA Ext Type 1, ON2 - OSPF NSSA Ext Type 2


Default gateway is 10.1.20.1


S      0.0.0.0/0 [254/0] via 10.1.20.1

C      10.1.20.0/24 [0/1] directly connected,   vlan2

C      20.1.20.0/24 [0/1] directly connected,   vlan4
```

show ipv6 route preferences

Use the **show ipv6 route preferences** command in Privileged EXEC mode to show the preference value associated with the type of route. Lower numbers have a greater preference.

Syntax

show ipv6 route preferences

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows the preference value associated with the type of route.

```
console#show ipv6 route preferences


Local..................................... 0
Static.................................... 1
OSPF Intra-area routes.................... 110
OSPF Inter-area routes.................... 110
OSPF External routes...................... 110
```

show ipv6 route summary

Use the **show ipv6 route summary** command in Privileged EXEC mode to display a summary of the routing table for all routes, including best and non-best routes. Use best to display the count summary for only best routes.

Syntax

show ipv6 route summary [**best**]

- **best** — Displays the count summary for only best routes.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays a summary of the routing table.

```
console#show ipv6 route summary
IPv6 Routing Table Summary - 0 entries
Connected Routes..............................  0
Static Routes.................................  0
OSPF Routes...................................  0
Intra Area Routes.............................  0
Inter Area Routes.............................  0
External Type-1 Routes........................  0
External Type-2 Routes........................  0
Total routes..................................  0
Number of Prefixes:
```

show ipv6 traffic

Use the **show ipv6 traffic** command in User EXEC mode to show traffic and statistics for IPv6 and ICMPv6.

Syntax

show ipv6 traffic [**vlan** *vlan-id* | **tunnel** *tunnel-id* | **loopback** *loopback-id*]

- *vlan-id* — Valid VLAN ID, shows information about traffic on a specific interface or, without the optional parameter, shows information about traffic on all interfaces.
- tunnel — Tunnel identifier. (Range: 0-7)
- loopback — Loopback identifier. (Range: 0-7)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following examples show traffic and statistics for IPv6 and ICMPv6, first for all interfaces and an individual VLAN.

```
console> show ipv6 traffic

IPv6 STATISTICS

Total Datagrams
Received..................................... 0

Received Datagrams Locally
Delivered.................................... 0

Received Datagrams Discarded Due To Header Errors.. 0

Received Datagrams Discarded Due To MTU...... 0

Received Datagrams Discarded Due To No Route..... 0

Received Datagrams With Unknown Protocol..... 0

Received Datagrams Discarded Due To Invalid Address.0

Received Datagrams Discarded Due To Truncated Data. 0

Received Datagrams Discarded Other.............. 0

Received Datagrams Reassembly Required.......... 0

Datagrams Successfully Reassembled.............. 0

Datagrams Failed To Reassemble.................. 0

Datagrams Forwarded............................. 0

Datagrams Locally Transmitted................... 0

Datagrams Transmit Failed....................... 0

Datagrams Successfully Fragmented.............. 0
```

```
Datagrams Failed To Fragment..................... 0
Fragments Created................................ 0
Multicast Datagrams Received..................... 0
Multicast Datagrams Transmitted.................. 0

console> show ipv6 traffic vlan 11
Interface ....................................... 11
IPv6 STATISTICS
Total Datagrams Received......................... 0
Received Datagrams Locally Delivered............. 0
Received Datagrams Discarded Due To Header Errors.. 0
Received Datagrams Discarded Due To MTU.......... 0
Red Datagrams Discarded Due To No Route.......... 0
Received Datagrams With Unknown Protocol......... 0
Received Datagrams Discarded Due To Invalid Address 0
Received Datagrams Discarded Due To Truncated Data. 0
Received Datagrams Discarded Other............... 0
Received Datagrams Reassembly Required........... 0
Datagrams Successfully Reassembled............... 0
Datagrams Failed To Reassemble................... 0
Datagrams Forwarded.............................. 0
Datagrams Locally Transmitted.................... 0
Datagrams Transmit Failed........................ 0
Datagrams Successfully Fragmented................ 0
Datagrams Failed To Fragment..................... 0
Fragments Created................................ 0
```

```
Multicast Datagrams Received..................... 0
Multicast Datagrams Transmitted.................. 0
```

show ipv6 vlan

Use the **show ipv6 vlan** command in Privileged EXEC mode to display IPv6 VLAN routing interface addresses.

Syntax

show ipv6 vlan

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays IPv6 VLAN routing interface addresses.

```
console#show ipv6 vlan
MAC Address used by Routing VLANs: 00:02:BC:00:30:68
VLAN ID  IPv6 Address/Prefix Length
-------  ------------------------------------
1
```

traceroute ipv6

Use the **traceroute ipv6** command in Privileged EXEC mode to discover the routes that packets actually take when traveling to their destination through the network on a hop-by-hop basis.

Syntax

traceroute ipv6 {*ip-address* | *hostname*} [*port*]

- *ipv6-address* — Destination IPv6 address.
- *hostname* — Hostname to ping (contact). (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes. For example, `console(config)#traceroute "host name"`
- *port* — UDP port used as the destination of packets sent as part of the traceroute. This port should be an unused port on the destination system. (Range: 0–65535)

Default Configuration

33434 is the default port value.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example discovers the packet routes on a hop-by-hop basis.

```
console#traceroute ipv6 2020:1::1
Tracing route over a maximum of 20 hops
1 * N * N * N
```

52

Loopback Interface Commands

PowerConnect provides for the creation, deletion, and management of loopback interfaces. They are dynamic interfaces that are created and deleted by user configuration.

A loopback interface is always expected to be up. As such, it provides a means to configure a stable IP address on the device which may be referred to by other switches in the network. This interface never transmits data but may receive data. It is typically expected to be used by routing protocols.

Support for the internal loopback address, if present, is limited to testing the IP stack.

Commands in this Chapter

This chapter explains the following commands:

interface loopback	show interfaces loopback

interface loopback

Use the **interface loopback** command in Global Configuration mode to enter the Interface Loopback configuration mode.

Syntax

interface loopback *loopback-id*

no interface loopback *loopback-id*

- loopback-id — Loopback identifier. (Range: 0-7)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example enters the Interface Loopback 1 configuration mode.

```
console(config)#interface loopback 1

console(config-if-loopback0)#ip address 192.168.22.1
255.255.255.255

console(config-if-loopback0)#exit

console(config)#ex

console#ping 192.168.22.1

 Pinging 192.168.22.1 with 0 bytes of data:


Reply From 192.168.22.1: icmp_seq = 0. time <10 msec.

Reply From 192.168.22.1: icmp_seq = 1. time <10 msec.

Reply From 192.168.22.1: icmp_seq = 2. time <10 msec.

Reply From 192.168.22.1: icmp_seq = 3. time <10 msec.
```

show interfaces loopback

Use the **show interfaces loopback** command in Privileged EXEC mode to display information about one or all configured loopback interfaces.

Syntax

show interfaces loopback [*loopback-id*]

- *loopback-id* — Loopback identifier. (Range: 0-7)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Examples

The following examples display information about configured loopback interfaces.

```
console# show interfaces loopback
Loopback Id  Interface  IP Address  Received Packets  Sent Packets
-----------  ---------  ----------  ----------------  ------------
1            loopback   1 0.0.0.0   0                 0

console# show interfaces loopback 1
Interface Link Status..... Up
IP Address..... 0.0.0.0 0.0.0.0
MTU size..... 1500 bytes
```

53

Multicast Commands

The PowerConnect Multicast component is best suited for video and audio traffic requiring multicast packet control for optimal operation. The Multicast component includes support for IGMPv2, IGMPv3, PIM-DM, PIM-SM, and DVMRP. Communication from point to multipoint is called Multicasting. The source host (point) transmits a message to a group of zero or more hosts (multipoint) that are identified by a single IP destination address. Although the task may be accomplished by sending unicast (point-to-point) messages to each of the destination hosts, multicasting is the more desirable method for this type of transmission. A multicast message is delivered to all members of its destination host group with the same best-efforts reliability as regular unicast IP messages. The message is not guaranteed to arrive intact at all members of the destination group or in the same order relative to other messages. The advantages of multicasting are explained below:

- Network Load Decrease: A number of applications are required to transmit packets to hundreds of stations. The packets transmitted to these stations share a group of links on their paths to their destinations. Multicast transmission can conserve much needed network bandwidth, since multicasting transmission requires the transmission of only a single packet by the source and replicates this packet only if it is necessary (at forks of the multicast delivery tree).
- Discovery of resources: A number of applications require a host to find out whether a certain type of service is available. Internet protocols such as Bootstrap Protocol (BOOTP) and Open Shortest Path First (OSPF) protocol are among these applications. Using multicast messages and sending the query to those hosts which are potentially capable of providing this service speeds the gathering of this information considerably. Although a group of hosts residing on the same network are the intended target for the majority of multicast packets, this limitation is not mandatory. Discovering the local domain-name server is the intended use of multicast messages on remote networks when there is less than one server per network.

- Applications used for datacasting: Since multimedia transmission has become increasingly popular, multicast transmission use has increased. Multicast transmission may be used to efficiently accommodate this type of communication. For instance, the audio and video signals are captured, compressed and transmitted to a group of receiving stations. Instead of using a set of point-to-point connections between the participating nodes, multicasting can be used for distribution of the multimedia data to the receivers. The participating stations are free to join or leave an audio-cast or a video-cast as needed. The variable membership maintenance is managed efficiently through multicasting.

Commands in this Chapter

This chapter explains the following commands:

ip mcast boundary	ip pim dr-priority	ip pim spt-threshold	show ip mcast mroute static
ip mroute	ip pim hello-interval	show bridge multicast address-table count	show ip pim bsr-router
ip multicast	ip pim join-prune-interval	show ip multicast	show ip pim interface
ip multicast ttl-threshold	ip pim register-rate-limit	show ip mcast boundary	show ip pim neighbor
ip pim	ip pim rp-address	show ip multicast interface	show ip pim rp hash
ip pim bsr-border	ip pim rp-candidate	show ip mcast mroute	show ip pim rp mapping
ip pim bsr-candidate	ip pim sparse	show ip mcast mroute group	
ip pim dense	ip pim ssm	show ip mcast mroute source	

ip mcast boundary

Use the **ip mcast boundary** command in Interface Configuration mode to add an administrative scope multicast boundary specified by *groupipaddr* and *mask* for which this multicast administrative boundary is applicable. *groupipaddr* is a group IP address and *mask* is a group IP mask.

Syntax

ip mcast boundary *groupipaddr mask*

no ip mcast boundary *groupipaddr mask*

- *groupipaddr* — IP address of multicast group. Valid range is 239.0.0.0 to 239.255.255.255.
- *mask* — IP mask of multicast group.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example adds an administrative scope multicast boundary.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip mcast boundary 239.5.5.5
255.255.255.255
```

ip mroute

Use the **ip mroute** command to create a static multicast route for a source range. Use the **no** form of this command to delete a static multicast route.

Syntax

ip mroute *source-address mask rpf-address preference*

no ip mroute *source-address mask*

- *source-address* — The IP address of the multicast data source.
- *mask* — The IP subnet mask of the multicast data source.
- *rpf-address* — The IP address of the next hop towards the source.
- *preference* — The cost of the route (Range: 1 - 255).

Default Configuration

There is no default configuration for this command.

Command Mode

Global Configuration mode

Usage Guidelines

There are no user guidelines for this command.

Example

```
console(config)#

console(config)#ip mroute 1.1.1.1 255.255.0.0
192.168.20.1 34
```

ip multicast

Use the **ip multicast** command in Global Configuration mode to set the administrative mode of the IP multicast forwarder in the router to active. For multicast routing to become operational, IGMP must be currently enabled. An error message is displayed on the CLI if multicast routing is enabled while IGMP is disabled. However, the IP multicast mode configuration is stored in the multicast configuration file and is automatically enabled once IGMP is enabled.

Syntax

ip multicast

no ip multicast

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables IP multicast on the router.

```
console#configure
console(config)#ip multicast
console(config)#no ip multicast
```

ip multicast ttl-threshold

Use the **ip multicast ttl-threshold** command in Interface Configuration mode to apply a *ttlvalue* to a routing interface. *ttlvalue* is the TTL threshold which is applied to the multicast Data packets forwarded through the interface.

Syntax

ip multicast ttl-threshold *ttlvalue*

no ip multicast ttl-threshold

- *ttlvalue* — Specifies TTL threshold. (Range: 0-255)

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example applies a *ttlvalue* of 5 to the VLAN 15 routing interface.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip multicast ttl-threshold
5
```

ip pim

Use the **ip pimdm** command in Interface (VLAN) Configuration mode to administratively configure PIM mode for IP multicast routing on a VLAN interface. Use the **no** form of the command to disable PIM on the interface.

Syntax

ip pim

no ip pim

Default Configuration

PIM is not enabled on interfaces by default.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

PIM requires that routing, multicast, and IGMP be enabled.

Example

```
console(config)#ip routing
console(config)#ip igmp
console(config)#ip multicast
```

```
console(config)#interface vlan 10
console(if-vlan-10)#ip pim
```

ip pim bsr-border

The **ip pim bsr-border** command is used in Interface (VLAN) Configuration mode to administratively disable bootstrap router (BSR) messages on the interface. Use the **no** form of this command to return the configuration to the default.

Syntax

ip pim bsr-border

no ip pim bsr-border

Default Configuration

BSR messages are enabled on the interface by default.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only has an effect if sparse mode is enabled. Lower values are preferred.

Example

```
console(if-vlan-10)#ip pim bsr-border
```

ip pim bsr-candidate

The **ip pim bsr-candidate** command is used to configure the router to advertise itself as a bootstrap router (BSR). Use the **no** form of this command to return to the default configuration. This command replaces the **ip pimsm bsr-candidate, ip pimsm cbsrhaskmasklength** and **ip pimsm cbsrpreference** commands.

Syntax

ip pim bsr-candidate vlan {*vlan-id hash-mask-length bsr-priority* [**interval** *interval*]}

no ip pim bsr-candidate vlan {*vlan-id}*

Parameter Description

Parameter	Description
vlan-id	A valid VLAN identifier with multicast routing enabled.
hash-mask-length	Length of the BSR hash to be ANDed with the multicast group address. (Range 0–32 bits). Default 0.
bsr-priority	The advertised priority of the BSR candidate. Range 0-255. Default 0.
interval	(Optional) Indicates the RP candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.

Default Configuration

None - the router does not advertise itself as a BSR candidate.

Command Mode

Global Configuration mode

User Guidelines

All multicast groups with the same hash value correspond to the same RP. Lower priority values are preferred.

Example

```
console(config)#ip pim bsr-candidate vlan 10 16 0
interval 30
```

ip pim dense

Use the **ip pim dense** command in Global Configuration mode to administratively configure PIM dense mode for IP multicast routing. Use the **no** form of this command to disable PIM dense mode. This command replaces the **ip pimsm** command.

Syntax

ip pim dense

no ip pim dense

Default Configuration

PIM is not enabled by default.

Command Mode

Global Configuration mode

User Guidelines

Only one of sparse or dense mode can be configured on a router.

Example

```
console(config)#ip pim dense
```

ip pim dr-priority

The **ip pim dr-priority** command in Interface (VLAN) Configuration mode to administratively configure the advertised designated router (DR) priority value. Use the **no** form of this command to return the configuration to the default.

Syntax

ip pim dr-priority *priority*

no ip pim dr-priority

- *priority* — The administratively configured priority (Range: 0–2147483647).

Default Configuration

The default election priority is 1.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only has an effect if sparse mode is enabled. Lower values are preferred.

Example

```
console(if-vlan10)#ip pim dr-priority 32768
```

ip pim hello-interval

The **ip pim hello-interval** command in Interface (VLAN) Configuration mode to administratively configure the frequency of PIM Hello messages on the specified interface. Use the **no** form of this command to return the configuration to the default. This command deprecates the **ip pimsm query-interval**, the **ip pimsm hello-interval** and the **ip pimdm hello-interval** commands.

Syntax

ip pim hello-interval *interval*

no ip pim hello-interval

- *interval*— The number of seconds between successive hello transmissions. Range: 0–18000 seconds. Default is 30.

Default Configuration

The default hello interval is 30 seconds.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan10)#ip pim hello-interval 20
```

ip pim join-prune-interval

The **ip pim join-prune-interval** command in Interface (VLAN) Configuration mode to administratively configure the frequency of join/prune messages on the specified interface. Use the **no** form of this command to return the configuration to the default. This command deprecates the **ip pimsm message-interval** and **ip pimsm join-prune-interval** commands.

Syntax

ip pim join-prune-interval *interval*

no ip pim join-prune-interval

- *interval* — The number of seconds between successive join-prune transmissions. Range: 0–18000 seconds. Default is 60.

Default Configuration

The default join/prune interval is 60 seconds.

Command Mode

Interface (VLAN) Configuration mode

User Guidelines

This command only has an effect if sparse mode is enabled.

Example

```
console(if-vlan10)#ip pim join-prune-interval 30
```

ip pim register-rate-limit

Use the **ip pim register-rate-limit** command in Global Configuration mode to set a limit on the maximum number of PIM register messages sent per second for each (S,G) entry. Use the **no** form of this command to return the limit to its default value (0). This command replaces the **ip pimsm spt-threshold** command.

Syntax

ip pim register-rate-limit *0-2000*

no ip pim register-rate-limit

Parameter Description

Parameter	Description
register-rate-limit	The PIM register message limit in kilobytes per second. Range 0-2000.

Default Configuration

The default threshold is 0. This indicates that the register limit is infinite.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config)#ip pim register-rate-limit 10
```

ip pim rp-address

Use the **ip pim rp-address** command in Global Configuration mode to define the address of a PIM Rendezvous point (RP) for a specific multicast group range. Use the **no** form of this command to remove a configured RP. This command replaces the **ip pimsm rp-address** command.

Syntax

ip pim rp-address {*rp-address group-address group-mask* [**override**]}

no ip pim rp-address {*rp-address group-address group-mask}*

Parameter Description

Parameter	Description
rp-address	The valid IPv4 address for the rendezvous point.
group-address	A valid multicast group address to be sourced from the rendezvous point.
group-mask	A mask indicating the range of multicast groups sourced from the RP
override	A flag indicating that the static entry should override dynamically learned entries for the configured multicast group.

Default Configuration

None —no static multicast groups are configured for an RP.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip pim rp-address 192.168.21.1
239.1.0.0 255.255.0.0 override
```

ip pim rp-candidate

Use the **ip pim rp-candidate** command in Global Configuration mode to configure the router to advertise itself to the bootstrap router (BSR) router as a PIM candidate rendezvous point (RP) for a specific multicast group range. Use the **no** form of this command to return to the default configuration. This command replaces the **ip pimsm rp-candidate** command.

Syntax

ip pim rp-candidate vlan {*vlanid group-address group-mask* [**interval** *interval*]}

no ip pim rp-candidate vlan *vlanid group-address group-mask}*

Parameter Description

Parameter	Description
vlan-id	A valid VLAN identifier with multicast routing enabled.
group-address	A valid multicast group address.
group-mask	A mask indicating the range of multicast groups for which the router should advertise itself as an RP-candidate.
interval	(Optional) Indicates the RP candidate advertisement interval. The range is from 1 to 16383 seconds. The default value is 60 seconds.

Default Configuration

None - the router does not advertise itself as an RP candidate by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip pimsm rp-candidate vlan 10
239.1.0.0 255.255.0.0 interval 30
```

ip pim sparse

Use the **ip pim sparse** command in Global Configuration mode to administratively configure PIM sparse mode for IP multicast routing. Use the **no** form of this command to disable PIM sparse mode. This command replaces the **ip pimsm** command.

Syntax

ip pim sparse

no ip pim sparse

Default Configuration

PIM not enabled by default.

Command Mode

Global Configuration mode

User Guidelines

Only one of sparse or dense mode can be configured on a router.

Example

```
console(config)#ip pim sparse
```

ip pim ssm

Use the **ip pim ssm** command in Global Configuration mode to administratively configure PIM source specific multicast range of addresses for IP multicast routing. Use the **no** form of this command to remove configured ranges of addresses from the router.

Syntax

ip pim ssm {**default** | *group-address group-mask* }

no ip pim ssm {**default** | *group-address group-mask* }

Parameter Description

Parameter	Description
default	Defines the SSM range access list to 232/8.
group-address	An IP multicast group address.
group-mask	An IPv4 mask in a.b.c.d form where a, b, c and d range from 0-255.

Default Configuration

There are no group addresses configured by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip pim ssm 239.0.10.0 255.255.255.0
```

ip pim spt-threshold

Use the **ip pim spt-threshold** command in Global Configuration mode to set the multicast traffic threshold rate for the last-hop router to switch to the shortest path on the router. Use the **no** form of this command to return the threshold to its default value (0).

Syntax

ip pim spt-threshold *spt-threshold*

no ip pim spt-threshold

Parameter Description

Parameter	Description
spt-threshold	The multicast traffic threshold rate in kilobytes per second. Range: 0–2000 Kbps).

Default Configuration

The default threshold is 0. This indicates that the multicast router should always switch to the multicast source tree.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip pim spt-threshold 100
```

show bridge multicast address-table count

Use the **show bridge multicast address-table count** command to view statistical information about the entries in the multicast address table.

Syntax

show bridge multicast address-table count

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following command shows information about the entries in the multicast address table.

```
console#show bridge multicast address-table count


Capacity: 1024
Used: 4
Static addresses: 2
Dynamic addresses: 1
```

```
Forbidden addresses: 1
```

The following table shows the information the command displays:

Field	Description
Capacity	The maximum number of addresses that can be stored in the multicast address table.
Used	The total number of addresses in the multicast address table.
Static addresses	The number of addresses in the multicast address table that are static IP addresses.
Dynamic addresses	The number of addresses in the multicast address table that were learned dynamically.
Forbidden addresses	The number of addresses in the multicast address table that are forbidden IP addresses.

show ip multicast

Use the **show ip multicast** command in Privileged EXEC mode to display the system-wide multicast information.

Syntax

show ip multicast

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays system-wide multicast information.

```
console#show ip multicast

Admin Mode..........................  Enabled

Protocol State.....................  Non-Operational

Table Max Size .....................  256

Protocol............................  PIMDM

Multicast Forwarding Cache Entry Count ..  0
```

show ip mcast boundary

Use the **show ip mcast boundary** command in Privileged EXEC mode to display all the configured administrative scoped multicast boundaries.

Syntax

show ip mcast boundary {vlan *vlan-id* | all}

- *vlan-id* — Valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays all the configured administrative scoped multicast boundaries.

```
console#show ip mcast boundary all

MULTICAST BOUNDARY
```

```
Interface  Group  Ip Mask
--------  ------  ---------------
```

show ip multicast interface

Use the **show ip multicast interface** command in Privileged EXEC mode to display the multicast information for the specified interface.

Syntax

show ip multicast interface [type number]

Syntax Description

Parameter	Description
type number	Interface type and number for which to display IP multicast information. VLAN Vlan-ID is the only supported type and number

Default Configuration

Show information for all multicast interfaces.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the multicast information for VLAN 15.

```
console#show ip mcast interface vlan 15
Interface  TTL
---------  -----
```

show ip mcast mroute

Use the **show ip mcast mroute** command in Privileged EXEC mode to display a summary or all the details of the multicast table.

Syntax

show ip mcast mroute {**detail** | **summary**}

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a summary or all the details of the multicast table.

```
console#show ip mcast mroute summary


console#show ip mcast mroute detail
```

show ip mcast mroute group

Use the **show ip mcast mroute group** command in Privileged EXEC mode to display the multicast configuration settings such as flags, timer settings, incoming and outgoing interfaces, RPF neighboring routers, and expiration times of all the entries in the multicast mroute table containing the *groupipaddr* value.

Syntax

show ip mcast mroute group *groupipaddr* {detail | summary}

- *groupipaddr* — IP address of the multicast group.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the multicast configuration settings such as flags, timer settings, incoming and outgoing interfaces.

```
console#show ip mcast mroute group 224.5.5.5 summary


console#show ip mcast mroute group 224.5.5.5 detail
```

show ip mcast mroute source

Use the **show ip mcast mroute source** command in Privileged EXEC mode to display the multicast configuration settings such as flags, timer settings, incoming and outgoing interfaces, RPF neighboring routers, and expiration times of all the entries in the multicast mroute table containing the *sourceipaddr* or *sourceipaddr* | *groupipaddr* pair value(s).

Syntax

show ip mcast mroute source *sourceipaddr* {summary | *groupipaddr*}

- *sourceipaddr* — IP address of source.
- *groupipaddr* — IP address of multicast group.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays multicast configuration settings.

```
console#show ip mcast mroute source 10.1.1.1 summary


console#show ip mcast mroute source 10.1.1.1 224.5.5.5
```

show ip mcast mroute static

Use the **show ip mcast mroute static** command in Privileged EXEC mode to display all the static routes configured in the static mcast table if it is specified or display the static route associated with the particular *sourceipaddr*.

Syntax

show ip mcast mroute static [*sourceipaddr*]

- *sourceipaddr* — IP address of source.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the static routes configured in the static mcast table.

```
console#show ip mcast mroute static
```

```
                    MULTICAST STATIC ROUTES
   Source IP      Source Mask   RPF Address     Preference
--------------- --------------- --------------- ----------
1.1.1.1         255.255.255.0   2.2.2.2         23
```

show ip pim bsr-router

The **show ip pim bsr-router** command displays information about a bootstrap router (BSR). This command deprecates the **show ip pimsm componenttable** and **show ip pimsm bsr** commands.

Syntax

show ip pim bsr-router

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

The following information is displayed:

Field	Description
BSR address	IP address of the BSR.
BSR Priority	The configured BSR priority.
BSR Hash Mask Length	The configured hash mask length (32 bits maximum).
Next Bootstrap Message in	Time remaining (in hours, minutes, and seconds) until a BSR message is sent.
Next Candidate RP Advertisement	Time remaining (in hours, minutes, and seconds) until the next RP advertisement is sent.

Example

```
console#show ip pim bsr-router candidate


BSR Address.......................... 192.168.10.1
BSR Priority......................... 0
BSR Hash Mask Length................. 30
C-BSR Advertisement Interval (secs).....60
Next Bootstrap message(hh:mm:ss)..... NA
```

If no configured/elected BSRs exist on the router, the following message is displayed.

```
No BSR's exist/learned on this router.
```

show ip pim interface

The **show ip pim interface** command displays the PIM interface status parameters. If the interface number is not is specified, the command displays the status parameters of all the PIM-enabled interfaces. This command deprecates the **show ip pimsm interface stats**, **show ip pimsm interface** and **show ip pimdm interface** commands.

Syntax

show ip pimsm interface [**vlan** *vlan-id*]

- *vlan-id* — A valid VLAN ID for which multicast routing has been enabled.

Field Descriptions

Field	Description
Mode	Active PIM Protocol
Interface	Interface number
Hello Interval	Hello interval value
Join-prune Interval	Join-prune interval value
DR Priority	DR Priority configured on this interface

Field	Description
BSR Border	Whether or not this interface is configured as a BSR Border
Neighbor Count	Number of PIM Neighbors learnt on this interface
Designated-Router	IP address of the elected DR on the interface

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC and Privileged EXEC modes

User Guidelines

There are no user guidelines for this command.

Example

```
(console) #show ip pim


Interface                    VLAN0010
  Mode                       Sparse
  Hello Interval (secs)      30
  Join Prune Interval (secs) 60
  DR Priority                1
  BSR Border                 Disabled
  Neighbor Count1
  Designated Router          192.168.10.1

Interface                    VLAN0001
  Mode                       Sparse
  Hello Interval (secs)      30
```

```
Join Prune Interval (secs) 60
DR Priority                1
BSR Border                 Disabled
Neighbor Count             1
Designated Router          192.168.10.1
```

If none of the interfaces are enabled for PIM, the following message is displayed:

```
None of the routing interfaces are enabled for PIM
```

show ip pim neighbor

Use the **show ip pim neighbor** command in User EXEC or Privileged EXEC modes to display PIM neighbors discovered by PIMv2 Hello messages. If the interface number is not specified, this command displays the neighbors discovered on all the PIM-enabled interfaces.

Syntax

show ip pim neighbor [**vlan** *vlan-id*]

- *vlan-id* — A valid VLAN ID for which multicast routing has been enabled.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Field Descriptions

Field	Description
Neighbor Addr	IP address of the PIM neighbor

Field	Description
Interface	Interface number
Uptime	Time since the neighbor is learned
Expiry Time	Time remaining for the neighbor to expire

Example

```
(console)#show ip pim neighbor vlan 10
                            Up Time   Expiry Time
Neighbor Addr  Interface   hh:mm:ss  hh:mm:ss
-------------- ---------- --------- -----------
192.168.10.2    VLAN0010     00:02:55     00:01:15

(FASTPATH) #show ip pim neighbor

Neighbor Addr   Interface  Uptime      Expiry Time
                           (HH:MM::SS) (HH:MM::SS)
-------------- ---------  ----------- -----------
192.168.10.2    VLAN0001      00:02:55     00:01:15
192.168.20.2    VLAN0010      00:03:50     00:02:10
```

If no neighbors are learned on any of the interfaces, the following message is displayed.

```
No neighbors are learned on any interface.
```

show ip pim rp hash

The **show ip pim rp hash** command displays the rendezvous point (RP) selected for the specified group address.

Syntax

show ip pim rp hash *group-address*

- *group-address* — A valid multicast address supported by RP.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

The following fields are displayed:

Field	Description
RP Address	Address of the RP
Type	Origin from where this group mapping was learned.

Example

```
console#show ip pimsm rp hash 224.1.2.0

RP Address       192.168.10.1

Type             Static
```

If no RP Group mapping exists on the router, the following message is displayed:

```
No RP-Group mappings exist/learned on this router.ny
interface.
```

show ip pim rp mapping

The **show ip pim rp mapping** command is used in User EXEC and Privileged EXEC modes to display the mappings for the PIM group to the active rendezvous points. This command deprecates the **show ip pimsm rp candidate**, **show ip pimsm staticrp**, **show ip pimsm rp mapping** commands.

Syntax

show ip pim rp mapping [*rp-address*]

rp-address — An RP address.

Default configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

There are no user guidelines for this command.

Field Descriptions

Field	Description
RP Address	Address of the RP
Group Address	Address of the multicast group.
Group Mask	Mask for the group address.
Origin	Origin from where this group mapping is learned.

Example

```
console#show ip pim rp mapping candidate
RP Address..................................... 192.168.10.1
   Group Address............................... 224.1.2.1
   Group Mask.................................. 255.255.0.0
   Origin...................................... BSR
   C-RP Advertisement Interval (secs)......... 60
   Next Candidate RP Advertisement (hh:mm:ss). 00:00:15
```

If no RP Group mapping exists on the router, the following message is displayed:

```
No RP-Group mappings exist on this router.
```

54

IPv6 Multicast Commands

This chapter explains the following commands:

ipv6 pimsm (Global config)	ipv6 pimsm rp-candidate
ipv6 pimsm (VLAN Interface config)	ipv6 pimsm spt-threshold
ipv6 pimsm bsr-border	ipv6 pimsm ssm
ipv6 pimsm bsr-candidate	show ipv6 pimsm
ipv6 pimsm dr-priority	show ipv6 pimsm bsr
ipv6 pimsm hello-interval	show ipv6 pimsm interface
ipv6 pimsm join-prune-interval	show ipv6 pimsm neighbor
ipv6 pimsm register-threshold	show ipv6 pimsm rphash
ipv6 pimsm rp-address	show ipv6 pimsm rp mapping

ipv6 pimsm (Global config)

Use the **ipv6 pimsm** command to administratively enable PIMSM for IPv6 multicast routing. Use the "no" form of this command to disable PIMSM for IPv6.

Syntax

ipv6 pimsm

no ipv6 pimsm

Default Configuration

IPv6 PIMSM is disabled on the router by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm
```

ipv6 pimsm (VLAN Interface config)

Use the **ipv6 pimsm** command in VLAN Interface configuration mode to administratively enable PIM-SM multicast routing mode on a particular IPv6 router interface. Use the "no" form of this command to disable PIM SM on an interface.

Syntax

ipv6 pimsm

no ipv6 pimsm

Default Configuration

PIM-SM is disabled by default.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 pimsm
```

ipv6 pimsm bsr-border

Use the **ipv6 pimsm bsr-border** command to prevent bootstrap router (BSR) messages from being sent or received through an interface. Use the "no" form of this command to disable the interface from being the BSR border.

Syntax

ipv6 pimsm bsr-border

no ipv6 pimsm bsr-border

Default Configuration

BSR-border is disabled by default.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 pimsm bsr-border
```

ipv6 pimsm bsr-candidate

Use the **ipv6 pimsm bsr-candidate** command to configure the router to announce its candidacy as a bootstrap router (BSR). Use the "no" form of this command to stop the router from announcing its candidacy as a bootstrap router.

Syntax

ipv6 pimsm bsr-candidate vlan *vlan-id hash-mask-len* [*priority*]

no ipv6 pimsm bsr-candidate vlan *vlan-id*

- *vlan-id*—A valid VLAN ID value.
- *hash-mask-len*—The length of a mask that is to be ANDed with the group address before the hash function is called. All groups with the same seed hash correspond to the same RP. For example, if this value is 24, only the first 24 bits of the group addresses matter. This allows you to get one RP for multiple groups. (Range 0–128 bits).

- *priority*—The priority of the candidate BSR. The BSR with the higher priority is preferred. If the priority values are the same, the router with the higher IP address is the BSR. (Range: 0–255).

Default Configuration

The router will not announce its candidacy by default.

The default hash mask length is 126 bits.

The default priority is 0.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm bsr-candidate vlan 9 10 34
```

ipv6 pimsm dr-priority

Use the **ipv6 pimsm dr-priority** command to set the priority value for which a router is elected as the designated router (DR). Use the "no" form of this command to set the priority to the default.

Syntax

ipv6 pimsm dr-priority *priority*

no ipv6 pimsm dr-priority

- *priority*—The election priority (Range: 0–2147483647).

Default Configuration

The default election priority is 1.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 pimsm dr-priority  10
```

ipv6 pimsm hello-interval

Use the **ipv6 pimsm hello-interval** command to configure the PIM-SM Hello Interval for the specified interface. Use the "no" form of this command to set the hello interval to the default.

Syntax

ipv6 pimsm hello-interval interval

no ipv6 pimsm hello-interval

- interval—The hello interval (Range: 0–65535 seconds).

Default Configuration

The default hello interval is 30 seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 pimsm hello-interval 45
```

ipv6 pimsm join-prune-interval

Use the **ipv6 pimsm join-prune-interval** command to configure the interface join/prune interval for the PIM-SM router. Use the "no" form of this command to set the join/prune interval to the default.

Syntax

ipv6 pimsm join-prune-interval interval

no ipv6 pimsm join-prune-interval

- interval—The join/prune interval (Range: 0–18000 seconds).

Default Configuration

The default join/prune interval is 60 seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan3)#ipv6 pimsm join-prune-
interval 90
```

ipv6 pimsm register-threshold

Use the **ipv6 pimsm register-threshold** command to configure the Register Threshold rate for the RP router to switch to the shortest path. Use the "no" form of this command to set the register threshold rate to the default.

Syntax

ipv6 pimsm register-threshold *threshold*

no ipv6 pimsm register-threshold

- threshold—The threshold rate (Range: 0–2000 Kbps).

Default Configuration

The default threshold rate is 0.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm register-threshold 250
```

ipv6 pimsm rp-address

Use the **ipv6 pimsm rp-address** command to statically configure the RP address for one or more multicast groups. The optional keyword override indicates that if there is a conflict, the RP configured with this command prevails over the RP learned by BSR. Use the "no" form of this command to remove the RP address for one or more multicast groups.

Syntax

ipv6 pimsm rp-address *rp-address group-address/prefixlength* [**override**]

no ipv6 pimsm rp-address

- *rp-address*—An RP address.
- *group-address*—The group address to display.
- *prefixlength*—This parameter specifies the prefix length of the IP address for the media gateway. (Range: 1–32)

Default Configuration

There are no static RP addresses configured by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm rp-address 2001::1
ff1e::/64
```

ipv6 pimsm rp-candidate

Use the **ipv6 pimsm rp-candidate** command to configure the router to advertise itself as a PIM candidate rendezvous point (RP) to the bootstrap router (BSR). Use the "no" form of this command to disable the router from advertising itself as a PIM candidate rendezvous point (RP) to the bootstrap router (BSR).

Syntax

ipv6 pimsm rp-candidate vlan *vlan-id group-address/prefixlength*

no ipv6 pimsm rp-candidate vlan *vlan-id*

- vlan-id—A valid VLAN ID value.
- group-address—The group address to display.
- prefixlength—This parameter specifies the prefix length of the IP address for the media gateway. (Range: 1–32)

Default Configuration

The router does not advertise itself as a PIM candidate rendezvous point by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm rp-candidate vlan 6
ff1e::/64
```

ipv6 pimsm spt-threshold

Use the **ipv6 pimsm spt-threshold** command to configure the Data Threshold rate for the last-hop router to switch to the shortest path. Use the "no" form of this command to set the data threshold to the default.

Syntax

ipv6 pimsm spt-threshold *threshold*

no ipv6 pimsm spt-threshold

- *threshold*—The threshold rate (Range: 0–2000 Kbps).

Default Configuration

The default threshold rate is 0.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm spt-threshold 1000
```

ipv6 pimsm ssm

Use the **ipv6 pimsm ssm** command to define the Source Specific Multicast (SSM) range of multicast addresses.

Syntax

ipv6 pimsm ssm { default | group-address/prefixlength }

- default—Defines the SSM range access list to 232/8.
- group-address—Group IP address supported by RP.
- prefixlength—This parameter specifies the prefix length of the IP address for the media gateway. (Range: 1–32)

Default Configuration

There is no SSM range defined by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 pimsm ssm ff1e::/64
```

show ipv6 pimsm

Use the **show ipv6 pimsm** command to display global status of IPv6 PIMSM and its IPv6 routing interfaces.

Syntax

show ipv6 pimsm

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ipv6 pimsm


Admin Mode..................................
Enabled
Data Threshold Rate (Kbps)..................... 1000
Register Threshold Rate (Kbps)................. 250


          SSM RANGE TABLE
```

```
       Group Address/Prefix Length
-------------------------------------


FF1E::/64
  PIM-SM INTERFACE STATUS
Interface  Interface-Mode  Operational-Status
---------  --------------  ----------------
vlan 3     Enabled         Operational
vlan 6     Enabled         Operational
vlan 9     Enabled         Operational
```

show ipv6 pimsm bsr

Use the **show ipv6 pimsm bsr** command to display the bootstrap router (BSR) information. The output includes elected BSR information and information about the locally configured candidate rendezvous point (RP) advertisement.

Syntax

show ipv6 pimsm bsr

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ipv6 pimsm bsr
```

```
BSR Address.....................................
3001::1

BSR Priority..................................... 23

BSR Hash Mask Length.........................   10

Next bootstrap message(hh:mm:ss).............
00:00:11

Next Candidate RP advertisement(hh:mm:ss)......
00:00:12
```

show ipv6 pimsm interface

Use the **show ipv6 pimsm interface** command to display interface config parameters. If no interface is specified, all interfaces are displayed.

Syntax

show ipv6 pimsm interface [**vlan** *vlan-id*]

- vlan-id—A valid VLAN ID value.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ipv6 pimsm interface vlan 6


Slot/Port..................................... vlan
6
```

```
IP Address.....................................
FE80::2FF:EDFF:FED0:2/128
Hello Interval (secs)......................... 30
Join Prune Interval (secs).................... 60
Neighbor Count ............................... 0
Designated Router..............................
FE80::2FF:EDFF:FED0:2
DR Priority................................... 1
BSR Border.....................................
Disabled
```

show ipv6 pimsm neighbor

Use the **show ipv6 pimsm neighbor** command to display IPv6 PIMSM neighbors learned on the routing interfaces.

Syntax

show ipv6 pimsm neighbor [**all** | **interface vlan** *vlan-id*]

- *vlan-id* —A valid VLAN ID value.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

console#show ipv6 pimsm neighbor all

```
Slot/Port..................................... vlan
6
```

```
Neighbor Address.............................
FE80::200:FF:FE00:33

Up Time (hh:mm:ss)...........................
00:00:12

Expiry Time (hh:mm:ss).......................
00:01:34

DR Priority.................................. 0
```

show ipv6 pimsm rphash

Use the **show ipv6 pimsm rphash** command to display which rendezvous point (RP) is being selected for a specified group.

Syntax

show ipv6 pimsm rphash *group-address*

group-address—Group IP address supported by RP.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ipv6 pimsm rphash ff1e::/64


RP                          Type
Address
------------------------ -----
```

```
3001::1                    BSR
```

show ipv6 pimsm rp mapping

Use the **show ipv6 pimsm rp mapping** command to display all group-to-RP mappings of which the router is aware (either configured or learned from the bootstrap router (BSR). If no RP is specified, all active RPs are displayed

Syntax

show ipv6 pimsm rp mapping [*rp-address*]

- *rp-address*—IP address of RP.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ipv6 pimsm rp mapping


Group Address.................................
FF1E::/64

RP Address....................................
2001::1

origin........................................
Static

Group Address.................................
FF1E::/64
```

```
RP Address.....................................
3001::1
origin.......................................... BSR
```

55

OSPF Commands

OSPF is a link-state protocol. PowerConnect OSPF supports variable-length subnet masks. PowerConnect OSPF only operates over VLAN interfaces.

OSPF operates within a hierarchy. The largest entity within the hierarchy is the autonomous system (AS), a collection of networks under a common administration sharing a common routing strategy. This is sometimes called a routing domain. An AS can be divided into a number of areas or groups of contiguous networks and attached hosts. Routers within the same area share the same information, so they have identical topological databases. Information is sent in the form of link-state advertisements (LSAs) to all other routers within the same hierarchical area. An area's topology is not visible to routers outside the area.

Two different types of OSPF routing occur as a result of area partitioning: Intra-area and Inter-area. Intra-area routing occurs if a source and destination are in the same area. Inter-area routing occurs when a source and destination are in different areas. An OSPF backbone distributes information between areas.

For IPv4 networks, PowerConnect routing supports OSPF version 2 in accordance with RFC 2328. The PowerConnect routing also provides a compatibility mode for the RFC 1583 OSPF specification, which allows interoperability with OSPF version 2 routers using the older implementation.

The PowerConnect OSFPv2 implementation supports point-to-point operation on Ethernet interfaces. The user can configure an OSPFv2 interface to run in broadcast or point-to-point mode. When there are only two routers attached to the link, OSPFv2 point-to-point mode has the advantage of not requiring designated router election or origination of a network LSA for the LAN. This makes the protocol more efficient. PowerConnect also supports OSPFv3 for use with IPv6 networks.

The PowerConnect routing OSPF NSSA feature supports RFC 3101, The OSPF Not-So-Stubby Area (NSSA) Option.

Route Preferences

Normally, OSPF select routes in the following order:

- Local
- Static
- Intra-area
- Inter-area
- External
- RIP

PowerConnect OSPF allows the administrator to change the preference for selecting intra, inter, and external routes according to the following rules:

a External route preferences apply to all ospf external routes like type1, type2, nssa-type1, nssa-type2 equally.

b Multiple route types may be configured with equal preference values.

c Configuring a route preference of 255 makes the route ineligible to be selected as the best route to its destination. That is, a route type with a preference of 255 shall never be used for forwarding.

The RIP preference is not used in IPv6 routing.

OSPF Equal Cost Multipath (ECMP)

A device running the IP routing protocol OSPF maintains multiple equal-cost routes to all destinations. The multiple routes are of the same type (intra-area, inter-area, type 1 external or type 2 external), cost, and have the same associated area. However, each route is defined by a separate advertising router and next hop.

With ECMP, a device forwards traffic to a specified destination through multiple paths thereby taking advantage of the bandwidth of both links.

ECMP routes are configured statically or learned dynamically as follows:

- Configured Statically: If an operator configures multiple static routes to the exact same destination but with different next hops, those routes are treated as a single route with two next hops.

- Learned Dynamically: Routing protocols can learn ECMP routes. For example, if OSPF is configured on both links connecting Router A to Router B with interface addresses 10.1.1.2 and 10.1.2.2 respectively, and Router B advertises its connection to 20.0.0.0/ 8, then Router A computes an OSPF route to 20.0.0.0/8 with next hops of 10.1.1.2 and 10.1.2.2.

PowerConnect routing stores static and dynamic routes in a single combined routing table. RTO accepts ECMP routes, but it is important to understand that RTO does not combine routes from different sources to create ECMP routes. Referring to the above configuration, assume OSPF is only configured on the 10.1.1.2 Router B interface connecting Router A and Router B. Then on Router A, OSPF reports to RTO a route to 20.0.0.0/8 with a next hop of 10.1.1.2. If the user configures a static route to 20.0.0.0/8 with a single next hop of 10.1.2.2, RTO does NOT combine the OSPF and static route into a single route to 20.0.0.0/8 with two next hops. All next hops within an ECMP route must be provided by the same source.

On StrataXGS® IV platforms, the ECMP hashing support is extended to Enhanced hashing mode, which provides improved load-balancing performance. ECMP hashing on these platforms has the following features:

- MODULO-N operation based on the number N of next hops in the route.
- Packet attributes selection based on the packet type. For IP packets, the following fields are used: Source IP address, Destination IP address, TCP/UDP port, IPv4 Protocol, IPv6 next header.

Forwarding of OSPF Opaque LSAs Enabled by Default

PowerConnect supports the flooding capability of opaque LSAs. PowerConnect cannot originate or process opaque LSAs. In the past, the capability to flood opaque LSAs was disabled by default.

Passive Interfaces

The passive interface feature is used to disable sending OSPF routing updates on an interface. An OSPF adjacency will not be formed on such an interface. On a passive interface, subnet prefixes for IP addresses configured on the interface will continue to be advertised as stub networks.

Graceful Restart

The PowerConnect implementation of OSPFv2 supports graceful restart as specified in RFC 3623. Graceful restart works in concert with PowerConnect nonstop forwarding to enable the hardware to continue forwarding IPv4 packets using OSPFv2 routes while a backup unit takes over management unit responsibility. When OSPF executes a graceful restart, it informs its neighbors that the OSPF control plane is restarting, but that it will be back shortly. Helpful neighbors continue to advertise to the rest of the network that they have full adjacencies with the restarting router, avoiding announcement of a topology change and everything that goes with that (i.e., flooding of LSAs, SPF runs). Helpful neighbors continue to forward packets through the restarting router. The restarting router relearns the network topology from its helpful neighbors.

PowerConnect implements both the restarting router and helpful neighbor features described in RFC 3623.

Commands in this Chapter

This chapter explains the following commands:

area default-cost (Router OSPF)	bandwidth	ip ospf network	show ip ospf area
area nssa (Router OSPF)	capability opaque	ip ospf priority	show ip ospf asbr
area nssa default-info-originate	clear ip ospf	ip ospf retransmit-interval	show ip ospf database
area nssa no-redistribute	compatible rfc1583	ip ospf transmit-delay	show ip ospf database database-summary
area nssa no-summary	default-information originate	maximum-paths	show ip ospf interface
area nssa translator-role	default-metric	network area	show ip ospf interface brief
area nssa translator-stab-intv	distance ospf		show ip ospf interface stats

area range (Router OSPF)	distribute-list out	nsf helper	show ip ospf neighbor
area stub	enable	nsf helper strict-lsa-checking	show ip ospf range
area stub no-summary	exit-overflow-interval	nsf restart-interval	show ip ospf statistics
area virtual-link	external-lsdb-limit	passive-interface default	show ip ospf stub table
area virtual-link authentication	ip ospf area	passive-interface	show ip ospf virtual-link
area virtual-link dead-interval	ip ospf authentication	redistribute	show ip ospf virtual-links brief
area virtual-link hello-interval	ip ospf cost	router-id	timers spf
area virtual-link retransmit-interval	ip ospf dead-interval	router ospf	
area virtual-link transmit-delay	ip ospf hello-interval	show ip ospf	
auto-cost	ip ospf mtu-ignore	show ip ospf abr	

area default-cost (Router OSPF)

Use the **area default-cost** command in Router OSPF Configuration mode to configure the advertised default cost for the stub area. Use the **no** form of the command to return the cost to the default value.

Syntax

area *area-id* **default-cost** *integer*

no area *area-id* **default-cost**

- *area-id* — Identifies the OSPF stub area to configure. (Range: IP address or decimal from 0-4294967295)
- *integer* — The default cost for the stub area. (Range: 1–16777215)

Default Configuration

10 is the default configuration for *integer*.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example identifies a stub area of 10 and default cost of 100.

```
console(config)#router ospf
console(config-router)#area 10 default-cost 100
```

area nssa (Router OSPF)

Use the **area nssa** command in Router OSPF Configuration mode to configure the specified area ID to function as an NSSA. If the area has not been previously created, this command creates the area and then applies the NSSA distinction. If the area already exists, the NSSA distinction is added or modified. Use the **no** form of the command to remove the NSSA distinction from the specified area ID.

Syntax

area *area-id* **nssa** [**no-redistribution**] [**default-information-originate** [**metric** *metric-value*] [**metric-type** *metric-type-value*]] [**no-summary**] [**translator-role role**] [**translator-stab-intv interval**]

no area *area-id* **nssa** [**no-redistribution**] [**default-information-originate**] [**no-summary**] [**translator-role**] [**translator-stab-intv**]

Parameter Description

Parameter	Description
area-id	Identifies the OSPF stub area to configure. (Range: IP address or decimal from 0–4294967295)

Parameter	Description
metric-value	Specifies the metric of the default route advertised to the NSSA. (Range: 1–16777214)
metric-type-value	The metric type can be one of the following : **1** A metric type of nssa-external 1 **2** A metric type of nssa-external 2 (default)
role	The translator role where role is one of the following : • always - The router assumes the role of the translator when it becomes a border router. • candidate - The router to participate in the translator election process when it attains border router status.
interval	The period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router. (Range: 0–3600)

Default Configuration

If no metric is defined, 10 is the default configuration.

The default role is candidate. The default metric is type 2.

Command Mode

Router OSPF Configuration mode.

User Guidelines

Specifying a metric with no metric type is equivalent to specifying a metric with a metric type of 2.

Example

The following example configures not-so-stubby-area 10 as an NSSA.

```
console(config)#router ospf
console(config-router)#area 10 nssa
```

The following example configures the metric value and type for the default route advertised into the NSSA and configures the NSSA so that summary LSAs are not advertised into the NSSA.

```
console(config-router)#area 20 nssa default-info-
originate metric 250 metric-type 2 no-summary
```

area nssa default-info-originate

Use the **area nssa default-info-originate** command in Router OSPF Configuration mode to configure the metric value and type for the default route advertised into the NSSA. The metric type can be comparable (nssa-external 1) or non-comparable (nssa-external 2). Use the no form of the command to return the metric value and type to the default value.

Syntax

area *area-id* **nssa default-info-originate** [*integer*] [**comparable | non-comparable**]

no area *area-id* **nssa default-info-originate**

- *area-id* — Identifies the OSPF NSSA to configure. (Range: IP address or decimal from 0–4294967295)
- *integer* — Specifies the metric of the default route advertised to the NSSA. (Range: 1–16777214)
- **comparable** — A metric type of nssa-external 1
- **non-comparable** — A metric type of nssa-external 2

Default Configuration

If no metric is defined, 10 is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the metric value and type for the default route advertised into the NSSA.

```
console(config-router)#area 20 nssa default-info-
originate 250 non-comparable
```

area nssa no-redistribute

Use the **area nssa no-redistribute** command in Router OSPF Configuration mode to configure the NSSA Area Border router (ABR) so that learned external routes are not redistributed to the NSSA.

Syntax

area *area-id* **nssa no-redistribute**

no area *area-id* **nssa no-redistribute**

- *area-id* — Identifies the OSPF NSSA to configure. (Range: IP address or decimal from 0–4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the NSSA ABR.

```
console(config-router)#area 20 nssa no-redistribute
```

area nssa no-summary

Use the **area nssa no-summary** command in Router OSPF Configuration mode to configure the NSSA so that summary LSAs are not advertised into the NSSA.

Syntax

area *area-id* **nssa no-summary**

no area *area-id* **nssa no-summary**

- *area-id* — Identifies the OSPF NSSA to configure. (Range: 0–4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the NSSA so that summary LSAs are not advertised into the NSSA.

```
console(config-router)#area 20 nssa no-summary
```

area nssa translator-role

Use the **area nssa translator-role** command in Router OSPF Configuration mode to configure the translator role of the NSSA.

Syntax

area *area-id* **nssa translator-role** {**always** | **candidate**}

no area *area-id* **nssa translator-role**

- *area-id* — Identifies the OSPF NSSA to configure. (Range: IP address or decimal from 0–4294967295)
- always — The router assumes the role of the translator when it becomes a border router.
- candidate — The router to participate in the translator election process when it attains border router status.

Default Configuration

The default role is candidate.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the translator role of the NSSA.

```
console(config-router)#area 20 nssa translator-role
always
```

area nssa translator-stab-intv

Use the **area nssa translator-stab-intv** command in Router OSPF Configuration mode to configure the translator stability interval of the NSSA.

Syntax

area *area-id* **nssa translator-stab-intv** *integer*

no area *area-id* **nssa translator-stab-intv**

- *area-id* — Identifies the OSPF NSSA to configure. (Range: IP address or decimal from 0–4294967295)
- *integer* — The period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router. (Range: 0–3600)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the translator stability interval of the area 20 NSSA.

```
console(config-router)#area 20 nssa translator-stab-
intv 2000
```

area range (Router OSPF)

Use the **area range** command in Router OSPF Configuration mode to configure a summary prefix for routes learned in a given area. There are two types of area ranges. An area range can be configured to summarize intra-area routes. An ABR advertises the range rather than the specific intra-area route as a type 3 summary LSA. Also, an area range can be configured at the edge of an NSSA to summarize external routes reachable within the NSSA. The range is advertised as a type 5 external LSA.

Syntax

area *area-id* **range** *ip-address subnet-mask* {**summarylink | nssaexternallink**} [**advertise | not-advertise**]

no area *area-id* **range** *ip-address subnet-mask* {**summarylink | nssaexternallink**}

Parameter Description

Parameter	Description
area-id	Identifies the OSPF NSSA to configure. (Range: IP address or decimal from 0–4294967295)
ip-address	IP address.
subnet-mask	Subnet mask associated with IP address.
summarylink	Specifies a summary link LSDB type.
nssaexternallink	Specifies an NSSA external link LSDB type.
advertise	Advertisement of the area range.

Parameter	Description
not-advertise	Suppresses advertisement of the area range.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

Use this command with Area Border Routers (ABRs).

Example

The following example defines an area range for the area 20.

```
console(config-router)#area 20 range 192.168.6.0
255.255.255.0 summarylink advertise
```

area stub

Use the **area stub** command in Router OSPF Configuration mode to create a stub area for the specified area ID. A stub area is characterized by the fact that AS External LSAs are not propagated into the area. Removing AS External LSAs and Summary LSAs can significantly reduce the link state database of routers within the stub area. Use the no form of the command to remove the stub area.

Syntax

area *area-id* **stub**

no area *area-id* **stub**

- *area-id* — Identifies the area identifier of the OSPF stub. (Range: IP address or decimal from 0–4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Examples

The following examples define area 3 for the stub and then removes the stub area.

```
console(config-router)#area 3 stub
console(config-router)#no area 3 stub
```

area stub no-summary

Use the **area stub no-summary** command in Router OSPF Configuration mode to prevent Summary LSAs from being advertised into the NSSA. Use the no form of the command to return the Summary LSA mode to the default value.

Syntax

area *area-id* **stub no-summary**

no area *area-id* **stub no-summary**

- *area-id* — Identifies the OSPF area to configure. (Range: IP address or decimal from 0–4294967295)

Default Configuration

Disabled is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example prevents the Summary LSA from being advertised into the area 3 NSSA.

```
console(config-router)#area 3 stub no-summary
```

area virtual-link

Use the **area virtual-link** command in Router OSPF Configuration mode to create the OSPF virtual interface for the specified area-id and neighbor router. To remove the link, use the **no** form of the command. Use the optional parameters to configure authentication, dead-interval, hello-interval, retransmit-interval and transmit-delay. If the area has not been previously created, it is created by this command. If the area already exists, the virtual-link information is added or modified.

Syntax

area *area-id* virtual-link *router-id* [*authentication* [*message-digest* | *null*]] [*hello-interval seconds*] [*retransmit-interval seconds*] [*transmit-delay seconds*] [*dead-interval seconds*] [[authentication-key *key*] | [message-digest-key *key-id md5 key*]]

no area *area-id* virtual-link *router-id* [*authentication* [*message-digest* | *null*]] [*hello-interval*] [*retransmit-interval*] [*transmit-delay*] [*dead-interval*] [[*authentication-key*] | [*message-digest-key*]]

Parameter Description

Parameter	Description
area-id	Identifies the OSPF stub area to configure. (Range: IP address or decimal from 0-4294967295)
router-id	Valid IP address.
authentication	Specifies authentication type.
message-digest	Specifies that message-digest authentication is used.
null	No authentication is used. Overrides password or message-digest authentication if configured for the area.

Parameter	Description
hello-interval seconds	Number of seconds to wait before sending hello packets to the OSPF virtual interface. (Range: 1–65535)
dead-interval seconds	Number of seconds to wait before the OSPF virtual interface on the virtual interface is assumed to be dead. (Range: 1–65535)
retransmit-interval seconds	The number of seconds to wait between retransmitting LSAs if no acknowledgement is received. (Range: 0–3600)
transmit-delay seconds	Number of seconds to increment the age of the LSA before sending, based on the estimated time it takes to transmit from the interface. (Range: 0–3600)
md5	Use MD5 Encryption for an OSPF Virtual Link.
key	Authentication key for the specified interface. (Range: 8 bytes or less if the authentication type is simple and 16 bytes or less if the type is encrypt.)
key-id	Authentication key identifier for the authentication type encrypt. (Range: 0–255)

Default Configuration

Parameter	Default
area-id	No area ID is predefined.
router-id	No router ID is predefined.
hello-interval seconds	10 seconds
retransmit-interval seconds	5 seconds
transmit-delay seconds	1 second
dead-interval seconds	40 seconds
authentication-key key	No key is predefined.
message-digest-key key-id md5 key	No key is predefined.

Command Mode

Router OSPF Configuration mode.

User Guidelines

Unauthenticated interfaces cannot be configured with an authentication key. Use the area virtual-link authentication command on page 1155 to enable configuration of an authentication key.

Example

The following example establishes a virtual link with a 40-second transmit-delay interval and default values for all other optional parameters:

```
router ospf
 network 10.50.50.0 0.0.0.255 area 10
 area 10 virtual-link 192.168.2.2 transmit-delay 40
```

The following example establishes a virtual link with MD5 authentication:

```
router ospf
 network 10.50.50.0 0.0.0.255 area 10
 area 10.0.0.0 virtual-link 10.3.4.5 message-digest-key 100
md5 test123
```

area virtual-link authentication

Use the **area virtual-link authentication** command in Router OSPF Configuration mode to configure the authentication type and key for the OSPF virtual interface identified by the area ID and neighbor ID. Use the no form of the command to return the authentication type to the default value.

Syntax

area *area-id* **virtual-link** *neighbor-id* **authentication** [**none** | **simple** *key* | **encrypt** *key key-id*]

no area *area-id* **virtual-link** *neighbor-id* **authentication**

- *area-id* — Identifies the OSPF area to configure. (Range: IP address or decimal from 0–4294967295)

- *neighbor-id* — Identifies the Router identifier of the neighbor.
- encrypt — Use MD5 Encryption for an OSPF Virtual Link.
- *key* — Authentication key for the specified interface. (Range: 8 bytes or less if the authentication type is simple and 16 bytes or less if the type is encrypt.)
- *key-id* — Authentication key identifier for the authentication type encrypt. (Range: 0–255)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

Unauthenticated interfaces cannot be configured with an authentication key. If no parameters are specified after the authentication keyword, then plain-text password authentication is used.

Example

The following example configures the authentication type and key for the area 10 OSPF virtual interface and neighbor ID.

```
console(config-router)#area 10 virtual-link
192.168.2.7 authentication

console(config-router)#area 10 virtual-link
192.168.2.7 authentication encrypt test123 1001010
```

area virtual-link dead-interval

Use the **area virtual-link dead-interval** command in Router OSPF Configuration mode to configure the dead interval for the OSPF virtual interface on the virtual interface identified by area-id and neighbor router. Use the no form of the command to return the dead interval to the default value.

Syntax

area *area-id* **virtual-link** *neighbor-id* **dead-interval** *seconds*

no area *area-id* **virtual-link** *neighbor-id* **dead-interval**

- *area-id* — Identifies the OSPF area to configure. (Range: IP address or decimal from 0–4294967295)
- *neighbor-id* — Identifies the Router ID of the neighbor.
- *seconds* — Number of seconds to wait before the OSPF virtual interface on the virtual interface is assumed to be dead. (Range: 1–2147483647)

Default Configuration

40 seconds is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the dead interval for the area 10 OSPF virtual interface on the virtual interface and neighbor router.

```
console(config-router)#area 10 virtual-link
192.168.2.2 dead-interval 655555
```

area virtual-link hello-interval

Use the **area virtual-link hello-interval** command in Router OSPF Configuration mode to configure the hello interval for the OSPF virtual interface on the virtual interface identified by the area ID and neighbor ID. Use the no form of the command to return the hello interval to the default value.

Syntax

area *area-id* **virtual-link** *neighbor-id* **hello-interval** *seconds*

no area *area-id* **virtual-link** *neighbor-id* **hello-interval**

- *area-id* — Identifies the OSPF area to configure. (Range: IP address or decimal from 0–4294967295)
- *neighbor-id* — Identifies the Router ID of the neighbor.
- *seconds* — Number of seconds to wait before sending hello packets to the OSPF virtual interface. (Range: 1–65535)

Default Configuration

10 seconds is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a 50-second wait interval.

```
console(config-router)#area 10 virtual-link
192.168.2.2 hello-interval 50
```

area virtual-link retransmit-interval

Use the **area virtual-link retransmit-interval** command in Router OSPF Configuration mode to configure the retransmit interval for the OSPF virtual interface on the virtual interface identified by the area ID and neighbor ID. Use the no form of the command to return the retransmit interval to the default value.

Syntax

area *area-id* **virtual-link** *neighbor-id* **retransmit-interval** *seconds*

no area *area-id* **virtual-link** *neighbor-id* **retransmit-interval**

- *area-id* — Identifies the OSPF area to configure. (Range: IP address or decimal from 0–4294967295)

- *neighbor-id* — Identifies the Router ID of the neighbor.
- *seconds* — The number of seconds to wait between retransmitting LSAs if no acknowledgement is received. (Range: 0–3600)

Default Configuration

The default configuration is 5 seconds.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a 500-second retransmit wait interval.

```
console(config-router)#area 10 virtual-link
192.168.2.2 retransmit-interval 500
```

area virtual-link transmit-delay

Use the **area virtual-link transmit-delay** command in Router OSPF Configuration mode to configure the transmit delay for the OSPF virtual interface identified by the area ID and neighbor ID. Use the no form of the command to return the transmit delay to the default value.

Syntax

area *area-id* **virtual-link** *neighbor-id* **transmit-delay** *seconds*

no area *area-id* **virtual-link** *neighbor-id* **transmit-delay**

- *area-id* — Identifies the OSPF area to configure. (Range: IP address or decimal from 0–4294967295)
- *neighbor-id* — Identifies the Router ID of the neighbor.
- *seconds* — Number of seconds to increment the age of the LSA before sending, based on the estimated time it takes to transmit from the interface. (Range: 0–3600)

Default Configuration

1 second is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a 40-second transmit-delay interval.

```
console(config-router)#area 10 virtual-link
192.168.2.2 transmit-delay 40
```

auto-cost

By default, OSPF computes the link cost of each interface from the interface bandwidth. The link cost is computed as the ratio of a "reference bandwidth" to the interface bandwidth (ref_bw / interface bandwidth), where interface bandwidth is defined by the "bandwidth" command. Because the default reference bandwidth is 100 Mbps, OSPF uses the same default link cost for all interfaces whose bandwidth is 100 Mbps or greater. To change the reference bandwidth, use the auto-cost command, specifying the reference bandwidth in megabits per second. The different reference bandwidth can be independently configured for OSPFv2 and OSPFv3.

Syntax

auto-cost reference-bandwidth *ref_bw*

- *ref_bw* — The reference bandwidth in Mbps (Range: 1–4294967).

Default Configuration

The default reference bandwidth is 100 Mbps.

Command Mode

OSPFv2 or OSPFv3 Router Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures a reference bandwidth of 500 Mbps.

console(config-router)#auto-cost reference-bandwidth 500

bandwidth

By default, OSPF computes the link cost of an interface as the ratio of the reference bandwidth to the interface bandwidth. Reference bandwidth is specified with the auto-cost command. For the purpose of the OSPF link cost calculation, the bandwidth command specifies the interface bandwidth. The bandwidth is specified in kilobits per second. If no bandwidth is configured, the bandwidth defaults to the actual interface bandwidth for port-based routing interfaces and to 10 Mbps for VLAN routing interfaces. This command does not affect the actual speed of an interface.

Syntax

bandwidth *bw*

- *bw* — Interface bandwidth in Kbps (Range: 1–10000000).

Default Configuration

The default reference bandwidth is 10 Mbps

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the interface bandwidth to 500000 Kbps.

```
console(config-if-vlan1)#bandwidth 500000
```

capability opaque

Use the **capability opaque** command to enable Opaque Capability on the router. Use the "no" form of this command to disable Opaque Capability.

Syntax

capability opaque

no capability opaque

Default Configuration

Opaque Capability is enabled by default.

Command Mode

Router Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-router)#capability opaque
```

clear ip ospf

Use the **clear ip ospf** command to reset specific OSPF states. If no parameters are specified, OSPF is disabled and then re-enabled.

Syntax

clear ip ospf [{ **configuration** | **redistribution** | **counters** | **neighbor** [**interface vlan** *vlan id* [*neighbor id*]] }]

- **configuration** — Reset the OSPF configuration to factory defaults.
- **redistribution** — Flush all self-originated external LSAs. Reapply the redistribution configuration and re originate prefixes as necessary.
- **counters** — Reset global and interface statistics.

- **neighbor** — Drop the adjacency with all OSPF neighbors. On each neighbor's interface, send a one-way hello. Adjacencies may then be reestablished.
- **interface vlan** *vlan-id* — Drop adjacency with all neighbors on a specific interface.
- *neighbor-id* — Drop adjacency with a specific router ID on a specific interface.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example shows the options for the **clear ip ospf** command.

```
console#clear ip ospf ?

<cr>           Press enter to execute the command.
configuration  Restore OSPF configuration to defaults
counters       Clear OSPF counters
neighbor       Bounce all OSPF neighbors
redistribution Flush and reoriginate external LSAs
```

compatible rfc1583

Use the **compatible rfc1583** command in Router OSPF Configuration mode to enable OSPF 1583 compatibility. Use the **no** form of the command to disable it.

Syntax

compatible rfc1583

no compatible rfc1583

Syntax Description

This command has no arguments or keywords.

Default Configuration

Compatible with RFC 1583.

Command Mode

Router OSPF Configuration mode.

User Guidelines

If all OSPF routers in the routing domain are capable of operating according to RFC 2328, OSPF 1583 compatibility mode should be disabled.

Example

The following example enables 1583 compatibility.

```
console(config-router)#compatible rfc1583
```

default-information originate

Use the **default-information originate** command in Router OSPF Configuration mode to control the advertisement of default routes. Use the **no** form of the command to return the default route advertisement settings to the default value.

Syntax

default-information originate [**always**] [**metric** *metric-value*] [**metric-type type-value**]

no default-information originate [metric] [metric-type]

Syntax Description

Parameter	Description
always	Always advertise default routes.
metric-value	The metric (or preference) value of the default route. (Range: 1–16777214)
type-value	**1** External type-1 route. **2** External type-2 route.

Default Configuration

The default metric is none and the default type is 2.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example always advertises default routes.

```
console(config-router)#default-information originate
always metric 100 metric-type 1
```

default-metric

Use the **default-metric** command in Router OSPF Configuration mode to set a default for the metric of distributed routes. Use the **no** form of the command to remove the metric from the distributed routes. If the area has not been previously created, it is created by this command. If the area already exists, the default-metric information is added or modified.

Syntax

default-metric *metric-value*

no default-metric

- *metric-value* — The metric (or preference) value of the default route. (Range: 1–16777214)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets a value of 50 for the default metric.

```
console(config-router)#default-metric 50
```

distance ospf

The **distance ospf** command sets the preference values of OSPF route types in the router. Lower route preference values are preferred when determining the best route. The type of OSPF route can be intra, inter, external. All the external type routes are given the same preference value. Use the **no** form of this command to reset the preference values to the default.

Syntax

distance ospf {[*intra-area dist1*] [*inter-area dist2*] [*external dist3*]}

no distance ospf { *intra-area* | *inter-area* | *external* }

Syntax Description

Parameter	Description
intra-area dist1	Used to select the best path within an area when there are two or more routes to the same destination from two different routing protocols (Range: 1–255).

Parameter	Description
inter-area dist2	Used to select the best path from one area to another area when there are two or more routes to the same destination from two different routing protocols (Range: 1–255).
external dist3	Used to select the best path for routes from other routing domains, learned by redistribution when there are two or more routes to the same destination from two different routing protocols (Range: 1–255).

Default Configuration

The default preference value is 110 for dist1, dist2 and dist3.

Command Mode

Router OSPF Configuration mode.

Router OSPFv3 Configuration mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following examples set route preference values of OSPF in the router.

```
console(config-router)#distance ospf intra 4
console(config-router)#distance ospf type1 19
```

distribute-list out

Use the **distribute-list out** command in Router OSPF Configuration mode to specify the access list to filter routes received from the source protocol. Use the **no** form of the command to remove the specified source protocol from the access list.

Syntax

distribute-list *name* **out** {**rip** | **static** | **connected**}

no distribute-list *name* **out** {**rip** | **static** | **connected**}

Syntax Description

Parameter	Description
name	The name used to identify an existing ACL. The range is 1–31 characters.
rip	Apply the specified access list when RIP is the source protocol.
static	Apply the specified access list when packets come through the static route.
connected	Apply the specified access list when packets come from a directly connected route.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example specifies the access list to filter routes received from the RIP source protocol.

```
console(config-router)#distribute-list ACL40 out rip
```

enable

Use the **enable** command in Router OSPF Configuration mode to reset the default administrative mode of OSPF in the router (active). Use the no form of the command to disable the administrative mode for OSPF.

Syntax

enable

no enable

Default Configuration

Enabled is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example enables OSPF router mode.

```
console(config-router)#enable
```

exit-overflow-interval

Use the **exit-overflow-interval** command in Router OSPF Configuration mode to configure the exit overflow interval for OSPF. When a router leaves the overflow state it can originate non-default AS-external-LSAs. When set to 0, the router will not leave Overflow State until restarted. Use the no form of the command to return the interval to the default value.

Syntax

exit-overflow-interval *seconds*

no exit-overflow-interval

- *seconds* — Number of seconds after entering overflow state that a router will wait before attempting to leave the overflow state. (Range: 0–2147483647)

Default Configuration

0 seconds is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the exit overflow interval for OSPF at 10 seconds.

```
console(config-router)#exit-overflow-interval 10
```

external-lsdb-limit

Use the **external-lsdb-limit** command in Router OSPF Configuration mode to configure the external LSDB limit for OSPF. If the value is -1, then there is no limit. When the number of non-default AS-external-LSAs in a router's link-state database reaches the external LSDB limit, the router enters overflow state. The router never holds more than the external LSDB limit non-default AS-external-LSAs in it database. Use the no form of the command to return the limit to the default value.

Syntax

external-lsdb-limit *integer*

no external-lsdb-limit

- *integer* — Maximum number of non-default AS-external-LSAs allowed in the router's link-state database. (Range: –1 to 2147483647)

Default Configuration

-1 is the default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

The external LSDB limit MUST be set identically in all routers attached to the OSPF backbone and/or any regular OSPF area.

Example

The following example configures the external LSDB limit for OSPF with the number of non-default AS-external-LSAs set at 20.

```
console(config-router)#external-lsdb-limit 20
```

ip ospf area

The **ip ospf area** command enables OSPFv2 and sets the area ID of an interface. This command supersedes the effects of network area command. It can also configure the advertisability of the secondary addresses on this interface into OSPFv2 domain. Use the "no" form of this command to disable OSPFv2 on an interface.

Syntax

ip ospf area *area-id* [**secondaries none**]

no ip ospf area [**secondaries none**]

- *area-id* — The ID of the area (Range: IP address or decimal from 0 –4294967295).

Default Configuration

OSPFv2 is disabled by default.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan1)#ip ospf area 192.168.1.10
console(config-if-vlan1)#ip ospf area 3232235786
```

ip ospf authentication

Use the **ip ospf authentication** command in the Interface Configuration mode to set the OSPF Authentication Type and Key for the specified interface. Use the no form of the command to return the authentication type to the default value.

Syntax

ip ospf authentication {**none** | {**simple** *key*} | {**encrypt** *key key-id*}}

no ip ospf authentication

- encrypt — MD5 encrypted authentication key.
- *key* — Authentication key for the specified interface. (Range: 8 bytes or less if the authentication type is **simple** and 16 bytes or less if the type is **encrypt**.)
- *key-id* — Authentication key identifier for the authentication type **encrypt**. (Range: 0–25)

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

Unauthenticated interfaces do not need an authentication key or authentication key ID.

Example

The following example sets the OSPF Authentication Type and Key for VLAN 15.

```
console(config-if-vlan15)#ip ospf authentication
encrypt test123 100
```

ip ospf cost

Use the **ip ospf cost** command in Interface Configuration mode to configure the cost on an OSPF interface. Use the **no** form of the command to return the cost to the default value.

Syntax

ip ospf cost *interface-cost*

no ip ospf cost

- *interface-cost* — Specifies the cost (link-state metric) of the OSPF interface. (Range: 1–65535)

Default Configuration

10 is the default link-state metric configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the cost on the OSPF interface at 5.

```
console(config-if-vlan15)#ip ospf cost 5
```

ip ospf dead-interval

Use the **ip ospf dead-interval** command in Interface Configuration to set the OSPF dead interval for the specified interface. Use the no form of the command to return the interval to the default value.

Syntax

ip ospf dead-interval *seconds*

no ip ospf dead-interval

- *seconds* — Number of seconds that a router's Hello packets have not been seen before its neighbor routers declare that the router is down. (Range: 1–65535)

Default Configuration

40 is the default number of seconds.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

The value for the length of time must be the same for all routers attached to a common network. This value should be some multiple of the Hello Interval (i.e. 4).

Example

The following example sets the dead interval at 30 seconds.

```
console(config-if-vlan15)#ip ospf dead-interval 30
```

ip ospf hello-interval

Use the **ip ospf hello-interval** command in Interface Configuration mode to set the OSPF hello interval for the specified interface. Use the no form of the command to return the interval to the default value.

Syntax

ip ospf hello-interval *seconds*

no ip ospf hello-interval

- *seconds* — Number of seconds to wait before sending Hello packets from the interface. (Range: 1–65535)

Default Configuration

10 is the default number of seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

The value for the length of time must be the same for all routers attached to a network.

Example

The following example sets the OSPF hello interval at 30 seconds.

```
console(config-if-vlan15)#ip ospf hello-interval 30
```

ip ospf mtu-ignore

Use the **ip ospf mtu-ignore** command in Interface Configuration mode to disable OSPF maximum transmission unit (MTU) mismatch detection. OSPF Database Description packets specify the size of the largest IP packet that can be sent without fragmentation on the interface. When a router receives a Database Description packet, it examines the MTU advertised by the neighbor. By default, if the MTU is larger than the router can accept, the Database Description packet is rejected and the OSPF adjacency is not established. Use the no form of the command to enable OSPF maximum transmission unit (MTU) mismatch detection.

Syntax

ip ospf mtu-ignore

no ip ospf mtu-ignore

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example disables OSPF MTU mismatch detection on VLAN interface 15.

```
console(config-if-vlan15)#ip ospf mtu-ignore
```

ip ospf network

Use the **ip ospf network** command to configure OSPF to treat an interface as a point-to-point rather than broadcast interface. To return to the default value, use the no form of this command.

Syntax

ip ospf network { *broadcast* | *point-to-point* }

no ip ospf network

- *broadcast* — Set the network type to broadcast.
- *point-to-point* — Set the network type to point-to-point

Default Configuration

Interfaces operate in broadcast mode by default.

Command Mode

Interface Configuration (VLAN) mode.

Usage Guidelines

OSPF treats interfaces as broadcast interfaces by default. Loopback interfaces have a special loopback network type, which cannot be changed. When there are only two routers on the network, OSPF can operate more efficiently by treating the network as a point-to-point network. For point-to-point networks, OSPF does not elect a designated router or generate a network link state advertisement (LSA). Both endpoints of the link must be configured to operate in point-to-point mode.

Example

The following example shows the options for the **ip ospf network** command.

```
console(config-if-vlan1)#ip ospf network ?
```

```
broadcast      Set the OSPF network type to Broadcast
point-to-point Set the OSPF network type to Point-to-Point
```

ip ospf priority

Use the **ip ospf priority** command in Interface Configuration mode to set the OSPF priority for the specified router interface. Use the **no** form of the command to return the priority to the default value.

Syntax

ip ospf priority *number-value*

no ip ospf priority

- *number-value* — Specifies the OSPF priority for the specified router interface. (Range: 0–255)

Default Configuration

1 is the default integer value.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

A value of 1 is the highest router priority. A value of 0 indicates that the interface is not eligible to become the designated router on this network.

Example

The following example sets the OSPF priority for the VLAN 15 router at 100.

```
console(config-if-vlan15)#ip ospf priority 100
```

ip ospf retransmit-interval

Use the **ip ospf retransmit-interval** command in Interface Configuration mode to set the OSPF retransmit Interval for the specified interface. Use the no form of the command to return the interval to the default value.

Syntax

ip ospf retransmit-interval *seconds*

no ip ospf retransmit-interval

- *seconds* — Number of seconds between link-state advertisement retransmissions for adjacencies belonging to this router interface. This value is also used when retransmitting database description and link-state request packets. (Range: 0–3600 seconds)

Default Configuration

5 is the default number of seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

A value of 1 is the highest router priority. A value of 0 indicates that the interface is not eligible to become the designated router on this network.

Example

The following example sets the OSPF retransmit Interval for VLAN 15 at 50 seconds.

```
console(config-if-vlan15)#ip ospf retransmit-interval
50
```

ip ospf transmit-delay

Use the **ip ospf transmit-delay** command in Interface Configuration mode to set the OSPF Transit Delay for the specified interface. Use the no form of the command to return the delay to the default value.

Syntax

ip ospf transmit-delay *seconds*

no ip ospf transmit-delay

- *seconds* — Sets the estimated number of seconds it takes to transmit a link state update packet over this interface. (Range: 1–3600 seconds)

Default Configuration

1 is the default number of seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the OSPF Transit Delay for VLAN 15 at 20 seconds.

```
console(config-if-vlan15)#ip ospf transmit-delay 20
```

maximum-paths

Use the **maximum-paths** command in Router OSPF Configuration mode to set the number of paths that OSPF can report for a given destination. Use the no form of the command to reset the number to the default value.

Syntax

maximum-paths *integer*

no maximum-paths

- *integer* — Number of paths that OSPF can report for a given destination. (Range: 1–4.)

Default Configuration

4 is the *integer* default value.

Command Mode

Router OSPF Configuration mode.

User Guidelines

OSPF is only enabled on an interface if the primary IPv4 address on the interface matches a network area range. Any individual interface can only be attached to a single area. If an interface address matches multiple network area ranges, the interface is assigned to the area for the first matching range. If the **ip ospf area** command is given for an interface, it overrides any matching network area command.

OSPF only advertises IP subnets for secondary IP addresses if the secondary address is within the range of a network area command for the same area as the primary address on the same interface.

When a network area command is deleted, matching interfaces are reevaluated against all remaining network area commands.

Example

The following example sets the number of paths at 2 that OSPF can report for a given destination.

```
console(config-router)#maximum-paths 2
```

network area

The **network area** command enables OSPFv2 on an interface and sets its area ID if the ip-address of an interface is covered by this network command. Use the "no" form of this command to disable OSPFv2 on an interface.

Syntax

network *ip-address wildcard-mask* **area** *area-id*

no network *ip-address wildcard-mask* **area** *area-id*

- *ip-address* — Base IPv4 address of the network area.
- *wildcard-mask* — The network mask indicating the subnet.
- *area-id* — The ID of the area (Range: IP address or decimal from 0–4294967295).

Default Configuration

OSPFv2 is disabled

Command Mode

Router OSPF Configuration mode.

User Guidelines

OSPF is only enabled on an interface if the primary IPv4 address on the interface matches a network area range. Any individual interface can only be attached to a single area. If an interface address matches multiple network area ranges, the interface is assigned to the area for the first matching range. If the **ip ospf area** command is given for an interface, it overrides any matching network area command.

OSPF only advertises IP subnets for secondary IP addresses if the secondary address is within the range of a network area command for the same area as the primary address on the same interface.

When a network area command is deleted, matching interfaces are reevaluated against all remaining network area commands.

Example

```
console(config-router)#network 10.50.50.0 0.0.0.255
area 4
```

nsf helper

Use the **nsf-helper** to allow OSPF to act as a helpful neighbor for a restarting router. Use the "no" form of this command to prevent OSPF from acting as a helpful neighbor.

Syntax

nsf helper[planned-only]

no nsf helper

- **planned-only** — This keyword indicates that OSPF should only help a restarting router performing a planned restart.

Default Configuration

OSPF may act as a helpful neighbor for both planned and unplanned restarts

Command Mode

Router OSPF Configuration mode

User Guidelines

The grace LSA announcing the graceful restart includes a restart reason. Reasons 1 (software restart) and 2 (software reload/upgrade) are considered planned restarts. Reasons 0 (unknown) and 3 (switch to redundant control processor) are considered unplanned restarts.

nsf ietf helper disable is functionally equivalent to no nsf helper and is supported solely for IS CLI compatibility.

nsf helper strict-lsa-checking

Use the **nsf-helper strict-lsa-checking** command to require that an OSPF helpful neighbor exit helper mode whenever a topology change occurs. Use the "no" form of this command to allow OSPF to continue as a helpful neighbor in spite of topology changes.

Syntax

nsf [ietf] helper strict-lsa-checking

no nsf [**ietf**] **helper strict-lsa-checking**

- **ietf** —This keyword is used to distinguish the IETF standard implementation of graceful restart from other implementations. Since the IETF implementation is the only one supported, this keyword is optional.

Default Configuration

A helpful neighbor exits helper mode when a topology change occurs.

Command Mode

Router OSPF Configuration mode

User Guidelines

The restarting router is unable to react to topology changes. In particular, the restarting router will not immediately update its forwarding table; therefore, a topology change may introduce forwarding loops or black holes that persist

until the graceful restart completes. By exiting the graceful restart on a topology change, a router tries to eliminate the loops or black holes as quickly as possible by routing around the restarting router.

A helpful neighbor considers a link down with the restarting router to be a topology change, regardless of the strict LSA checking configuration.

nsf restart-interval

Use the **nsf restart-interval** command to configure the length of the grace period on the restarting router. Use the "no" form of this command to revert the grace period to its default.

Syntax

nsf [**ietf**] **restart-interval** *seconds*

no nsf [**ietf**] **restart-interval**

- **ietf** — This keyword is used to distinguish the IETF standard implementation of graceful restart from other implementations. Since the IETF implementation is the only one supported, this keyword is optional.
- *seconds* — The number of seconds that the restarting router asks its neighbors to wait before exiting helper mode. The restarting router includes the restart interval in its grace LSAs (range 1–1800 seconds).

Default Configuration

The default restart interval is 120 seconds.

Command Mode

Router OSPF

User Guidelines

The grace period must be set long enough to allow the restarting router to reestablish all of its adjacencies and complete a full database exchange with each of those neighbors.

Example

```
console(config-router)#nsf restart-interval 180
```

passive-interface default

The **passive-interface default** command enables the global passive mode by default for all interfaces. It overrides any interface level passive mode. Use the "no" form of this command to disable the global passive mode by default for all interfaces. Any interface previously configured to be passive reverts to non-passive mode.

Syntax

passive-interface default

no passive-interface default

Default Configuration

Global passive mode is disabled by default.

Command Mode

Router OSPF Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-router)#passive-interface
```

passive-interface

Use the **passive-interface** command to set the interface as passive. It overrides the global passive mode that is currently effective on the interface. Use the "no" form of this command to set the interface as non-passive.

Syntax

passive-interface vlan *vlan-id*

no passive-interface vlan *vlan-id*

- *vlan-id* — The vlan number

Default Configuration

Passive interface mode is disabled by default.

Command Mode

Router OSPF Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-router)#passive-interface vlan 1
```

redistribute

Use the **redistribute** command in Router OSPF Configuration mode to configure OSPF protocol to allow redistribution of routes from the specified source protocol/routers. Use the **no** version of the command to disable redistribution from the selected source or to reset options to their default values.

Syntax

redistribute protocol [**metric metric-value**] [**metric-type type-value**] [**tag tag-value**] [**subnets**]

no redistribute protocol [**metric**] [**metric-type**] [**tag**] [**subnets**]

Parameter Description

Parameter	Description
protocol	rip - Specifies RIP as the source protocol. static - Specifies that the source is a static route. connected - Specifies that the source is a directly connected route.
static	Specifies that the source is a static route.
connected	Specifies that the source is a directly connected route.

Parameter	Description
metric-value	Specifies the metric to use when redistributing the route. (Range: 0–16777214)
type-value	Type 1 external route. Type 2 external route.
tag-value	Value attached to each external route, which might be used to communicate information between ASBRs. (Range: 0–4294967295)
subnets	Specifies whether to redistribute the routes to subnets.

Default Configuration

0 is the tag-value default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures OSPF protocol to allow redistribution of routes from the specified source protocol/routers.

```
console(config-router)#redistribute rip metric 90
metric-type 1 tag 555 subnets
```

router-id

Use the **router-id** command in Router OSPF Configuration mode to set a 4-digit dotted-decimal number uniquely identifying the router OSPF ID.

Syntax

router-id *ip-address*

- *ip-address* — IP address that uniquely identifies the router OSPF ID.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example defines the router OSPF ID as 5.5.5.5.

```
console(config)#router ospf
console(config-router)#router-id 5.5.5.5
```

router ospf

Use the **router ospf** command in Global Configuration mode to enter Router OSPF mode.

Syntax

router ospf

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

The command prompt changes when the **router ospf** command executes.

Example

The following example enters into router OSPF mode.

```
console(config)#router ospf
console(config-router)#
```

show ip ospf

Use the **show ip ospf** command to display information relevant to the OSPF router. This command has been modified to show additional fields.

Syntax

show ip ospf

Syntax Description

This command has no arguments or keywords.

Default Configuration

There is no default configuration for this command.

Command Mode

User EXEC, Privileged EXEC modes.

User Guidelines

Some of the information below displays only if you enable OSPF and configure certain features. The following fields may be displayed:

Field	Description
Router ID	A 32-bit integer in dotted decimal format identifying the router about which information is displayed. This is a configured value.
OSPF Admin Mode	Shows whether OSPF is administratively enabled or disabled.

RFC 1583 Compatibility	This configuration option controls the preference rules used when choosing among multiple external LSAs advertising the same destination. When enabled, the preference rules remain those specified by RFC 1583. When disabled, the preference rules are those stated in Section 16.4.1 of RFC 2328. These rules prevent routing loops when external LSAs for the same destination have been originated from different areas.
External LSDB Limit	Shows the maximum number of non-default external LSAs entries that can be stored in the link-state database.
Exit Overflow Interval	Shows the number of seconds that, after entering OverflowState, as defined by RFC 1765, a router will attempt to leave OverflowState.
Spf Delay Time	The number of seconds to wait before running a routing table calculation after a topology change.
Spf Hold Time	The minimum number of seconds between routing table calculations.
Opaque Capability	Shows whether router is capable of sending Opaque LSAs.
AutoCost Ref BW	The configured autocost reference bandwidth. This value is used to determine the OSPF metric on its interfaces. The reference bandwidth is divided by the interface speed to compute the metric.
Default Passive Setting	When enabled, OSPF interfaces are passive by default.
Maximum Paths	Shows the maximum number of paths that OSPF can report for a given destination.
Default Metric	Default metric for redistributed routes.
Default Route Advertise	When enabled, OSPF originates a type 5 LSA advertising a default route.
Always	When this option is configured, OSPF only originates a default route when the router has learned a default route from another source.
Metric	Shows the metric for the advertised default routes. If the metric is not configured, this field is not configured.
Metric Type	Shows whether the metric for the default route is advertised as External Type 1 or External Type 2.

Number of Active Areas	The number of OSPF areas to which the router is attached on interfaces that are up.
ABR Status	Shows whether the router is an OSPF Area Border Router.
ASBR Status	Indicates whether the router is an autonomous system border router. Router automatically becomes an ASBR when it is configured to redistribute routes learned from another protocol. The possible values for the ASBR status is enabled (if the router is configured to re-distribute routes learned by other protocols) or disabled (if the router is not configured for the same).
Stub Router	OSPF enters stub router mode, as described in RFC 3137, when it encounters a resource limitation that prevents it from computing a complete routing table. In this state, OSPF sets the link metrics of non-stub links in its own router LSAs to the largest possible value, discouraging other routers from computing paths through the stub router, but allowing other routers to compute routes to destinations attached to the stub router. To restore OSPF to normal operation, resolve the condition that caused the resource overload, then disable and re-enable OSPF globally.
External LSDB Overflow	OSPF enters this state when the number of external LSAs exceeds a configured limit, as described in RFC 1765.
External LSA Count	Shows the number of external (LS type 5) link-state advertisements in the link-state database.
External LSA Checksum	Shows the sum of the LS checksums of external link-state advertisements contained in the link-state database.
AS_OPAQUE LSA Count	Shows the number of AS Opaque LSAs received.
AS_OPAQUE LSA Checksum	Sum of the checksums of all AS Opaque LSAs in the link state database.
New LSAs Originated	Shows the number of link-state advertisements that have been originated.
LSAs Received	Shows the number of link-state advertisements received determined to be new instantiations.
LSA Count	The number of LSAs in the link state database.
Maximum Number of LSAs	The limit on the number of LSAs that the router can store in its link state database.

LSA High Water Mark	The maximum number of LSAs that have been in the link state database since OSPF began operation.
Retransmit List Entries	The current number of entries on all neighbors' retransmit lists.
Maximum Number of Retransmit Entries	The maximum number of entries that can be on neighbors' retransmit lists at any given time. This is the sum for all neighbors. When OSPF receives an LSA and cannot allocate a new retransmit list entry, the router does not acknowledge the LSA, expecting the sender to retransmit.
Retransmit Entries High Water Mark	The maximum number of retransmit list entries that have been on all neighbors' retransmit lists at one time.
NSF Support	Whether graceful restart is administratively enabled. Possible values are Support Always, Disabled, or Planned.
NSF Restart Interval	The number of seconds a helpful neighbor allows a restarting router to complete its graceful restart.
NSF Restart Status	Whether the router is currently performing a graceful restart.
NSF Restart Age	The number of seconds until a graceful restart expires. Only non-zero when the router is in graceful restart.
NSF Restart Exit Reason	The reason the previous graceful restart ended. Possible values are Not attempted, In progress, Completed, Timed out, Topology change, and Manual clear.
NSF Helper Support	Whether this router is configured to act as a graceful restart helpful neighbor. Possible values are: Helper Support Always, Disabled, or Planned.
NSF Helper Strict LSA Checking	As a graceful restart helpful neighbor, whether to terminate the helper relationship if a topology change occurs during a neighbor's graceful restart.
Redistributing	This field is a heading and appears only if you configure the system to take routes learned from a non-OSPF source and advertise them to its peers.
Source	Shows source protocol/routes that are being redistributed. Possible values are static, connected, or RIP.
Tag	Shows the decimal value attached to each external route.
Subnets	When this option is not configured, OSPF will only redistribute classful prefixes.

Distribute-List	Shows the access list used to filter redistributed routes.

Example

The following example displays OSPF router information.

```
console#show ip ospf

Router ID.............................. 1.1.1.1
OSPF Admin Mode........................ Enable
RFC 1583 Compatibility................. Enable
External LSDB Limit.................... No Limit
Exit Overflow Interval................. 0
Spf Delay Time......................... 5
Spf Hold Time.......................... 10
Opaque Capability...................... Disable
AutoCost Ref BW........................ 100 Mbps
Default Passive Setting................ Disabled
Maximum Paths.......................... 4
Default Metric......................... Not configured

Default Route Advertise.............. Disabled
Always................................. FALSE
Metric................................. Not configured
Metric Type............................ External Type 2


Number of Active Areas... 1 (1 normal, 0 stub, 0 nssa)
ABR Status............................. Disable
```

```
ASBR Status..........................  Disable
Stub Router..........................  FALSE
External LSDB Overflow...............  FALSE
External LSA Count...................  0
External LSA Checksum................  0
AS_OPAQUE LSA Count..................  0
AS_OPAQUE LSA Checksum...............  0
New LSAs Originated..................  25
LSAs Received........................  7
LSA Count............................  4
Maximum Number of LSAs...............  18200
LSA High Water Mark..................  4
Retransmit List Entries..............  0
Maximum Number of Retransmit Entries..72800
Retransmit Entries High Water Mark...  2

NSF Support..........................  Disabled
NSF Restart Interval.................  120
NSF Restart Status...................  Not Restarting
NSF Restart Age......................  0 seconds
NSF Restart Exit Reason..............  Not Attempted
NSF Helper Support...................  Always
NSF Helper Strict LSA Checking.......  Enabled
```

show ip ospf abr

The **show ip ospf abr** command displays the internal OSPF routing table entries to Area Border Routers (ABR). This command takes no options.

Syntax

show ip ospf abr

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show ip ospf abr
Type  Router Id   Cost  Area ID         Next Hop    Next Hop
                                                    Intf
----- ---------   ----- --------------- ---------   --------
INTRA 3.3.3.3     1     0.0.0.1         10.1.23.3   vlan11
INTRA 4.4.4.4     10    0.0.0.1         10.1.24.4   vlan12
```

show ip ospf area

Use the **show ip ospf area** command in Privileged EXEC mode to display information about the identified OSPF area.

Syntax

show ip ospf area *area-id*

- *area-id* — Identifies the OSPF area whose ranges are being displayed. (Range: 0–4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays OSPF router information.

```
console#show ip ospf area 10

AreaID..................................... 0.0.0.10

External Routing........................... Import
External LSAs

Spf Runs................................... 0

Area Border Router Count................... 0

Area LSA Count............................. 0

Area LSA Checksum.......................... 0

Import Summary LSAs........................ Enable

console#show ip ospf area 20

AreaID..................................... 0.0.0.20

External Routing........................... Import
NSSAs

Spf Runs................................... 0

Area Border Router Count................... 0

Area LSA Count............................. 0

Area LSA Checksum.......................... 0

OSPF NSSA Specific Information.

Import Summary LSAs........................ Enable

Redistribute into NSSA..................... Enable

Default Information Originate.............. TRUE

Default Metric............................. 250
```

```
Default Metric Type.......................... Non-
Comparable
Translator Role.............................. Candidate
Translator Stability Interval................. 2000
Translator State............................. Disabled
```

show ip ospf asbr

The **show ip ospf asbr** command displays the internal OSPF routing table entries to Autonomous System Boundary Routes (ASBR). This command takes no options.

Syntax

show ip ospf asbr

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

```
console#show ip ospf asbr
Type   Router Id   Cost  Area ID   Next Hop    Next Hop
                                                 Intf
-----  ----------  ----  --------  ----------  ----------
INTRA  1.1.1.1      1    0.0.0.1   10.1.12.1    vlan10
INTRA  4.4.4.4     10    0.0.0.1   10.1.24.4    vlan12
```

show ip ospf database

Use the **show ip ospf database** command in Privileged EXEC mode to display information about the link state database when OSPF is enabled. If parameters are entered, the command displays the LSA headers. Use the optional parameters to specify the type of link state advertisements to display.

Syntax

show ip ospf [*area-id*] **database** [{**asbr-summary** | **external** | **network** | **nssa-external** | **router** | **summary**}] [*ls-id*] [**adv-router** [*ip-address*] | **self-originate**]

- *area-id* — Identifies a specific OSPF area for which link state database information will be displayed.
- asbr-summary — Display the autonomous system boundary router (ASBR) summary LSAs.
- external — Display the external LSAs.
- network — Display the network LSAs.
- nssa-external — Display NSSA external LSAs.
- router — Display router LSAs.
- summary — Display the LSA database summary information.
- ls-id — Specifies the link state ID (LSID). (Range: IP address or an integer in the range of 0–4294967295)
- **adv-router** — Display the LSAs that are restricted by the advertising router. To specify a router, enter the IP address of the router.
- self-originate — Display the LSAs in that are self-originated.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

Information is only displayed if OSPF is enabled.

Example

The following example displays information about the link state database when OSPF is enabled.

```
console#show ip ospf database

                Router Link States (Area 0.0.0.0)

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
5.2.0.0         0.0.0.0          1360  80000006 3a1f   ------  -----
5.2.0.0         5.2.0.0          1360  80000009 a47e   ------  ---E-
20.20.20.20     20.20.20.20      1165  8000000b 0f80   -E----  -----


                Network Link States (Area 0.0.0.0)

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
2.2.2.2         20.20.20.20      1165  80000005 f86d   -E--O-



                Network Summary States (Area 0.0.0.0)

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
5.2.0.0         0.0.0.0          1360  80000007 242e   ------


                Summary ASBR States (Area 0.0.0.0)

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
```

```
5.2.0.0         0.0.0.0         1361  80000006 183a   ------
```

```
                Link Opaque States (Area 0.0.0.0)

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
5.2.0.0         0.0.0.0         1361  80000005 ef59   ------
```

```
                Area Opaque States (Area 0.0.0.0)

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
5.2.0.0         0.0.0.0         1362  80000005 e166   ------
```

```
                AS External States

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
6.0.0.0         5.2.0.0         1364  80000008 e35d
```

```
                AS Opaque States

Link Id         Adv Router      Age   Sequence Chksm  Options Rtr Opt
--------------- --------------- ----- -------- ------ ------- -----
5.2.0.0         0.0.0.0         1364  80000005 d373
```

show ip ospf database database-summary

Use the **show ip ospf database database-summary** command to display the number of each type of LSA in the database for each area and for the router. The command also displays the total number of LSAs in the database. This command has been modified.

Syntax

show ip ospf database database-summary

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

The following fields are displayed:

Field	Description
Router	Shows Total number of router LSAs in the OSPF link state database.
Network	Shows Total number of network LSAs in the OSPF link state database.
Summary Net	Shows Total number of summary network LSAs in the database.
Summary ASBR	Shows Number of summary ASBR LSAs in the database.
Type-7 Ext	Shows Total number of Type-7 external LSAs in the database.
Self-Originated Type-7	Shows Total number of self originated AS external LSAs in the OSPFv3 link state database.
Opaque Link	Shows Number of opaque link LSAs in the database.
Opaque Area	Shows Number of opaque area LSAs in the database.
Subtotal	Shows Number of entries for the identified area.
Opaque AS	Shows Number of opaque AS LSAs in the database.

Total	Shows Number of entries for all areas.

Example

The following example displays the number of each type of LSA in the database for each area and for the router.

```
console#show ip ospf database database-summary

OSPF Router with ID (5.5.5.5)

Area 0.0.0.0 database summary

Router..................................... 0

Network.................................... 0

Summary Net................................ 0

Summary ASBR............................... 0

Type-7 Ext................................. 0

Self Originated Type-7..................... 0

Opaque Link................................ 0

Opaque Area................................ 0

Subtotal................................... 0

Area 0.0.0.10 database summary

Router..................................... 0

Network.................................... 0

Summary Net................................ 0

Summary ASBR............................... 0

Type-7 Ext................................. 0

Self Originated Type-7..................... 0

Opaque Link................................ 0

Opaque Area................................ 0

Subtotal................................... 0
```

```
Router database summary
Router..................................... 0
Network.................................... 0
Summary Net................................ 0
Summary ASBR............................... 0
Type-7 Ext................................. 0
Opaque Link................................ 0
Opaque Area................................ 0
Type-5 Ext................................. 0
Self-Originated Type-5 Ext................. 0
Opaque AS.................................. 0
Total...................................... 0
```

show ip ospf interface

Use the **show ip ospf interface** command in Privileged EXEC mode to display the information for the VLAN or loopback interface.

Syntax

show ip ospf interface [interface-type interface-number]

Syntax Description

Parameter	Description
interface-type	Vlan or loopback
interface-number	Valid VLAN ID or loopback interface number (Range: 0–7).

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the information for the IFO object or virtual interface tables associated with VLAN 3.

```
console#show ip ospf interface vlan 10


IP Address..................................... 1.1.1.1
Subnet Mask.................................... 255.255.255.0
Secondary IP Address(es).......................
OSPF Admin Mode................................ Enable
OSPF Area ID................................... 0.0.0.0
OSPF Network Type.............................. Broadcast
Router Priority................................ 1
Retransmit Interval............................ 5
Hello Interval................................. 10
Dead Interval.................................. 40
LSA Ack Interval............................... 1
Iftransit Delay Interval....................... 1
Authentication Type............................ None
Metric Cost.................................... 10  (computed)
Passive Status................................. Non-passive
interface
OSPF Mtu-ignore................................ Disable
State.......................................... designated-router
Designated Router.............................. 1.1.1.1
Backup Designated Router....................... 0.0.0.0
Number of Link Events.......................... 2
```

show ip ospf interface brief

Use the **show ip ospf interface brief** command in Privileged EXEC mode to display brief information for the IFO object or virtual interface tables.

Syntax

show ip ospf interface brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays brief information for the IFO object or virtual interface tables.

```
console#show ip ospf interface brief
Router Hello Dead Retrax Retrax LSAAck
Interface AdminMode Area ID Priority Intval Intval Intval Delay Intval
--------- --------- ------- -------- ------ ------ ------ ----- ------
vlan1     Enable    0.0.0.10 1       10      40      5      1      1
vlan2     Disable   0.0.0.0  1       10      40      5      1      1
vlan3     Disable   0.0.0.0  1       10      40      5      1      1
loopback2 Disable   0.0.0.0  1       10      40      5      1      1
```

show ip ospf interface stats

Use the show ip ospf interface stats command in User EXEC mode to display the statistics for a specific interface. The information is only displayed if OSPF is enabled.

Syntax

show ip ospf interface stats vlan *vlan-id*

- *vlan-id* — Valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the ospf statistics for VLAN 15.

```
console>show ip ospf interface stats vlan15
OSPF Area ID..................................... 0.0.0.0
Area Border Router Count.............................. 0
AS Border Router Count................................ 0
Area LSA Count........................................ 1
IP Address....................................... 2.2.2.2
OSPF Interface Events................................. 1
Virtual Events........................................ 0
Neighbor Events....................................... 0
External LSA Count.................................... 0
```

show ip ospf neighbor

Use the **show ip ospf neighbor** command in Privileged EXEC mode to display information about OSPF neighbors. The information below only displays if OSPF is enabled and the interface has a neighbor.

Syntax

show ip ospf neighbor [interface-type interface-number] [neighbor-id]

Syntax Description

Parameter	Description
interface-type	Interface type – only supported type is vlan.
interface-number	A valid interface number.
neighbor-id	Valid IP address of the neighbor.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following examples display information about OSPF neighbors on the specified Ethernet and IP interfaces.

```
console#show ip ospf neighbor  99.9.9.9


Interface..................................... Vl12
Neighbor IP Address........................... 5.5.5.5
Interface Index............................... 723
Area Id....................................... 0.0.0.0
Options....................................... 0x42
Router Priority............................... 1
Dead timer due in (secs)...................... 31
Up Time....................... 0 days 0 hrs 2 mins 17 secs
State......................................... Full/DR
Events........................................ 5
Retransmission Queue Length................... 0
```

```
Restart Helper Status..................... Not helping
Restart Helper Exit Reason................ Not attempted
```

Field Description

Field	Description
Interface	The name of the interface on which the adjacency is formed.
Neighbor IP Address	The IPv4 address on the neighbor's interface used to form the adjacency.
Interface Index	The SNMP interface index.
Area Id	The OSPF area in which the adjacency is formed.
Options	The options advertised by the neighbor.
Router Priority	The router priority advertised by the neighbor.
Dead timer	The number of seconds until the dead timer expires.
Up Time	How long this adjacency has been in FULL state.
State	The current state of the adjacency.
Events	Incremented for the following events: • A DD is received from the neighbor with an MTU mismatch. • The neighbor sent an ACK for an LSA not on the neighbor's retransmit list. • The state of the adjacency changed.
Retransmission Queue Length	The number of LSAs on the neighbor's retransmit queue waiting for the neighbor to acknowledge.
Restart Helper Status	One of two values: • Helping — This router is acting as a helpful neighbor to this neighbor. A helpful neighbor does not report an adjacency change during graceful restart, but continues to advertise the restarting router as a FULL adjacency. A helpful neighbor continues to forward data packets to the restarting router, trusting that the restarting router's forwarding table is maintained during the restart. • Not Helping — This router is not a helpful neighbor at this time.

Field	Description
Restart Helper Exit Reason	One of the following values: • Restart Reason — When the router is in helpful neighbor mode, the output includes the restart reason the restarting router sent in its grace LSA. The Restart Reason is the value in the Graceful Restart Reason TLV in the grace LSA sent by the restarting router. Possible values for the Restart Reason are defined in RFC 3623 as follows: – Unknown (0) – Software restart (1) – Software reload/upgrade (2) – Switch to redundant control processor (3) – Unrecognized - a value not defined in RFC 3623 When the switch sends a grace LSA, it sets the Restart Reason to **Software Restart** on a planned warm restart (when the command is invoked), and to **Unknown** on an unplanned warm restart. • Remaining Grace Time — The number of seconds remaining in the current graceful restart interval. This row is only included if the router is currently acting as a restart helper for the neighbor. • Restart Exit Reason — One of the following: – None — graceful restart has not been attempted – In Progress — restart is in progress – Completed — the previous graceful restart completed successfully – Timed Out — the previous graceful restart timed out – Topology Changed — The previous graceful restart terminated prematurely because of a topology change. A helpful neighbor declares a topology change when it forwards a changed LSA to the restarting router. An LSA is considered changed if its contents are changed, not if it is simply a periodic refresh.

show ip ospf range

Use the **show ip ospf range** command in Privileged EXEC mode to display information about the area ranges for the specified area-id.

Syntax

show ip ospf range *area-id*

- *area-id* — Identifies the OSPF area whose ranges are being displayed. (Range: IP address or decimal from 0–4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays information about the area ranges for the specified area-id.

```
console#show ip ospf range 20
Area ID  IP Address  Subnet Mask   Lsdb Type    Advertisement
-------  ----------  ---------     ---------    -------------
0.0.0.20 192.168.6.0 255.255.255.0 Summary Link Enabled
```

show ip ospf statistics

This command displays information about recent Shortest Path First (SPF) calculations. The SPF is the OSPF routing table calculation. The output lists the number of times the SPF has run for each OSPF area. A table follows this information. For each of the 15 most recent SPF runs, the table lists how long ago the SPF ran, how long the SPF took, and the reasons why the SPF was scheduled.

Syntax

show ip ospf statistics

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

```
console>show ip ospf statistics
Area 0.0.0.0: SPF algorithm executed 0 times
Delta T   SPF Duration (msec)        Reason
--------  -------------------    ---------------
26:01:45           0
23:15:05           0                    R
23:14:22           0                    R, N
23:14:12           0                    R
23:10:04           0
```

show ip ospf stub table

Use the **show ip ospf stub table** command in Privileged EXEC mode to display the OSPF stub table. The information below will only be displayed if OSPF is initialized on the switch.

Syntax

show ip ospf stub table

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the OSPF stub table.

```
console(config)#show ip ospf stub table
AreaId        TypeofService  Metric Val Import SummaryLSA


------------ -------------  ---------- -----------------


0.0.0.1          Normal          1          Enable
```

show ip ospf virtual-link

Use the **show ip ospf virtual-link** command in Privileged EXEC mode to display the OSPF Virtual Interface information for a specific area and neighbor or for all.

Syntax

show ip ospf virtual-link [*area-id neighbor-id*]

- *area-id* — Identifies the OSPF area whose ranges are being displayed. (Range: IP address or decimal from 0–4294967295)
- *neighbor-id* — Identifies the neighbor's router ID. (Range: Valid IP address)

Default Configuration

Show information for all OSPF Virtual Interfaces.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the OSPF Virtual Interface information for area 10 and its neighbor.

```
console#show ip ospf virtual-link 10 192.168.2.2
Area ID..................................... 10
Neighbor Router ID.......................... 192.168.2.2
Hello Interval.............................. 10
Dead Interval............................... 655555
Iftransit Delay Interval.................... 1
Retransmit Interval......................... 5
State....................................... down
Metric...................................... 0
Neighbor State.............................. down
Authentication Type......................... MD5
Authentication Key.......................... "test123"
Authentication Key ID....................... 100
```

show ip ospf virtual-links brief

Use the **show ip ospf virtual-link brief** command in Privileged EXEC mode to display the OSPF Virtual Interface information for all areas in the system in table format.**Syntax**

show ip ospf virtual-link brief

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes.

User Guidelines

This command has no user guidelines.

Example

The following example displays the OSPF Virtual Interface information in the system.

```
console#show ipv6 ospf virtual-link brief
                      Hello    Dead     Retransmit  Transit
Area ID  Neighbor     Interval Interval Interval    Delay
-------  --------     -------- -------- ----------  -------
0.0.0.2  5.5.5.5      10        40         5           1
```

timers spf

Use the **timers spf** command in Router OSPF Configuration mode to configure the SPF delay and hold time. Use the no form of the command to reset the numbers to the default value.

Syntax

timers spf *delay-time hold-time*

no timers spf

- *delay-time* — SPF delay time. (Range: 0–65535 seconds)
- *hold-time* — SPF hold time. (Range: 0–65535 seconds)

Default Configuration

The default value for *delay-time* is 5. The default value for *hold-time* is 10.

Command Mode

Router OSPF Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the SPF delay and hold time.

```
console(config-router)#timers spf 20 30
```

56

OSPFv3 Commands

This chapter explains the following commands:

area default-cost (Router OSPFv3)	area virtual-link transmit-delay	ipv6 ospf priority	show ipv6 ospf abr
area nssa (Router OSPFv3)	default-information originate	ipv6 ospf retransmit-interval	show ipv6 ospf area
area nssa default-info-originate	default-metric	ipv6 ospf transmit-delay	show ipv6 ospf asbr
area nssa no-redistribute	distance ospf	ipv6 router ospf	show ipv6 ospf database
area nssa no-summary	enable	maximum-paths	show ipv6 ospf database database-summary
area nssa translator-role	exit-overflow-interval	nsf	show ipv6 ospf interface
area nssa translator-stab-intv	external-lsdb-limit	nsf helper	show ipv6 ospf interface brief
area range (Router OSPFv3)	ipv6 ospf	nsf helper strict-lsa-checking	show ipv6 ospf interface stats
area stub	ipv6 ospf area	nsf restart-interval	show ipv6 ospf interface vlan
area stub no-summary	ipv6 ospf cost	passive-interface	show ipv6 ospf neighbor
area virtual-link	ipv6 ospf dead-interval	passive-interface default	show ipv6 ospf range
area virtual-link dead-interval	ipv6 ospf hello-interval	redistribute	show ipv6 ospf stub table
area virtual-link hello-interval	ipv6 ospf mtu-ignore	router-id	show ipv6 ospf virtual-links

area virtual-link retransmit-interval	ipv6 ospf network	show ipv6 ospf	show ipv6 ospf virtual-link brief

area default-cost (Router OSPFv3)

Use the **area default-cost** command in Router OSPFv3 Configuration mode to configure the monetary default cost for the stub area. The operator must specify the area id and an integer value between 1-16777215. Use the **no** form of the command to return the cost to the default value. If the area has not been previously created, this command creates the area and then applies the default-cost.

Syntax

area *area-id* **default-cost** *cost*

no area *area-id* **default-cost**

- *areaid* — Valid area identifier.
- *cost* — Default cost. (Range: 1-16777215)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the monetary default cost at 100 for stub area 1.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 default-cost 100
```

area nssa (Router OSPFv3)

Use the **area nssa command** in Router OSPF Configuration mode to configure the specified area ID to function as an NSSA. If the area has not been previously created, this command creates the area and then applies the NSSA distinction. If the area already exists, the NSSA distinction is added or modified. Use the **no** form of the command to remove the NSSA distinction from the area.

Syntax

area *area-id* **nssa** [**no-redistribution**] [**default-information-originate** [**metric** *metric-value*] [**metric-type** *metric-type-value*]] [**no-summary**] [**translator-role** *role*] [**translator-stab-intv** *interval*]

no area *area-id* **nssa** [**no-redistribution**] [**default-information-originate**] [**no-summary**] [**translator-role**] [**translator-stab-intv**]

Parameter Description

Parameter	Description
area-id	Identifies the OSPFv3 stub area to configure. (Range: IP address or decimal from 0–4294967295)
metric-value	Specifies the metric of the default route advertised to the NSSA. (Range: 1–16777214)
metric-type-value	The metric type can be one of the following : **1** A metric type of nssa-external 1 (comparable) **2** A metric type of nssa-external 2 (non-comparable)
role	The translator role where role is one of the following : • always - The router assumes the role of the translator when it becomes a border router. • candidate - The router to participate in the translator election process when it attains border router status.
interval	The period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router. (Range: 0–3600)

Default Configuration

If no metric is defined, 10 is the default configuration.

The default role is candidate.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures not-so-stubby-area 10 as an NSSA.

```
console(config)#ipv6 router ospf
console(config-router)#area 10 nssa
```

The following example configures the metric value and type for the default route advertised into the NSSA and configures the NSSA so that summary LSAs are not advertised into the NSSA.

```
console(config-router)#area 20 nssa default-info-
originate metric 250 metric-type 2 no-summary
```

area nssa default-info-originate

Use the **area nssa default-info-originate** command in Router OSPFv3 Configuration mode to configure the metric value and type for the default route advertised into the NSSA. The optional metric parameter specifies the metric of the default route. The metric type can be comparable (nssa-external 1) or noncomparable (nssa-external 2). Use the **no** form of the command to return the metric value and type to the default value

Syntax

area *areaid* **nssa default-info-originate** [*metric* [**comparable | non-comparable**]]

no area *areaid* **nssa default-info-originate**

- *areaid* — Valid OSPFv3 area identifier.

- *metric* — Metric value for default route. (Range: 1-16777214)
- **comparable** — Metric Type (nssa-external 1).
- **non-comparable** — Metric Type (nssa-external 2).

Default Configuration

If no metric is defined, 10 is the default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the default metric value for the default route advertised into the NSSA.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 nssa default-info-originate
```

area nssa no-redistribute

Use the **area nssa no-redistribute** command in Router OSPFv3 Configuration mode to configure the NSSA ABR so that learned external routes will not be redistributed to the NSSA. Use the **no** form of the command to remove the configuration.

Syntax

area *areaid* **nssa no-redistribute**

no area *areaid* **nssa no-redistribute**

- *areaid* — Valid OSPF area identifier.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the area 1 NSSA ABR so that learned external routes will not be redistributed to the NSSA.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 nssa no-redistribute
```

area nssa no-summary

Use the **area nssa no-summary** command in Router OSPFv3 Configuration mode to configure the NSSA so that summary LSAs are not advertised into the NSSA. Use the no form of the command to remove the configuration.

Syntax

area *areaid* **nssa no-summary**

no area *area-id* **nssa no-summary**

- *areaid* — Valid OSPF area identifier.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the area 1 NSSA so that summary LSAs are not advertised into the NSSA.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 nssa no-summary
```

area nssa translator-role

Use the **area nssa translator-role** command in Router OSPFv3 Configuration mode to configure the translator role of the NSSA. Use the **no** form of the command to remove the configuration.

Syntax

area *areaid* **nssa translator-role** {**always** | **candidate**}

no area *areaid* **nssa translator-role**

- *areaid* — Valid OSPF area identifier.
- **always** — Causes the router to assume the role of the translator the instant it becomes a border router.
- **candidate** — Causes the router to participate in the translator election process when it attains border router status.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the **always** translator role of the area 1 NSSA.

```
console(config)#ipv6 router ospf
```

```
console(config-rtr)#area 1 nssa translator-role
always
```

area nssa translator-stab-intv

Use the **area nssa translator-stab-intv** command in Router OSPFv3 Configuration mode to configure the translator stability interval of the NSSA. The stability interval is the period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router.

Syntax

area *areaid* **nssa translator-stab-intv** *seconds*

no area *areaid* **nssa translator-stab-intv**

- *areaid* — Valid OSPF area identifier.
- *seconds* — Translator stability interval of the NSSA. (Range: 0-3600 seconds)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a translator stability interval of 100 seconds for the area 1 NSSA.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 nssa translator-stab-intv
100
```

area range (Router OSPFv3)

Use the **area range** command in Router OSPF Configuration mode to configure a summary prefix for routes learned in a given area. If the area has not been previously created, this command creates the area and then applies the range parameters. There are two types of area ranges. An area range can be configured to summarize intra-area routes. An ABR advertises the range rather than the specific intra-area route as a type 3 summary LSA. Also, an area range can be configured at the edge of an NSSA to summarize external routes reachable within the NSSA. The range is advertised as a type 5 external LSA. Use the **no** form of the command to remove the summary prefix configuration for routes learned in the specified area.

Syntax

area *area-id* **range** *ipv6-prefix/prefix-length* {**summarylink** | **nssaexternallink**} [**advertise** | **not-advertise**]

no area *area-id* range *ipv6-prefix/prefix-length* {**summarylink** | **nssaexternallink**}

Parameter Description

Parameter	Description
areaid	Valid OSPFv3 area identifier.
ipv6-prefix/prefix-length	Valid route prefix.
summarylink	LSDB type
nssaexternallink	LSDB type.
advertise	Allows area range to be advertised.
not-advertise	Suppresses area range from being advertised.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

The LSDB type must be specified by either **summarylink** or **nssaexternallink**, and the advertising of the area range can be allowed or suppressed.

Example

The following example creates an area range for the area 1 NSSA.

```
console(config)#ipv6 router ospf

console(config-rtr)#area 1 range 2020:1::1/64
summarylink
```

area stub

Use the **area stub** command in Router OSPFv3 Configuration mode to create a stub area for the specified area ID. If the area has not been previously created, this command creates the area and then applies the stub distinction. A stub area is characterized by the fact that AS External LSAs are not propagated into the area. Removing AS External LSAs and Summary LSAs can significantly reduce the size of the link state database of routers within the stub area.

Syntax

area *area-id* **stub** [**no summary**]

no area *area-id* **stub** [**no summary**]

- *area-id* — Valid OSPFv3 area identifier.

Parameter Description

Parameter	Description
area-id	Valid OSPFv3 area identifier.
no-summary	Disable the import of Summary LSAs for the stub area identified by area-id.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example creates a stub area for area 1.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 stub
```

area stub no-summary

Use the **area stub no-summary** command in Router OSPFv3 Configuration mode disable the import of Summary LSAs for the stub area identified by *area-id* .

Syntax

area *area-id* **stub no-summary**

no area *area-id* **stub no-summary**

- *area-id* — Valid OSPFv3 area identifier.
- so-summary — Disable the import of Summary LSAs for the stub area identified by area-id.

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example prevents Summary LSAs from being advertised into the area 1 NSSA.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 stub no-summary
```

area virtual-link

Use the **area virtual-link** command in Router OSPFv3 Configuration mode to create the OSPF virtual interface for the specified area-id and neighbor router. If the area has not been previously created, this command creates the area and then applies the virtual-link parameters. To remove the link, use the **no** form of the command. Use the optional parameters to configure dead-interval, hello-interval, retransmit-interval and transmit-delay.

Syntax

area *area-id* **virtual-link** *router-id* [**hello-interval** *seconds*] [**retransmit-interval** *seconds*] [**transmit-delay** *seconds*] [**dead-interval** *seconds*]

no area *area-id* **virtual-link** *router-id id* [**hello-interval**] [**retransmit-interval**] [**transmit-delay**] [**dead-interval**]

Parameter	Description
area-id	Valid OSPFv3 area identifier (or decimal value in the range of 0-4294967295).
router-id	Identifies the Router ID or valid IP address of the neighbor.
hello-interval seconds	Number of seconds to wait before sending hello packets to the OSPF virtual interface. (Range: 1–65535)
dead-interval seconds	Number of seconds to wait before the OSPF virtual interface on the virtual interface is assumed to be dead. (Range: 1–65535)
retransmit-interval seconds	The number of seconds to wait between retransmitting LSAs if no acknowledgement is received. (Range: 0–3600)
transmit-delay seconds	Number of seconds to increment the age of the LSA before sending, based on the estimated time it takes to transmit from the interface. (Range: 0–3600)

Default Configuration

Parameter	Default
area-id	No area ID is predefined.
router-id	No router ID is predefined.
hello-interval seconds	10 seconds
retransmit-interval seconds	5 seconds
transmit-delay seconds	1 second
dead-interval seconds	40 seconds

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example creates the OSPF virtual interface for area 1 and its neighbor router.

```
console(config)#ipv6 router ospf

console(config-rtr)#area 1 virtual-link 2
```

The following example configures a 20-second dead interval, a hello interval of 20 seconds, a retransmit interval of 20 seconds, and a 20-second transmit delay for the OSPF virtual interface on the virtual interface identified by area 1 and its neighbor.

```
console(config)#ipv6 router ospf

console(config-rtr)#area 1 virtual-link 2 dead-
interval 20 hello-interval 20 retransmit-interval 20
transmit-delay 20
```

area virtual-link dead-interval

Use the **area virtual-link dead-interval** command in Router OSPFv3 Configuration mode to configure the dead interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.

Syntax

area *areaid* **virtual-link** *neighbor* **dead-interval** *seconds*

no area *areaid* **virtual-link** *neighbor* **dead-interval**

- *areaid* — Valid OSPFv3 area identifier.
- *neighbor* — Router ID of neighbor.
- *seconds* — Dead interval. (Range: 1-65535)

Default Configuration

40 is the default value for *seconds*.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a 20-second dead interval for the OSPF virtual interface on the virtual interface identified by area 1 and its neighbor.

```
console(config)#ipv6 router ospf

console(config-rtr)#area 1 virtual-link 2 dead-
interval 20
```

area virtual-link hello-interval

Use the **area virtual-link hello-interval** command in Router OSPFv3 Configuration mode to configure the hello interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.

Syntax

area *areaid* **virtual-link** *neighbor* **hello-interval** *seconds*

no area *areaid* **virtual-link** *neighbor* **hello-interval**

- *areaid* — Valid OSPFv3 area identifier.
- *neighbor* — Router ID of neighbor.
- *seconds* — Hello interval. (Range: 1-65535)

Default Configuration

10 is the default value for *seconds*.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a hello interval of 20 seconds for the OSPF virtual interface on the virtual interface identified by area 1 and its neighbor.

```
console(config)#ipv6 router ospf

console(config-rtr)#area 1 virtual-link 2 hello-
interval 20
```

area virtual-link retransmit-interval

Use the **area virtual-link retransmit-interval** command in Router OSPFv3 Configuration mode to configure the retransmit interval for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.

Syntax

area *areaid* **virtual-link** *neighbor* **retransmit-interval** *seconds*

no area *areaid* **virtual-link** *neighbor* **retransmit-interval**

- *areaid* — Valid OSPFv3 area identifier.

- *neighbor* — Router ID of neighbor.
- *seconds* — Retransmit interval. (Range: 0-3600)

Default Configuration

5 is the default value for *seconds*.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures the retransmit interval of 20 seconds for the OSPF virtual interface on the virtual interface identified by area 1 and its neighbor.

```
(config)#ipv6 router ospf
(config-rtr)#area 1 virtual-link 2 retransmit-
interval 20
```

area virtual-link transmit-delay

Use the **area virtual-link transmit-delay** command in Router OSPFv3 Configuration mode to configure the transmit delay for the OSPF virtual interface on the virtual interface identified by *areaid* and *neighbor*.

Syntax

area *areaid* **virtual-link** *neighbor* **transmit-delay** *seconds*

no area *areaid* **virtual-link** *neighbor* **transmit-delay**

- *areaid* — Valid OSPFv3 area identifier.
- *neighbor* — Router ID of neighbor.
- *seconds* — Transmit delay interval. (Range: 0-3600)

Default Configuration

1 is the default value for *seconds*.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a 20-second transmit delay for the OSPF virtual interface on the virtual interface identified by area 1 and its neighbor.

```
console(config)#ipv6 router ospf
console(config-rtr)#area 1 virtual-link 2 transmit-delay 20
```

default-information originate

Use the **default-information originate** command in Router OSPFv3 Configuration mode to control the advertisement of default routes. Use the **no** form of the command to return the default route advertisement settings to the default value.

Syntax

default-information originate [**always**] [**metric** *metric-value*] [**metric-type** **type-value**]

no default-information originate [**metric**] [**metric-type**]

Syntax Description

Parameter	Description
always	Always advertise default routes.
metric-value	The metric (or preference) value of the default route. (Range: 1–16777214)

Parameter	Description
type-value	**1** External type-1 route. **2** External type-2 route.

Default Configuration

The default metric is none and the default type is 2.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example controls the advertisement of default routes by defining a metric value of 100 and metric type 2.

```
console(config)#ipv6 router ospf

console(config-rtr)#default-information originate
metric 100 metric-type 2
```

default-metric

Use the **default-metric** command in Router OSPFv3 Configuration mode to set a default for the metric of distributed routes. Use the **no** form of the command to remove the metric from the distributed routes.

Syntax

default-metric *metric-value*

no default-metric

- *metric-value* — The metric (or preference) value of the default route. (Range: 1–16777214)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets a default of 100 for the metric of distributed routes.

```
console(config)#ipv6 router ospf
console(config-rtr)#default-metric 100
```

distance ospf

The **distance ospf** command sets the preference values of OSPF route types in the router. Lower route preference values are preferred when determining the best route. The type of OSPF route can be intra, inter, external. All the external type routes are given the same preference value. Use the "no" form of this command to reset the preference values to the default.

Syntax

distance ospf {**external** | **inter-area** | **intra-area** } *distance*

no distance ospf {**external** | **inter-area** | **intra-area** } *distance*

- *distance*— Used to select the best path when there are two or more routes to the same destination from two different routing protocols (Range: 1–255).

Default Configuration

The default preference value is 110.

Command Mode

Router OSPF Configuration mode.

Router OSPFv3 Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example sets a route preference value of 100 for intra OSPF in the router.

```
console(config)#ipv6 router ospf
console(config-rtr)#distance ospf intra 100
```

enable

Use the **enable** command in Router OSPFv3 Configuration mode to enable administrative mode of OSPF in the router (active).

Syntax

enable

no enable

Default Configuration

Enabled is the default state.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example enables administrative mode of OSPF in the router (active).

```
console(config)#ipv6 router ospf
console(config-rtr)#enable
```

exit-overflow-interval

Use the **exit-overflow-interval** command in Router OSPFv3 Configuration mode to configure the exit overflow interval for OSPF. It describes the number of seconds after entering Overflow state that a router will wait before attempting to leave the Overflow State. This allows the router to originate non-default AS-external-LSAs again. When set to 0, the router will not leave Overflow State until restarted.

Syntax

exit-overflow-interval *seconds*

no exit-overflow-interval

- *seconds* — Exit overflow interval for OSPF (Range: 0-2147483647)

Default Configuration

0 is the default value for *seconds*.

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the exit overflow interval for OSPF at 100 seconds.

```
console(config)#ipv6 router ospf
console(config-rtr)#exit-overflow-interval 100
```

external-lsdb-limit

Use the **external-lsdb-limit** command in Router OSPFv3 Configuration mode to configure the external LSDB limit for OSPF. If the value is -1, then there is no limit. When the number of non-default AS-external-LSAs in a router's link-state database reaches the external LSDB limit, the router enters

overflow state. The router never holds more than the external LSDB limit non-default AS-external- LSAs in it database. The external LSDB limit MUST be set identically in all routers attached to the OSPF backbone and/or any regular OSPF area.

Syntax

external-lsdb-limit *limit*

no external-lsdb-limit

- *limit* — External LSDB limit for OSPF (Range: -1-2147483647)

Default Configuration

-1 is the default value for *limit*.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the external LSDB limit at 100 for OSPF.

```
console(config)#ipv6 router ospf
console(config-rtr)#external-lsdb-limit 100
```

ipv6 ospf

Use the **ipv6 ospf** command in Interface Configuration mode to enable OSPF on a router interface or loopback interface.

Syntax

ipv6 ospf

no ipv6 ospf

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

This command has no user guidelines.

Example

The following example enables OSPF on VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf
```

ipv6 ospf area

Use the **ipv6 ospf area** ***areaid*** command in Interface Configuration mode to set the OSPF area to which the specified router interface belongs.

Syntax

ipv6 ospf area *areaid*

no ipv6 ospf area *areaid*

- *areaid* — Is a 32-bit integer, formatted as a 4-digit dotted-decimal number or a decimal value. It uniquely identifies the area to which the interface connects. Assigning an area id which does not exist on an interface causes the area to be created with default values. (Range: 0-4294967295).

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example defines the OSPF area to which VLAN 15 belongs.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf area 100
```

ipv6 ospf cost

Use the **ipv6 ospf cost** command in Interface Configuration mode to configure the cost on an OSPF interface. Use the **no** form of the command to return the cost to the default value.

Syntax

ipv6 ospf cost *interface-cost*

no ipv6 ospf cost

- *interface-cost* — Specifies the cost (link-state metric) of the OSPF interface. (Range: 1–65535)

Default Configuration

10 is the default link-state metric configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example configures a cost of 100.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf cost 100
```

ipv6 ospf dead-interval

Use the **ipv6 ospf dead-interval** command in Interface Configuration mode to set the OSPF dead interval for the specified interface.

Syntax

ipv6 ospf dead-interval *seconds*

no ipv6 ospf dead-interval

- *seconds* — A valid positive integer, which represents the length of time in seconds that a router's Hello packets have not been seen before its neighbor routers declare that the router is down. The value for the length of time must be the same for all routers attached to a common network. This value should be some multiple of the Hello Interval (i.e. 4). (Range: 1-65535)

Default Configuration

40 seconds is the default value of *seconds*.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the OSPF dead interval at 100 seconds.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf dead-interval 100
```

ipv6 ospf hello-interval

Use the **ipv6 ospf hello-interval** command in Interface Configuration mode to set the OSPF hello interval for the specified interface.

Syntax

ipv6 ospf hello-interval *seconds*

no ipv6 ospf hello-interval

- *seconds* — A valid positive integer which represents the length of time of the OSPF hello interval. The value must be the same for all routers attached to a network. (Range: 1-65535 seconds)

Default Configuration

10 seconds is the default value of *seconds*.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the OSPF hello interval at 15 seconds.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf hello-interval 15
```

ipv6 ospf mtu-ignore

Use the **ipv6 ospf mtu-ignore** command in Interface Configuration mode to disable OSPF maximum transmission unit (MTU) mismatch detection. Use the **no** form of the command to reset mismatch detection to the default value.

Syntax

ipv6 ospf mtu-ignore

no ipv6 ospf mtu-ignore

Default Configuration

The default state is Disabled.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

OSPF Database Description packets specify the size of the largest IP packet that can be sent without fragmentation on the interface. When a router receives a Database Description packet, it examines the MTU advertised by the neighbor. By default, if the MTU is larger than the router can accept, the Database Description packet is rejected and the OSPF adjacency is not established.

Example

The following example disables OSPF maximum transmission unit (MTU) mismatch detection.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf mtu-ignore
```

ipv6 ospf network

Use the **ipv6 ospf network** command in Interface Configuration mode to change the default OSPF network type for the interface. Use the **no** form of the command to return the network setting to the default value.

Syntax

ipv6 ospf network { **broadcast** | **point-to-point** }

no ipv6 ospf network

- **broadcast** — The network type is broadcast.
- **point-to-point** — The network type is point-to-point.

Default Configuration

The default state is point-to-point.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode

User Guidelines

Normally, the network type is determined from the physical IP network type. By default all Ethernet networks are OSPF-type broadcast. Similarly, tunnel interfaces default to point-to-point. When an Ethernet port is used as a single large bandwidth IP network between two routers, the network type can be point-to-point since there are only two routers. Using point-to-point as the network type eliminates the overhead of the OSPF designated router election. It is normally not useful to set a tunnel to OSPF network type broadcast.

Example

The following example changes the default OSPF network type to point-to-point.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ipv6 ospf network point-to-
point
```

ipv6 ospf priority

Use the **ipv6 ospf priority** command in Interface Configuration mode to set the OSPF priority for the specified router interface. Use the **no** form of the command to return the priority to the default value.

Syntax

ipv6 ospf priority *number-value*

no ipv6 ospf priority

- *number-value* — Specifies the OSPF priority for the specified router interface. (Range: 0–255) A value of 0 indicates that the router is not eligible to become the designated router on this network.

Default Configuration

1, the highest router priority, is the default value.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the OSPF priority at 50 for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ipv6 ospf priority 50
```

ipv6 ospf retransmit-interval

Use the **ipv6 ospf retransmit-interval** command in Interface Configuration mode to set the OSPF retransmit interval for the specified interface.

Syntax

ipv6 ospf retransmit-interval *seconds*

no ipv6 ospf retransmit-interval

- *seconds* — The number of seconds between link-state advertisement retransmissions for adjacencies belonging to this router interface. This value is also used when retransmitting database description and link-state request packets. (Range: 0 to 3600 seconds)

Default Configuration

5 seconds is the default value.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the OSPF retransmit interval at 100 seconds.

```
console(config)#interface vlan 15
```

```
console(config-if-vlan15)#ipv6 ospf retransmit-
interval 100
```

ipv6 ospf transmit-delay

Use the **ipv6 ospf transmit-delay** command in Interface Configuration mode to set the OSPF Transmit Delay for the specified interface.

Syntax

ipv6 ospf transmit-delay *seconds*

no ipv6 ospf transmit-delay

- *seconds* — OSPF transmit delay for the specified interface. In addition, it sets the estimated number of seconds it takes to transmit a link state update packet over this interface. (Range: 1 to 3600 seconds)

Default Configuration

No default value.

Command Mode

Interface Configuration (VLAN, Tunnel, Loopback) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the OSPF Transmit Delay at 100 seconds for VLAN 15.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ipv6 ospf transmit-delay
100
```

ipv6 router ospf

Use the **ipv6 router ospf** command in Global Configuration mode to enter Router OSPFv3 Configuration mode.

Syntax

ipv6 router ospf

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

Use the following command to enable OSPFv3.

```
console(config)#ipv6 router ospf
```

maximum-paths

Use the **maximum-paths** command in Router OSPFv3 Configuration mode to set the number of paths that OSPF can report for a given destination.

Syntax

maximum-paths *maxpaths*

no maximum-paths

- *maxpaths* — Number of paths that can be reported. (Range: 1-2)

Default Configuration

2 is the default value for *maxpaths*.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the number of paths that OSPF can report for a destination to 1.

```
console(config)#ipv6 router ospf
console(config-rtr)#maximum-paths 1
```

nsf

Use this command to enable OSPF graceful restart. Use the "no" form of this command to disable graceful restart.

Syntax

nsf [**ietf**] [**planned-only**]

no nsf [**ietf**]

ietf — This keyword is used to distinguish the IETF standard implementation of graceful restart from other implementations. Since the IETF implementation is the only one supported, this keyword is optional.

planned-only — This keyword indicates that OSPF should only perform a graceful restart when the restart is planned (i.e., when the restart is a result of the initiate failover command).

Default Configuration

Graceful restart is disabled by default

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

Graceful restart works in concert with nonstop forwarding to enable the hardware to continue forwarding IPv6 packets using OSPFv3 routes while a backup unit takes over management unit responsibility. When OSPF executes a graceful restart, it informs its neighbors that the OSPF control plane is restarting, but that it will be back shortly. Helpful neighbors continue to advertise to the rest of the network that they have full adjacencies with the restarting router, avoiding announcement of a topology change and

everything that goes with that (i.e., flooding of LSAs, SPF runs). Helpful neighbors continue to forward packets through the restarting router. The restarting router relearns the network topology from its helpful neighbors.

This implementation of graceful restart restarting router behavior is only useful with a router stack. Graceful restart does not work on a standalone, single-unit router.

nsf helper

Use the **nsf-helper** to allow OSPF to act as a helpful neighbor for a restarting router. Use the "no" form of this command to prevent OSPF from acting as a helpful neighbor.

Syntax

nsf helper[planned-only]

no nsf helper

- **planned-only** — This keyword indicates that OSPF should only help a restarting router performing a planned restart.

Default Configuration

OSPF may act as a helpful neighbor for both planned and unplanned restarts

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

The grace LSA announcing the graceful restart includes a restart reason. Reasons 1 (software restart) and 2 (software reload/upgrade) are considered planned restarts. Reasons 0 (unknown) and 3 (switch to redundant control processor) are considered unplanned restarts.

nsf ietf helper disable is functionally equivalent to no nsf helper and is supported solely for IS CLI compatibility.

nsf helper strict-lsa-checking

Use the **nsf-helper strict-lsa-checking** command to require that an OSPF helpful neighbor exit helper mode whenever a topology change occurs. Use the "no" form of this command to allow OSPF to continue as a helpful neighbor in spite of topology changes.

Syntax

nsf [ietf] helper strict-lsa-checking

no nsf [**ietf**] **helper strict-lsa-checking**

- **ietf** —This keyword is used to distinguish the IETF standard implementation of graceful restart from other implementations. Since the IETF implementation is the only one supported, this keyword is optional.

Default Configuration

A helpful neighbor exits helper mode when a topology change occurs.

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

The restarting router is unable to react to topology changes. In particular, the restarting router will not immediately update its forwarding table; therefore, a topology change may introduce forwarding loops or black holes that persist until the graceful restart completes. By exiting the graceful restart on a topology change, a router tries to eliminate the loops or black holes as quickly as possible by routing around the restarting router.

A helpful neighbor considers a link down with the restarting router to be a topology change, regardless of the strict LSA checking configuration.

nsf restart-interval

Use the **nsf restart-interval** command to configure the length of the grace period on the restarting router. Use the "no" form of this command to revert the grace period to its default.

Syntax

nsf [**ietf**] **restart-interval** *seconds*

no nsf [**ietf**] **restart-interval**

- **ietf** — This keyword is used to distinguish the IETF standard implementation of graceful restart from other implementations. Since the IETF implementation is the only one supported, this keyword is optional.
- *seconds* — The number of seconds that the restarting router asks its neighbors to wait before exiting helper mode. The restarting router includes the restart interval in its grace LSAs (range 1–1800 seconds).

Default Configuration

The default restart interval is 120 seconds.

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

The grace period must be set long enough to allow the restarting router to reestablish all of its adjacencies and complete a full database exchange with each of those neighbors.

passive-interface

Use the **passive-interface** command to set the interface or tunnel as passive. It overrides the global passive mode that is currently effective on the interface or tunnel. Use the "no" form of this command to set the interface or tunnel as non-passive.

Syntax

passive-interface {**vlan** *vlan-id* | **tunnel** *tunnel-id* }

no passive-interface {**vlan** *vlan-id* | **tunnel** *tunnel-id* }

- *vlan-id* — The vlan number
- *tunnel-id* — Tunnel identifier. (Range: 0–7)

Default Configuration

Passive interface mode is disabled by default.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-router)#passive-interface vlan 1
```

passive-interface default

The **passive-interface default** command enables the global passive mode by default for all interfaces. It overrides any interface level passive mode. Use the "no" form of this command to disable the global passive mode by default for all interfaces. Any interface previously configured to be passive reverts to non-passive mode.

Syntax

passive-interface default

no passive-interface default

Default Configuration

Global passive mode is disabled by default.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-rtr)#passive-interface default
```

redistribute

Use the **redistribute** command in Router OSPFv3 Configuration mode to configure the OSPFv3 protocol to allow redistribution of routes from the specified source protocol/routers.

Syntax

redistribute {static | connected} [metric *metric*] [metric-type {1 | 2}] [**tag** *tag*]

no redistribute {static | connected} [*metric*] [metric-type] [*tag*]

- *metric* — Metric value used for default routes. (Range: 0-16777214)
- *tag* — Tag. (Range: 0-4294967295)

Default Configuration

2 is the default value for **metric-type,** 0 for *tag*.

Command Mode

Router OSPFv3 Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the OSPFv3 protocol to allow redistribution of routes from the specified source protocol/routers.

```
console(config)#ipv6 router ospf
console(config-rtr)#redistribute connected
```

router-id

Use the **router-id** command in Router OSPFv3 Configuration mode to set a 4-digit dotted-decimal number uniquely identifying the Router OSPF ID.

Syntax

router-id *router-id*

- *router-id* — Router OSPF identifier. (Range: 0-4294967295)

Default Configuration

This command has no default configuration.

Command Mode

Router OSPFv3 Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets a 4-digit dotted-decimal number identifying the Router OSPF ID as 2.3.4.5.

```
console(config)#ipv6 router ospf
console(config-rtr)#router-id 2.3.4.5
```

show ipv6 ospf

Use the **show ipv6 ospf** command in Privileged EXEC mode to display information relevant to the OSPF router.

Syntax

show ipv6 ospf [*area-id*]

area-id — Identifier for the OSPF area being displayed.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

Some of the information below displays only if you enable OSPF and configure certain features. The following fields may be displayed:

Field	Description
Router ID	A 32-bit integer in dotted decimal format identifying the router about which information is displayed. This is a configured value.
OSPF Admin Mode	Shows whether OSPF is administratively enabled or disabled.
External LSDB Limit	Shows the maximum number of non-default external LSAs entries that can be stored in the link-state database.
Exit Overflow Interval	Shows the number of seconds that, after entering OverflowState, as defined by RFC 1765, a router will attempt to leave OverflowState.
AutoCost Ref BW	The configured autocost reference bandwidth. This value is used to determine the OSPF metric on its interfaces. The reference bandwidth is divided by the interface speed to compute the metric.
Default Passive Setting	When enabled, OSPF interfaces are passive by default.
Maximum Paths	Shows the maximum number of paths that OSPF can report for a given destination.
Default Metric	Default metric for redistributed routes.
Default Route Advertise	When enabled, OSPF originates a type 5 LSA advertising a default route.
Always	When this option is configured, OSPF only originates a default route when the router has learned a default route from another source.
Metric	Shows the metric for the advertised default routes. If the metric is not configured, this field is not configured.
Metric Type	Shows whether the metric for the default route is advertised as External Type 1 or External Type 2.
Number of Active Areas	The number of OSPF areas to which the router is attached on interfaces that are up.

ABR Status	Shows whether the router is an OSPF Area Border Router.
ASBR Status	Indicates whether the router is an autonomous system border router. Router automatically becomes an ASBR when it is configured to redistribute routes learned from another protocol. The possible values for the ASBR status is enabled (if the router is configured to re-distribute routes learned by other protocols) or disabled (if the router is not configured for the same).
Stub Router	OSPF enters stub router mode, as described in RFC 3137, when it encounters a resource limitation that prevents it from computing a complete routing table. In this state, OSPF sets the link metrics of non-stub links in its own router LSAs to the largest possible value, discouraging other routers from computing paths through the stub router, but allowing other routers to compute routes to destinations attached to the stub router. To restore OSPF to normal operation, resolve the condition that caused the resource overload, then disable and re-enable OSPF globally.
External LSDB Overflow	OSPF enters this state when the number of external LSAs exceeds a configured limit, as described in RFC 1765.
External LSA Count	Shows the number of external (LS type 5) link-state advertisements in the link-state database.
External LSA Checksum	Shows the sum of the LS checksums of external link-state advertisements contained in the link-state database.
New LSAs Originated	Shows the number of link-state advertisements that have been originated.
LSAs Received	Shows the number of link-state advertisements received determined to be new instantiations.
LSA Count	The number of LSAs in the link state database.
Maximum Number of LSAs	The limit on the number of LSAs that the router can store in its link state database.
LSA High Water Mark	The maximum number of LSAs that have been in the link state database since OSPF began operation.
Retransmit List Entries	The current number of entries on all neighbors' retransmit lists.

Maximum Number of Retransmit Entries	The maximum number of entries that can be on neighbors' retransmit lists at any given time. This is the sum for all neighbors. When OSPF receives an LSA and cannot allocate a new retransmit list entry, the router does not acknowledge the LSA, expecting the sender to retransmit.
Retransmit Entries High Water Mark	The maximum number of retransmit list entries that have been on all neighbors' retransmit lists at one time.
NSF Support	Whether graceful restart is administratively enabled. Possible values are Support Always, Disabled, or Planned.
NSF Restart Interval	The number of seconds a helpful neighbor allows a restarting router to complete its graceful restart.
NSF Restart Status	Whether the router is currently performing a graceful restart.
NSF Restart Age	The number of seconds until a graceful restart expires. Only non-zero when the router is in graceful restart.
NSF Restart Exit Reason	The reason the previous graceful restart ended. Possible values are Not attempted, In progress, Completed, Timed out, Topology change, and Manual clear.
NSF Helper Support	Whether this router is configured to act as a graceful restart helpful neighbor. Possible values are: Helper Support Always, Disabled, or Planned.
NSF Helper Strict LSA Checking	As a graceful restart helpful neighbor, whether to terminate the helper relationship if a topology change occurs during a neighbor's graceful restart.
Redistributing	This field is a heading and appears only if you configure the system to take routes learned from a non-OSPF source and advertise them to its peers.
Source	Shows source protocol/routes that are being redistributed. Possible values are static, connected, or RIP.
Tag	Shows the decimal value attached to each external route.
Subnets	When this option is not configured, OSPF will only redistribute classful prefixes.
Distribute-List	Shows the access list used to filter redistributed routes.

Example

The following example enables OSPF traps.

```
console#show ipv6 ospf
Router ID..................................... 0.0.0.2
OSPF Admin Mode............................... Enable
ASBR Mode..................................... Disable
ABR Status.................................... Disable
Exit Overflow Interval........................ 0
External LSA Count............................ 0
External LSA Checksum......................... 0
New LSAs Originated........................... 0
LSAs Received................................. 0
External LSDB Limit........................... No Limit
Default Metric................................ Not Configured
Maximum Paths................................. 2
Default Route Advertise....................... Disabled
Always........................................ FALSE
Metric.....................................
Metric Type................................... External Type 2
NSF Support................................... Disabled
NSF Restart Interval.......................... 120 seconds
NSF Helper Support............................ Always
NSF Helper Strict LSA Checking................ Enabled
```

show ipv6 ospf abr

This command displays the internal OSPFv3 routes to reach Area Border Routers (ABR). This command takes no options.

Syntax

show ipv6 ospf abr

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

This command has no user guidelines.

Example

```
console#show ipv6 ospf abr
Type  Router Id  Cost  Area ID   Next Hop                Next Hop
                                                         Intf
----    --------  ----  --------  ----------------------  -----
INTRA  3.3.3.3   10    0.0.0.1   FE80::211:88FF:FE2A:3CB3  vlan11
INTRA  4.4.4.4   10    0.0.0.1   FE80::210:18FF:FE82:8E1   vlan12
```

show ipv6 ospf area

Use the **show ipv6 ospf area** command in Privileged EXEC mode to display information about the area.

Syntax

show ipv6 ospf area *areaid*

- *areaid* — Identifier for the OSPF area being displayed.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays information about area 1.

```
console#show ipv6 ospf area 1
AreaID..................................... 0.0.0.1
External Routing........................... Import External LSAs
Spf Runs................................... 0
Area Border Router Count................... 0
Area LSA Count............................. 0
Area LSA Checksum.......................... 0
Stub Mode.................................. Disable
Import Summary LSAs........................ Enable
```

show ipv6 ospf asbr

The **show ipv6 ospf asbr** command displays the internal OSPFv3 routes to reach Autonomous System Boundary Routes (ASBR). This command takes no options.

Syntax

show ipv6 ospf asbr

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

```
console#show ipv6 ospf asbr
Type   Router Id   Cost  Area ID   Next Hop                Next Hop
                                                           Intf
----   ---------   ----  --------  ----------------------  -------
INTRA  1.1.1.1     10     0.0.0.1  FE80::213:C4FF:FEDB:6C41   vlan10
```

```
INTRA  4.4.4.4     10     0.0.0.1  FE80::210:18FF:FE82:8E1     vlan12
```

show ipv6 ospf border-routers

Use the **show ipv6 ospf** command to display internal OSPFv3 routes to reach Area Border Routers (ABR) and Autonomous System Boundary Routers (ASBR). This command takes no options.

Syntax

show ipv6 ospf border-routers

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

show ipv6 ospf database

Use the **show ipv6 ospf database** command in Privileged EXEC mode to display information about the link state database when OSPFv3 is enabled. If no parameters are entered, the command displays the LSA headers. Optional parameters specify the type of link state advertisements to display.

The information below is only displayed if OSPF is enabled.

Syntax

show ipv6 ospf [*area-id*] **database** [{**external** | **inter-area** {**prefix** | **router**} | **link** | **network** | **nssaexternal** | **prefix** | **router** | **unknown** [area | as | **link**]}] [*link-state-id*] [**adv-router** [*router-id*] | **self-originate**]

- *area-id* — Identifies a specific OSPF area for which link state database information will be displayed.
- **external** — Displays the external LSAs.
- **inter-area** — Displays the inter-area LSAs.
- **link** — Displays the link LSAs.
- **network** — Displays the network LSAs.

- **nssa-external —** Displays NSSA external LSAs.
- **prefix —** Displays intra-area Prefix LSA.
- **router —** Displays router LSAs.
- **unknown —** Displays unknown area, AS or link-scope LSAs.
- *link-state-id* **—** Specifies a valid link state identifier (LSID).
- **adv-router —** Shows the LSAs that are restricted by the advertising router.
- *router-id* — Specifies a valid router identifier.
- **self-originate —** Displays the LSAs in that are self originated.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays information about the link state database when OSPFv3 is enabled.

```
console#show ipv6 ospf database

               Router Link States (Area 0.0.0.0)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                   0   4      80000034 54BD V6E--R- ----B
2.2.2.2                   0   2      80000044 95A5 V6E--R- ----B

               Network Link States (Area 0.0.0.0)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
2.2.2.2                 636    636   80000001 8B0D V6E--R-
```

```
                Inter Network States (Area 0.0.0.0)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                   1   323    80000001 3970
2.2.2.2                   1   322    80000001 1B8A
1.1.1.1                   2   293    80000001 3529
2.2.2.2                   2   375    80000001 FC5E

                Link States (Area 0.0.0.0)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                 634   700  80000008 2D89 V6E--R-
2.2.2.2                 634   689  8000000A 6F82 V6E--R-
2.2.2.2                 635   590  80000001 7782 V6E--R-


                Intra Prefix  States (Area 0.0.0.0)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                   0   1      8000003C 9F31
2.2.2.2                   0   2      8000004D 9126

                Router Link States (Area 0.0.0.1)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                   0   1      8000002E 35AD V6E--R- --V-B
2.2.2.2                   0   0      8000004A D2F3 V6E--R- ----B

                Network Link States (Area 0.0.0.1)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                 634  621    80000001 B9E2 V6E--R-
```

```
                Inter Network States (Area 0.0.0.1)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                  16   4      80000001 CA7C
2.2.2.2                  18   3      80000001 B28D

                Link States (Area 0.0.0.1)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                 634   441    80000003 B877 V6E--R-
2.2.2.2                 634   433    80000003 FE6E V6E--R-


                Intra Prefix  States (Area 0.0.0.1)
Adv Router     Link Id         Age   Sequence Csum Options Rtr Opt
-------------- --------------- ----- -------- ---- ------- -------
1.1.1.1                   0   6    8000003A 37C4
2.2.2.2                   0   1    8000004F 439A
1.1.1.1                10634   434  80000002 440A
```

show ipv6 ospf database database-summary

Use the **show ipv6 ospf database database-summary** command in Privileged EXEC mode to display the number of each type of LSA in the database and the total number of LSAs in the database.

Syntax

show ipv6 ospf database database-summary

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the number of each type of LSA in the database and the total number of LSAs in the database.

```
console#show ipv6 ospf database database-summary

OSPF Router with ID (0.0.0.2)

Router database summary

Router..................................... 0

Network.................................... 0

Inter-area Prefix.......................... 0

Inter-area Router.......................... 0

Type-7 Ext................................. 0

Link....................................... 0

Intra-area Prefix.......................... 0

Link Unknown............................... 0

Area Unknown............................... 0

AS Unknown................................. 0

Type-5 Ext................................. 0

Self-Originated Type-5 Ext................. 0

Total...................................... 0
```

show ipv6 ospf interface

Use the **show ipv6 ospf interface** command in Privileged EXEC mode to display the information for the IFO object or virtual interface tables.

Syntax

show ipv6 ospf interface [interface-type interface-number]

Syntax Description

Parameter	Description
interface-type	The interface type, VLAN, tunnel or loopback
interface-number	The valid interface number, a valid VLAN ID, tunnel identifier (Range: 0–7) or loopback identifier (Range: 0–7).

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the information in VLAN 11's virtual interface tables.

```
console#show ipv6 ospf interface vlan 11
IP Address..................................... Err
ifIndex........................................ 1
OSPF Admin Mode................................ Enable
OSPF Area ID................................... 0.0.0.0
Router Priority................................ 1
Retransmit Interval............................ 5
Hello Interval................................. 10
Dead Interval.................................. 40
LSA Ack Interval............................... 1
```

```
Iftransit Delay Interval..................... 1
Authentication Type.......................... None
Metric Cost.................................. 10
(computed)
OSPF Mtu-ignore.............................. Disable
OSPF cannot be initialized on this interface.
```

show ipv6 ospf interface brief

Use the **show ipv6 ospf interface brief** command in Privileged EXEC mode to display brief information for the IFO object or virtual interface tables.

Syntax

show ipv6 ospf interface brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays brief ospf interface information.

```
console#show ipv6 ospf interface brief
                                        Hello Dead  Retrax       LSA
          Admin              Router      Int.  Int.  Int.  Retrax Ack
Interface  Mode    Area ID   Prior. Cost Val.  Val.  Val.  Delay  Intval
--------- -------- --------  ------ ----- ----- ----- ------ ------ -----
```

show ipv6 ospf interface stats

Use the **show ipv6 ospf interface stats** command in User EXEC mode to display the statistics for a specific interface. The command only displays information if OSPF is enabled.

Syntax

show ipv6 ospf interface stats vlan *vlan-id*

- *vlan-id* — Valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the interface statistics for VLAN 5.

```
console>show  ipv6  ospf interface stats  vlan  5

OSPFv3 Area ID.............................. 0.0.0.1

Spf Runs.................................... 265

Area Border Router Count..................... 1

AS Border Router Count....................... 0

Area LSA Count.............................. 6

IPv6 Address.................................
FE80::202:BCFF:FE00:3146/1283FFE::2/64

OSPF Interface Events....................... 53

Virtual Events.............................. 13

Neighbor Events............................. 6

External LSA Count.......................... 0
```

```
LSAs Received.............................. 660
Originate New LSAs......................... 853
Sent Packets............................... 1013
Received Packets........................... 893
Discards................................... 48
Bad Version................................ 0
Virtual Link Not Found..................... 9
Area Mismatch.............................. 39
Invalid Destination Address................ 0
No Neighbor at Source Address.............. 0
Invalid OSPF Packet Type................... 0
  Packet Type             Sent        Received
--------------------      ----------  ----------
Hello                     295          219
Database Description      10            14
LS Request                4              4
LS Update                 521          398
LS Acknowledgement        209          282
```

show ipv6 ospf interface vlan

Use the **show ipv6 ospf interface vlan** command in Privileged EXEC mode to display OSPFv3 configuration and status information for a specific vlan.

Syntax

show ipv6 ospf interface vlan {*vlan-id* | **brief** }

- *vlan-id* — Valid VLAN ID. Range is 1-4093.
- **brief —** Displays a snapshot of configured interfaces.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays ospf interface vlan information.

```
console#show ipv6 ospf interface vlan 10

IPv6 Address.............................
FE80::2FC:E3FF:FE90:44

ifIndex..................................... 634

OSPF Admin Mode............................. Enable

OSPF Area ID................................ 0.0.0.1

Router Priority............................. 1

Retransmit Interval......................... 5

Hello Interval.............................. 10

Dead Interval............................... 40

LSA Ack Interval............................ 1

Iftransit Delay Interval.................... 1

Authentication Type......................... None

Metric Cost................................. 10  (computed)

OSPF Mtu-ignore............................. Disable

OSPF Interface Type......................... broadcast

State....................................... backup-
designated-router

Designated Router........................... 1.1.1.1

Backup Designated Router.................... 2.2.2.2

Number of Link Events....................... 46
```

show ipv6 ospf neighbor

Use the **show ipv6 ospf neighbor** command in Privileged EXEC mode to display information about OSPF neighbors. If a neighbor IP address is not specified, the output displays summary information in a table. If an interface or tunnel is specified, only the information for that interface or tunnel displays. The information below only displays if OSPF is enabled and the interface has a neighbor.

Syntax

show ipv6 ospf neighbor [interface-type interface-number] [neighbor-id]

Syntax Description

Parameter	Description
interface-type	Interface type, vlan or tunnel.
interface-number	A valid interface number, a valid VLAN ID or tunnel identifier. (Range is 0-7).
neighbor-id	Valid IP address of the neighbor about which information is displayed.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Examples

The following examples display information about OSPF neighbors, in the first case in a summary table, and in the second in a table specific to tunnel 1.

```
console#show ipv6 ospf neighbor
Router ID Priority Intf Interface    State         Dead
```

```
                    ID                                  Time
--------- -------- ---- -----------  ------------ ----

console#show ipv6 ospf neighbor interface tunnel 1
IP Address..................................... Err
ifIndex........................................ 619
OSPF Admin Mode................................ Enable
OSPF Area ID................................... 0.0.0.0
Router Priority................................ 1
Retransmit Interval............................ 5
Hello Interval................................. 10
Dead Interval.................................. 40
LSA Ack Interval............................... 1
Iftransit Delay Interval....................... 1
Authentication Type............................ None
Metric Cost.................................... 1
(computed)
OSPF Mtu-ignore................................ Disable
OSPF cannot be initialized on this interface.
```

show ipv6 ospf range

Use the **show ipv6 ospf range** command in Privileged EXEC mode to display information about the area ranges for the specified area identifier.

Syntax

show ipv6 ospf range *areaid*

- *areaid* — Identifies the OSPF area whose ranges are being displayed.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays information about the area ranges for area 1.

```
console#show ipv6 ospf range 1
Area ID   IPv6 Prefix/Prefix Length  Lsdb Type       Advertisement
--------- ------------------------  -------------- -------------
```

show ipv6 ospf stub table

Use the show ipv6 ospf stub table command in Privileged EXEC mode to display the OSPF stub table. The information below will only be displayed if OSPF is initialized on the switch.

Syntax

show ipv6 ospf stub table

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the OSPF stub table.

```
console#show ipv6 ospf stub table
AreaId       TypeofService   Metric Val   Import SummaryLSA
```

```
------------ -------------   ----------   -----------------
0.0.0.10          Normal          1             Enable
```

show ipv6 ospf virtual-links

Use the **show ipv6 ospf virtual-links** command in Privileged EXEC mode to display the OSPF Virtual Interface information for a specific area and neighbor or for all areas in the system. **Syntax**

show ipv6 ospf virtual-link [*area-id neighbor-id* | brief]

- *area-id* — Identifies the OSPF area whose virtual interface information is being displayed.
- *neighbor-id* — Router ID of neighbor.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the OSPF Virtual Interface information for area 1 and its neighbor.

```
console#show ipv6 ospf virtual-link 1 1.1.1.1
Area ID..................................... 1
Neighbor Router ID.......................... 1.1.1.1
Hello Interval.............................. 10
Dead Interval............................... 40
Iftransit Delay Interval.................... 1
Retransmit Interval......................... 5
State....................................... point-to-point
```

```
Metric..................................... 10
Neighbor State............................. Full
```

show ipv6 ospf virtual-link brief

Use the **show ipv6 ospf virtual-link brief** command in Privileged EXEC mode to display the OSPFV3 Virtual Interface information for all areas in the system.

Syntax

show ipv6 ospf virtual-link brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays the OSPF stub table.

```
console(config)#show ipv6 ospf virtual-link brief
                        Hello      Dead       Retransmit Transit
Area ID     Neighbor    Interval   Interval   Interval   Delay
----------- ----------- ---------- ---------- ---------- --------
```

57

Router Discovery Protocol Commands

Routers can be configured to periodically send router discovery messages to announce their presence to locally attached hosts. The router discovery message advertises one or more IP addresses on the router that hosts can use as their default gateway. Hosts can send a router solicitation message asking any router that receives the message to immediately send a router advertisement, so that the host does not have to wait for the next periodic message.

Router discovery enables hosts to select from among multiple default gateways and switch to a different default gateway if an initially designated gateway goes down.

Commands in this Chapter

This chapter explains the following commands:

ip irdp	ip irdp minadvertinterval
ip irdp address	ip irdp multicast
ip irdp holdtime	ip irdp preference
ip irdp maxadvertinterval	show ip irdp

ip irdp

Use the **ip irdp** command in Interface Configuration mode to enable Router Discovery on an interface. Use the **no** form of the command to disable Router Discovery.

Syntax

ip irdp [multicast | holdtime seconds | maxadvertinterval seconds | minadvertinterval seconds | preference number | address address]

no ip irdp holdtime

Syntax Description

Parameter	Description
multicast	Configure the address that the interface uses to send the router discovery advertisements to be 224.0.0.1, the all-hosts IP multicast address. Use the **no** form of the command to use 255.255.255.255, the limited broadcast address.
holdtime seconds	Integer value in seconds of the the holdtime field of the router advertisement sent from this interface. (Range: 4-9000 seconds)
maxadvertinterval seconds	Maximum time in seconds allowed between sending router advertisements from the interface. (Range: 4 or the minimum advertisement interval, whichever is greater, and 1800 seconds).
minadvertinterval seconds	Minimum time in seconds allowed between sending router advertisements from the interface. (Range: 3 to value of maximum advertisement interval in seconds)
preference number	Preference of the address as a default router address, relative to other router addresses on the same subnet. (Range: -2147483648 to 2147483647)
address address	IP address for router discovery advertisements. (Range: 224.0.0.1 [all-hosts IP multicast address] or 255.255.255.255 [limited broadcast address])

Default Configuration

- Router discovery is disabled by default.
- 1800 seconds is the default value for holdtime.
- 600 seconds is the default value for maxadvertinterval.
- The minadvertinterval default value is 450.
- The preference default value is 0.
- IP address 224.0.0.1 is the default configuration for address.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

This command has no user guidelines.

Example

The following example enables router discovery on the selected interface.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip irdp
```

ip irdp address

Use the **ip irdp address** command in Interface Configuration mode to configure the address that the interface uses to send the router discovery advertisements. Use the no form of the command to return the address to the default.

Syntax

ip irdp address *ip-address*

no ip irdp address

- *ip-address* — IP address for router discovery advertisements. (Range: 224.0.0.1 [all-hosts IP multicast address] or 255.255.255.255 [limited broadcast address])

Default Configuration

IP address 224.0.0.1 is the default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines. This command is deprecated in favor of the **ip irdp multicast** command. If you issue this command, the configuration will show the **ip irdp multicast** command instead.

Example

The following example sets the limited broadcast address as the IP address for router discovery advertisements.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip irdp address
255.255.255.255
```

ip irdp holdtime

Use the **ip irdp holdtime** command in Interface Configuration mode to configure the value, in seconds, of the holdtime field of the router advertisement sent from this interface. Use the no form of the command to set the time to the default value.

Syntax

ip irdp holdtime *integer*

no ip irdp holdtime

- *integer* — Integer value in seconds of the the holdtime field of the router advertisement sent from this interface. The holdtime must be no less than the maximum advertisement interval and cannot be greater than 9000 seconds.

Default Configuration

The holdtime defaults to 3 times the maximum advertisement interval.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

The holdtime is the length of time that a host considers the router advertisement valid. After the holdtime expires, a host will no longer use the router as its default gateway.

Example

The following example sets hold time at 2000 seconds for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip irdp holdtime 2000
```

ip irdp maxadvertinterval

Use the **ip irdp maxadvertinterval** command in Interface Configuration mode to configure the maximum time, in seconds, allowed between sending router advertisements from the interface. Use the no form of the command to set the time to the default value.

Syntax

ip irdp maxadvertinterval *integer*

no ip irdp maxadvertinterval

- *integer* — Maximum time in seconds allowed between sending router advertisements from the interface. (Range: 4 or the minimum advertisement interval, whichever is greater, and 1800 seconds)

Default Configuration

600 seconds is the default value.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

The default values of the minimum advertisement interval and the holdtime depend on the value of the maximum advertisement interval. Setting the maximum advertisement interval changes the minimum advertisement interval and holdtime if those values are at their defaults; so, the maximum advertisement interval should always be set first. If the minimum advertisement interval has been configured to a non-default value, the maximum advertisement interval cannot be configured to a lower value than the minimum advertisement interval. If the holdtime has been configured to a non-default value, the maximum advertisement interval cannot be configured to a value larger than the holdtime.

Example

The following example sets maximum advertisement interval at 600 seconds for VLAN 15.

```
console(config)#interface vlan 15

console(config-if-vlan15)#ip irdp maxadvertinterval
600
```

ip irdp minadvertinterval

Use the **ip irdp minadvertinterval** command in Interface Configuration mode to configure the minimum time, in seconds, allowed between sending router advertisements from the interface. Use the no form of the command to set the time to the default value.

Syntax

ip irdp minadvertinterval *integer*

no ip irdp minadvertinterval

- *integer* — Minimum time in seconds allowed between sending router advertisements from the interface. (Range: 3 to value of maximum advertisement interval in seconds)

Default Configuration

The default value is 0.75 times the maximum advertisement interval.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets minimum advertisement interval at 100 seconds for VLAN 15.

```
console(config)#interface vlan 15
```

```
console(config-if-vlan15)#ip irdp minadvertinterval
100
```

ip irdp multicast

To send router advertisements as IP multicast packets, use the **ip irdp multicast** command in Interface Configuration mode. To send router advertisements to the limited broadcast address (255.255.255.255), use the no form of this command.

Syntax

ip irdp multicast

no ip irdp multicast

Default Configuration

Router discovery packets are sent to the all hosts IP multicast address (224.0.0.1) by default.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

If a subnet includes any hosts that do not accept IP multicast packets, send router advertisements to the limited broadcast address.

Example

The following example configures router discovery to send to the limited broadcast address:

```
console(config)#interface vlan 15804 Router Discovery
Protocol Commands www. d e l l . c om|s u p p o r t .
d e l l .com console(config-if-vlan15)#no ip irdp
multicast
```

ip irdp preference

Use the **ip irdp preference** command in Interface Configuration mode to configure the preference of the address as a default router address relative to other router addresses on the same subnet. Use the no form of the command to set the preference to the default value.

Syntax

ip irdp preference *integer*

no ip irdp preference

- *integer* — Preference of the address as a default router address, relative to other router addresses on the same subnet. (Range: -2147483648 to 2147483647 **)**

Default Configuration

0 is the default value.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the ip irdp preference to 1000 for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#ip irdp preference 1000
```

show ip irdp

Use the **show ip irdp** command in Privileged EXEC mode to display the router discovery information for all interfaces, or for a specified interface.

Syntax

show ip irdp [**vlan** *vlan-id*]

- *vlan-id* — Valid VLAN ID

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example shows router discovery information for VLAN 15.

```
console#show ip irdp vlan 15
Interface  Ad Mode  Advertise Address Max Int Min Int Hold Time Preference
---------  -------  ----------------- ------- ------- -------- ----------
vlan15     Enable  224.0.0.1            600     450     1800       0
```

58

Routing Information Protocol Commands

The Routing Information Protocol (RIP) has been a long-standing protocol used by routers for exchanging route information. RIP is a distance vector protocol whereby each route is characterized by the number of gateways, or hops, a packet must traverse to reach its intended destination. Categorized as an interior gateway protocol, RIP operates within the scope of an autonomous system. RIP is a simple protocol. Its usefulness is limited to moderately sized networks whose physical interconnections are of similar type and speed.

PowerConnect routing supports RIPv2 as specified in RFC 2453.

Commands in this Chapter

This chapter explains the following commands:

auto-summary	hostroutesaccept	router rip
default-information originate	ip rip	show ip rip
default-metric	ip rip authentication	show ip rip interface
distance rip	ip rip receive version	show ip rip interface brief
distribute-list out	ip rip send version	split-horizon
enable	redistribute	

auto-summary

Use the **auto-summary** command in Router RIP Configuration mode to enable the RIP auto-summarization mode. Use the no form of the command to disable auto-summarization mode.

Syntax

auto-summary

no auto-summary

Default Configuration

Disabled is the default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-router)#auto-summary
```

default-information originate

Use the **default-information originate** command in Router RIP Configuration mode to control the advertisement of default routes.

Syntax

default-information originate

no default-information originate

Default Configuration

This command has no default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-router)#default-information originate
```

default-metric

Use the **default-metric** command in Router RIP Configuration mode to set a default for the metric of distributed routes. Use the **no** form of the command to return the metric to the default value.

Syntax

default-metric *number-value*

no default-metric

- *number-value* — Metric for the distributed routes. (Range: 1-15)

Default Configuration

Default metric is not configured by default.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets a default of 12 for the metric of distributed routes.

```
console(config-router)#default-metric 12
```

distance rip

Use the **distance rip** command in Router RIP Configuration mode to set the route preference value of RIP in the router. Lower route preference values are preferred when determining the best route. Use the no form of the command to return the preference to the default value.

Syntax

distance rip *integer*

no distance rip

- *integer* — RIP route preference. (Range: 1-255)

Default Configuration

15 is the default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the route preference value of RIP in the router at 100.

```
console(config-router)#distance rip 100
```

distribute-list out

Use the **distribute-list out** command in Router RIP Configuration mode to specify the access list to filter routes received from the source protocol. Use the no form of the command to remove the access list from the specified source protocol.

Syntax

distribute-list *accesslistname* **out** {**ospf** | **static** | **connected**}

no distribute-list *accesslistname* **out** {**ospf** | **static** | **connected**}

- *accesslistname* — The name used to identify the existing ACL. The range is 1-31 characters.
- **ospf** — Apply the specific access list when OSPF is the source protocol.
- **static** — Apply the specified access list when packets come through a static route.
- **connected** — Apply the specified access list when packets come from a directly connected route.

Default Configuration

This command has no default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example elects access list ACL40 to filter routes received from the source protocol.

```
console(config-router)#distribute-list ACL40 out
static
```

enable

Use the **enable** command in Router RIP Configuration mode to reset the default administrative mode of RIP in the router (active). Use the no form of the command to disable the administrative mode for RIP.

Syntax

enable

no enable

Default Configuration

Enabled is the default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-router)#enable
```

hostroutesaccept

Use the **hostroutesaccept** command in Router RIP Configuration mode to enable the RIP hostroutesaccept mode. Use the no form of the command to disable the RIP hostroutesaccept mode.

Syntax

hostroutesaccept

no hostroutesaccept

Default Configuration

Enabled is the default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-router)#hostroutesaccept
```

ip rip

Use the **ip rip** command in Interface Configuration mode to enable RIP on a router interface. Use the no form of the command to disable RIP on the interface.

Syntax

ip rip

no ip rip

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-vlan2)#ip rip
console(config-if-vlan2)#no ip rip
```

ip rip authentication

Use the **ip rip authentication** command in Interface Configuration Mode to set the RIP Version 2 Authentication Type and Key for the specified VLAN. Use the no form of the command to return the authentication to the default value.

Syntax

ip rip authentication {**none** | {**simple** *key*} | {**encrypt** *key key-id*}}

no ip rip authentication

- none—Do not use RIP authentication on the VLAN.
- simple—Use simple authentication on the VLAN.
- *key* — Authentication key for the VLAN. (Range: 16 bytes or less)
- encrypt — Use MD5 encryption for the RIP interface.
- *key-id* — Authentication key identifier for authentication type encrypt. (Range: 0-255)

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the RIP Version 2 Authentication Type and Key for VLAN 11.

```
console(config-if-vlan11)#ip rip authentication
encrypt pass123 35
```

ip rip receive version

Use the **ip rip receive version** command in Interface Configuration mode to configure the interface to allow RIP control packets of the specified version(s) to be received. Use the no form of the command to return the version to the default value.

Syntax

ip rip receive version {rip1 | rip2 | both | none}

no ip rip receive version

- rip1 — Receive only RIP version 1 formatted packets.
- rip2 — Receive only RIP version 2 formatted packets.
- both — Receive packets from either format.
- none — Do not allow any RIP control packets to be received.

Default Configuration

Both is the default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example allows no RIP control packets to be received by VLAN 11.

```
console(config-if-vlan11)#ip rip receive version none
```

ip rip send version

Use the **ip rip sent version** command in Interface Configuration mode to configure the interface to allow RIP control packets of the specified version to be sent. Use the no form of the command to return the version to the default value.

Syntax

ip rip send version {rip1 | rip1c | rip2 | none}

no ip rip send version

- rip1 — Send RIP version 1 formatted packets.
- rip1c — Send RIP version 1 compatibility mode, which sends RIP version 2 formatted packets via broadcast.
- rip2 — Send RIP version 2 using multicast.
- none — Do not allow any RIP control packets to be sent.

Default Configuration

RIP2 is the default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example allows no RIP control packets to be sent by VLAN 11.

```
console(config-if-vlan11)#ip rip send version none
```

redistribute

The **redistribute** command configures RIP protocol to redistribute routes from the specified source protocol/routers. If the source protocol is OSPF, there are five possible match options.

Syntax

redistribute ospf [**metric** *integer*] [**match** [**internal**] [**external 1**] [**external 2**] [**nssa-external 1**] [**nssa-external 2**]]
no redistribute ospf

redistribute { **static** | **connected**} [**metric** *integer*]

- metric *integer* — Specifies the metric to use when redistributing the route. Range: 0-15.
- match internal — Adds internal matches to any match types presently being redistributed.
- match external 1 — Adds routes imported into OSPF as Type-1 external routes into any match types presently being redistributed.
- match external 2 — Adds routes imported into OSPF as Type-2 external routes into any match types presently being redistributed.
- match nssa-external 1 — Adds routes imported into OSPF as NSSA Type-1 external routes into any match types presently being redistributed.
- match nssa-external 2 — Adds routes imported into OSPF as NSSA Type-2 external routes into any match types presently being redistributed.
- **static** — Redistributes static routes.
- connected — Redistributes directly-connected routes.

Default Configuration

metric *integer* — not configured
match — internal

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config-router)#redistribute ospf metric 10
match nssa-external 1

console(config-router)#redistribute connected metric
1
```

router rip

Use the **router rip command** in Global Configuration mode to enter Router RIP mode.

Syntax

router rip

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example enters Router RIP mode.

```
console(config)#router rip

console(config-router)#
```

show ip rip

Use the **show ip** rip command in Privileged EXEC mode to display information relevant to the RIP router.

Syntax

show ip rip

Default Configuration

The command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays information relevant to the RIP router.

```
console#show ip rip
RIP Admin Mode.............................. Enable
Split Horizon Mode.......................... Simple
Auto Summary Mode........................... Enable
Host Routes Accept Mode..................... Enable
Global route changes........................ 0
Global queries.............................. 0
Default Metric.............................. 12
Default Route Advertise..................... 0
Redistributing..............................
Source...................................... Connected
Metric...................................... 2
Distribute List............................. Not configured
Redistributing..............................
Source...................................... ospf
```

```
Metric..................................... 10
Match Value................................ 'nssa-external 1'
Distribute List............................ Not configured
```

show ip rip interface

Use the **show ip rip interface** command in Privileged EXEC mode to display information related to a particular RIP interface.

Syntax

show ip rip interface vlan *vlan-id*

- *vlan-id* — Valid VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays information related to the VLAN 15 RIP interface.

```
console#show ip rip interface vlan 15
Interface..................................... 15
IP Address.................................... -----
Send version.................................. RIP-2
Receive version............................... Both
RIP Admin Mode................................ Disable
Link State.................................... -----
Authentication Type........................... MD5
```

```
Authentication Key.......................... "pass123"
Authentication Key ID....................... 35
Bad Packets Received........................ -----
Bad Routes Received......................... -----
Updates Sent................................ -----
```

show ip rip interface brief

Use the **show ip rip interface brief** command in Privileged EXEC mode to display general information for each RIP interface. For this command to display successful results routing must be enabled per interface (i.e. ip rip).

Syntax

show ip rip interface brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays general information for each RIP interface.

```
console#show ip rip interface brief
                          Send     Receive     RIP       Link
Interface  IP Address     Version  Version     Mode       State
---------- ----------     -------- ----------- --------- ----------
vlan1      0.0.0.0        RIP-2    Both        Disable    Down
vlan2      0.0.0.0        RIP-2    Both        Disable    Down
```

split-horizon

Use the **split-horizon** command in Router RIP Configuration mode to set the RIP split horizon mode. Use the no form of the command to return the mode to the default value.

Syntax

split-horizon {none | simple | poison}

no split-horizon

- none — RIP does not use split horizon to avoid routing loops.
- simple — RIP uses split horizon to avoid routing loops.
- poison — RIP uses split horizon with poison reverse (increases routing packet update size).

Default Configuration

Simple is the default configuration.

Command Mode

Router RIP Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example does not use split horizon.

```
console(config-router)#split-horizon none
```

59

Tunnel Interface Commands

PowerConnect provides for the creation, deletion, and management of tunnel interfaces. They are dynamic interfaces that are created and deleted by user configuration.

Tunnel interfaces are used for the following purposes.

- IPv4 tunnels
- IPv6 tunnels

Each router interface (port or VLAN interface) may have associated tunnel interfaces. Each interface can have multiple tunnel interfaces. There is no set limit to the number of tunnel interfaces associated with a router interface. There is a compile platform limitation to the number of tunnel interfaces available to the entire system.

To support IPv4 to IPv6 transition, PowerConnect supports configured tunnels (RFC 4213) and automatic 6to4 tunnels (RFC 3056). 6to4 tunnels are automatically formed for IPv4 tunnels carrying IPv6 traffic. The automatic tunnels IPv4 destination address is derived from the 6to4 IPv6 address of the tunnel's next hop. PowerConnect can act as a 6to4 border router that connects a 6to4 site to a 6to4 domain. The border router sends and receives tunneled traffic from routers in the 6to4 domain that include other 6to4 border routers and 6to4 relay routers.

Commands in this Chapter

This chapter explains the following commands:

interface tunnel	tunnel mode ipv6ip
show interfaces tunnel	tunnel source
tunnel destination	

interface tunnel

Use the **interface tunnel** command in Global Configuration mode to enter the interface configuration mode for a tunnel.

Syntax

interface tunnel *tunnel-id*

no interface tunnel *tunnel-id*

- *tunnel-id* — Tunnel identifier. (Range: 0–7)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example enables the interface configuration mode for tunnel 1.

```
console(config)#interface tunnel 1
console(config-if-tunnel1)#
```

show interfaces tunnel

Use the **show interfaces tunnel** command in Privileged EXEC mode to display the parameters related to tunnel such as tunnel mode, tunnel source address and tunnel destination address.

Syntax

show interfaces tunnel [*tunnel-id*]

- *tunnel-id* — Tunnel identifier. (Range: 0–7)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Examples

The following examples show the parameters related to an individual tunnel and to all tunnel interfaces.

```
console#show interfaces tunnel 1
Interface Link Status..... down
MTU size..... 1480 bytes

console#show interfaces tunnel
TunnelId    Interface     TunnelMode  SourceAddress   DestinationAddress
--------    ---------     ----------  -------------    ----------------
1           tunnel 1      IPv6OVER4   10.254.25.14    10.254.25.10
2           tunnel 2      IPv6OVER4                   10.254.20.10
```

tunnel destination

Use the **tunnel destination** command in Interface Configuration mode to specify the destination transport address of the tunnel.

Syntax

tunnel destination *ip-address*

no tunnel destination

- *ip-addr*ess — Valid IPv4 address.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Tunnel) mode.

User Guidelines

This command has no user guidelines.

Example

The following example specifies the destination transport address of tunnel 1.

```
console(config)#interface tunnel 1

console(config-if-tunnel1)#tunnel destination
10.1.1.1
```

tunnel mode ipv6ip

Use the **tunnel mode ipv6ip** command in Interface Configuration mode to specify the mode of the tunnel.

Syntax

tunnel mode ipv6ip [6to4]

no tunnel mode

- 6to4 — Sets the tunnel mode to automatic.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Tunnel) mode.

User Guidelines

This command has no user guidelines.

Example

The following example specifies ipv6ip mode for tunnel 1.

```
console(config)#interface tunnel 1
console(config-if-tunnel1)#tunnel mode ipv6ip
console(config-if-tunnel1)#tunnel mode ipv6ip 6to4
```

tunnel source

Use the **tunnel source** command in Interface Configuration mode to specify the source transport address of the tunnel, either explicitly or by reference to an interface.

Syntax

tunnel source {*ip-address* | *interface-type interface-number*}

no tunnel source

Syntax Description

Parameter	Description
ip-address	Valid IPv4 address.
interface-type	Valid interface type. VLAN is the only type supported.
interface-number	Valid interface number.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Tunnel) mode.

User Guidelines

This command has no user guidelines.

Example

The following example specifies VLAN 11 as the source transport address of the tunnel.

```
console(config)#interface tunnel 1
console(config-if-tunnel1)#tunnel source vlan 11
```

60

Virtual Router Redundancy Protocol Commands

An end station running IP needs to know the address of its first hop router. While some network administrators choose to install dynamic router discovery protocols such as DHCP, others prefer to statically allocate router addresses. If the router identified by such a statically allocated address goes down, the end station loses connectivity. The Virtual Router Redundancy Protocol (VRRP) is designed to provide backup for the failing router without requiring any action on the part of the end station. It is based on the concept of having more than one router recognize the same IP address. One of the routers is elected the master router and handles all traffic sent to the specified virtual router IP address. If the master router fails, one of the backup routers is elected in its place and starts handling traffic sent to the address. This change is transparent to end stations.

VRRP increases the availability of the default path without requiring configuration of dynamic routing or router discovery protocols on every end station.

Multiple virtual routers can be defined on a single router interface.

Pingable VRRP Interface

RFC 3768 specifies that a router may only accept IP packets sent to the virtual router's IP address if the router is the address owner. In practice, this restriction makes it more difficult to troubleshoot network connectivity problems. When a host cannot communicate, it is common to ping (send an ICMP Echo Request) the host's default gateway to determine whether the problem is in the first hop of the path to the destination. When the default gateway is a virtual router that does not respond to pings, the operator cannot use this troubleshooting technique. Because of this, it has been common for VRRP implementations to respond to pings, in spite of the prohibition in the RFC. The IETF has recognized the issue, and a draft revision of the VRRP

RFC defines a new configuration option that allows the router to accept any packet sent to a VRRP address, regardless of whether the VRRP Master is the address owner.

The Pingable VRRP Interface feature, when enabled, allows the VRRP master to respond to both fragmented and unfragmented ICMP echo requests packets destined to a VRRP address (or addresses). A virtual router in backup state discards these. For any packet destined to a VRRP address (or addresses), the VRRP master responds with VRRP address as the source IPv4 address and VRMAC as the source MAC address. A configuration option controls whether the router responds to Echo Requests sent to a VRRP IP address.

PowerConnect 4.0 includes a separate configuration option that controls whether the router responds to ICMP Echo Requests. When Echo Replies are disabled using that option, the VRRP master does not respond to Echo Requests, even if this new option is enabled.

VRRP Route/Interface Tracking

The VRRP Route/Interface Tracking feature extends the capability of the Virtual Router Redundancy Protocol (VRRP) to allow tracking of specific route/interface IP states, within the router, that can alter the priority level of a virtual router for a VRRP group. Exception to this is, if that VRRP group is the IP address owner, and, in that case, its priority is fixed at 255 and cannot be reduced through the tracking process.

VRRP Route/Interface Tracking provides a way to ensure the best VRRP router is master for the group by altering VRRP priorities to the status of tracked objects, such as IP interface or IP route states. In the process of altering the VRRP priorities the priority must not go below 1 or above the configured priority.

NOTE: Note that the mastership only switches on a priority change if preempt is enabled.

Interface Tracking

For interface tracking, VRRP is a routing event client. When a routing interface goes up or down (or routing is disabled globally, implying all routing interfaces are down), VRRP checks if the interface is tracked. If so, it adjusts the priority. Interface tracking is useful for tracking interfaces that are not configured for VRRP. Only IP interfaces are tracked.

Route Tracking

The network operator may perform this task to track the reachability of an IP route. A tracked route is considered up when a routing table entry exists for the route and the route is accessible. For route tracking, make VRRP a best route client of RTO. When a tracked route is added or deleted, change the priority. For simplicity, routes are not distinguished with the next hop interface that has VRRP enabled. So VRRP Route Tracking can ignore route modifications.

Commands in this Chapter

This chapter explains the following commands:

Virtual Router Redundancy Protocol Commands

ip vrrp	vrrp timers advertise
vrrp accept-mode	vrrp timers learn
vrrp authentication	vrrp track interface
vrrp description	vrrp track ip route
vrrp ip	show vrrp
vrrp mode	show vrrp interface
vrrp preempt	show vrrp interface brief
vrrp priority	show vrrp interface stats

Pingable VRRP Commands

ip vrrp accept-mode	show ip vrrp interface

Virtual Router Redundancy Protocol Commands

ip vrrp

Use the **ip vrrp** command in Global Configuration mode to enable the administrative mode of VRRP for the router. Use the **no** form of the command to disable the administrative mode of VRRP for the router.

Syntax

ip vrrp

no ip vrrp

Default Configuration

VRRP is disabled by default.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example enables VRRP protocol on the router.

```
console(config)#ip vrrp
```

vrrp accept-mode

Use the **vrrp accept-mode** command in Interface (VLAN) Configuration mode to enable the VRRP Master to accept ping packets sent to one of the virtual router's IP addresses. Use the **no** form of the command to disable responding to ping packets.

Syntax

vrrp *vrid* **accept-mode**

no vrrp *vrid* **accept-mode**

- vrid — Virtual router identification. (Range: 1-255)

Default Configuration

The default configuration is disabled.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

vrrp authentication

Use the **vrrp authentication** command in Interface Configuration mode to set the authentication details value for the virtual router configured on a specified interface. Use the **no** form of the command to return the authentication type to the default value.

Syntax

vrrp group authentication {none | simple *key***}**

no vrrp group authentication

Syntax Description

Parameter	Description
group	The virtual router identifier. (Range: 1-255)
none	Indicates authentication type is none.
simple	Authentication type is a simple text password.
key	The key for simple authentication. (Range: String values)

Default Configuration

None is the default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the authorization details value for VRRP router group 5 on VLAN 15.

```
console(config)#interface vlan 15

console(config-if-vlan15)#vrrp 2 authentication
simple test123
```

vrrp description

Use the **vrrp description** command in Interface Configuration mode to assign a description to the Virtual Router Redundancy Protocol (VRRP) group. To remove the description, use the **no** form of the command.

Syntax

vrrp group description ***text***

no vrrp group description

Syntax Description

Parameter	Description
group	The virtual router identifier. (Range: 1-255)
text	Description for the virtual router group up to 80 characters.

Default Configuration

No description is present.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

Descriptions containing spaces must be wrapped with quotes.

Example

The following example creates virtual router group 5 on VLAN 15 and configures its description.

```
console(config)#interface vlan 15

console(config-if-vlan15)#vrrp 5

console(config-if-vlan15)#vrrp 5 description “Sales
and Marketing”
```

vrrp ip

Use the **vrrp ip** command in Interface Configuration mode to enable VRRP and set the virtual router IP address value for an interface. Use the **no** form of the command remove the secondary IP address. It is not possible to remove the primary IP address once assigned. Remove the VRRP group instead.

Syntax

vrrp *group* **ip** *ip-address* [**secondary**]

no vrrp *group* **ip** *ip-address* **vlan secondary**

Syntax Description

Parameter	Description
group	The virtual router identifier. (Range: 1-255)
ip-address	The IP address of the virtual router.
secondary	Designates the virtual router IP address as a secondary IP address on an interface.

Default Configuration

VRRP is not configured on the interface.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

The virtual router IP addresses must be on the local subnet configured on the VLAN. To configure vrrp, perform the following steps:

1. Enable ip routing in global configuration mode.
2. Enable ip vrrp globally.
3. Set an IP address on the desired interface where VRRP is to be configured.
4. Configure the VRRP group ID on the selected interface.
5. Set the virtual router ID and address on the selected interface.
6. Enable VRRP on the interface using the **vrrp mode** command.

Example

The following example configures VRRP on VLAN 15.

```
console#configure
console(config)#ip routing
console(config)#ip vrrp
console(config)#vlan database
console(config-vlan)#vlan 15
console(config-vlan)#vlan routing 15
console(config-vlan)#exit
console(config)#interface vlan 15
console(config-if-vlan15)#ip address 192.168.5.1 255.255.255.0
console(config-if-vlan15)#vrrp 20
console(config-if-vlan15)#vrrp 20 ip 192.168.5.20
console(config-if-vlan15)#vrrp 20 mode
```

vrrp mode

Use the **vrrp mode** command in Interface Configuration mode to enable the virtual router configured on an interface. Enabling the status field starts a virtual router. Use the no form of the command to disable the virtual router.

Syntax

vrrp *vr-id* **mode**

no vrrp *vr-id* **mode**

- *vr-id* — The virtual router identifier. (Range: 1-255)

Default Configuration

Disabled is the default configuration.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example enables the virtual router for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#vrrp 5 mode
```

vrrp preempt

Use the **vrrp preempt** command in Interface Configuration mode to set the preemption mode value for the virtual router configured on a specified interface. Use the **no** form of the command to disable preemption mode.

Syntax

vrrp *group* **preempt** [**delay** *seconds*]

no vrrp *group* **preempt**

Syntax Description

Parameter	Description
group	The virtual router identifier. (Range: 1-255)

Parameter	Description
seconds	The number of seconds the VRRP router will wait before issuing an advertisement claiming master ownership.

Default Configuration

Enabled is the default configuration. Delay defaults to 0 seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

As per the VRRP RFC, when preemption is enabled, the backup router discards the advertisements until the masterdowntimer starts. This feature requires immediate sending of advertisements when the preemption case occurs and the delay is 0. This is a violation according to the RFC 3768. Delay, if configured, will cause the VRRP router to wait the specified number of seconds before issuing an advertisement claiming master ownership.

Example

The following example sets the preemption mode value for the virtual router for VLAN 15.

```
console(config)#interface vlan 15
console(config-if-vlan15)#vrrp 5 preempt
```

vrrp priority

Use the **vrrp priority** command in Interface Configuration mode to set the priority value for the virtual router configured on a specified interface. Use the **no** form of the command to return the priority to the default value.

Syntax

vrrp *group* **priority** *level*

no vrrp *group* **priority** *level*

- *group* — The virtual router identifier. (Range: 1-255)

- *level* — Priority value for the interface. (Range: 1-254)

Default Configuration

Priority has a default value of 100.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the priority value for the virtual router 5 on VLAN 15.

```
console(config-if-vlan15)#vrrp 5 priority 20
```

vrrp timers advertise

Use the **vrrp timers advertise** command in Interface Configuration mode to set the frequency, in seconds, that an interface on the specified virtual router sends a virtual router advertisement. Use the **no** form of the command to return the advertisement frequency to the default value.

Syntax

vrrp *group* **timers advertise** *interval*

no vrrp *group* **timers advertise** *interval*

- *group* — The virtual router identifier. (Range: 1-255)
- *interval* — The frequency at which an interface on the specified virtual router sends a virtual router advertisement. (Range: 1-255 seconds)

Default Configuration

Interval has a default value of 1.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example sets the frequency at which the VLAN 15 virtual router 5 sends a virtual router advertisement.

```
console(config-if-vlan15)#vrrp 5 timers advertise 10
```

vrrp timers learn

Use the **vrrp timers learn** command in Interface Configuration mode to configure the router, when it is acting as backup virtual router for a Virtual Router Redundancy Protocol (VRRP) group, to learn the advertisement interval used by the master virtual router. Use the **no** form of the command to prevent the router from learning the advertisement interval from the master virtual router.

Syntax

vrrp *group* **timers learn**

no vrrp *group* **timers learn**

- *group* — The virtual router identifier. (Range: 1-255)

Default Configuration

Timer learning is disabled by default and the router uses the configured advertisement.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following configures VLAN 15 virtual router to learn the advertisement interval used by the master virtual router.

```
console(config-if-vlan15)#vrrp 5 timers learn
```

vrrp track interface

Use the **vrrp track interface** command in Interface Configuration mode to alter the priority of the VRRP router based on the availability of its interfaces. It is useful for tracking interfaces that are not configured for VRRP. Only routing interfaces may be tracked. A tracked interface is up if routing on that interface is up. Otherwise, the tracked interface is down.

When the tracked interface is down, or the interface has been removed from the router, the priority of the VRRP router will be decremented by the value specified in the priority argument. When the interface is up for the IP protocol, the priority will be incremented by the priority value.

A VRRP configured interface can track more than one interface. When a tracked interface goes down, then the priority of the router will be decreased by 10 (default priority decrement) for each downed interface. The default priority decrement is changed using the priority argument. The default priority of the virtual router is 100, and the default decrement priority is 10. By default, no interfaces are tracked. If you specify, just the interface to be tracked without giving the priority, which is optional, then the default priority will be set.

Use the **no** form of this command to remove the interface from the tracked list or to restore the priority decrement to its default. When removing an interface from the tracked list, the priority is incremented by the decrement value if that interface is down.

Syntax

vrrp *group* **track interface vlan** *vlan-id* [**decrement** priority]

no vrrp *group* **track interface vlan** *vlan-id*

Syntax Description

Parameter	Description
group	The virtual router identifier. (Range: 1-255)
vlan vlan-id	Valid VLAN ID.
priority	Priority decrement value for the tracked interface. (Range: 1-254)

Default Configuration

No interfaces are tracked. The default decrement priority is 10.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

Example

The following example adds VLAN 2 to the virtual router tracked list (with a priority decrement value of 20.)

```
(config-if-vlan10)#vrrp 1 track interface vlan 2
decrement 20
```

vrrp track ip route

Use the **vrrp track ip route** command to track the route reachability. When the tracked route is deleted, the priority of the VRRP router is decremented by the value specified in the priority argument. When the tracked route is added, the priority is incremented by the same. A VRRP configured interface can track more than one route. When a tracked route goes down, the priority of the router is decreased by 10 (default priority decrement) for each downed route. By default no routes are tracked. If we specify just the route to be tracked without specifying the optional parameter, then the default priority will be set.

Use the **no** form of this command to remove the route from the tracked list or to restore the priority decrement to its default. When removing a tracked IP route from the tracked list, priority should be incremented by the decrement value if the route is not reachable.

Syntax

vrrp ***group*** **track ip route** *ip-address/prefix-length* [**decrement** *priority*]

no vrrp ***group*** **track ip route** *ip-address/prefix-length*

Parameter Description

Parameter	Description
group	The virtual router identifier. (Range: 1–255).
ip-address/prefix-length	Specifies the route to be tracked.
priority	Priority decrement value for the tracked route. (Range: 1–254).

Default Configuration

There are no routes tracked by default.

The default decrement priority is 10.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example adds the route 2.2.2.0/24 to the virtual router tracked list (with a priority decrement value of 20).

```
console(config-if-vlan10)#vrrp 1 track ip route
2.2.2.0/24 decrement 20
```

show vrrp

Use the **show vrrp** command in User EXEC or Privileged EXEC mode to display the global VRRP configuration and status as well as the brief or detailed status of one or all VRRP groups.

Syntax

show vrrp [**brief** | *group*]

Syntax Description

Parameter	Description
group	The virtual router group identifier. Range 1-255.
brief	Provide a summary view of the VRRP group information.

Default Configuration

Show information on all VRRP groups.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays detailed VRRP status.

```
console# show vrrp


Admin Mode.....................................
Enable
Router Checksum Errors..................... 0
Router Version Errors...................... 0
Router VRID Errors......................... 0
```

```
Vlan 7 – Group 1

Primary IP Address.............................
192.168.5.55

VMAC Address...................................
0000.5E00.0101

Authentication Type............................ None

Priority....................................... 60

Configured Priority............................ 100

Advertisement Interval (secs).................. 10

Accept Mode.....................................
Enable

Pre-empt Mode...................................
Enable

Pre-empt Delay..................................
Enable

Administrative Mode.............................
Enable

State...........................................
Initialized

Timers Learn Mode...............................
Enable

Description ....................................

Track Interface................................ vlan
3

Track Interface State ......................... Down

Track Interface DecrementPriority ............. 20

Track Route (pfx/len) ..........................
10.10.10.0/24
```

```
Track Route Reachable ..... False

Track Route DecrementPriority ..... 20


Vlan 7 – Group 2

Primary IP Address.....
192.168.5.65

VMAC Address.....
0000.5E00.0202

Authentication Type..... None

Priority..... 60

Configured Priority..... 100


Advertisement Interval (secs)..... 10

Accept Mode .....
Enable

Pre-empt Mode.....
Enable

Pre-empt Delay..... 0

Administrative Mode.....
Enable

State.....
Initialized

Timers Learn Mode..... Disable

Description .....

Track Interface..... vlan
3

Track Interface State ..... Down

Track Interface DecrementPriority ..... 20
```

```
Track Route (pfx/len) ..........................
10.10.10.0/24
Track Route Reachable ......................... False
Track Route DecrementPriority ................. 20


console#show vrrp brief
Interface Grp Prio IP Address     Mode    State
--------- --- ---- -------------- ------  ------------
V1 1      2    60 0.0.0.0        Disable Initialize
V1 2      5    70 192.168.5.55   Enable  Initialize
```

show vrrp interface

Use the **show vrrp interface** command in User EXEC or Privileged EXEC mode to display all configuration information and VRRP router statistics of a virtual router configured on a specific interface.

Syntax

show vrrp interface [**brief | vlan** *vlan-id* {**stats**}]

Syntax Description

Parameter	Description
brief	Display summary information about each virtual router configured on the switch.
stats	Display the statistical information about each virtual router configured on the VLAN.
vlan-id	Display information about each virtual router configured on the VLAN. Valid interface type (VLAN) and interface number (vlan-id).

Default Configuration

Show information for each group in the specified interface.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays all configuration information about the VLAN 15 virtual router.

```
console#show vrrp interface vlan 7

Vlan 7 – Group 1

Primary IP Address..... 192.168.5.55

VMAC Address..... 0000.5E00.0101

Authentication Type..... None

Priority..... 100

Configured Priority..... 100

Advertisement Interval (secs)..... 10

Accept Mode..... Disable

Pre-empt Mode..... Enable

Pre-empt Delay..... 0

Administrative Mode..... Enable

State..... Initialized

Timers Learn Mode..... Disable

Description..... GoodStuff
```

The following example displays all configuration information about the virtual router on the selected interface.

```
console#show vrrp interface brief

Interface VRID IP Address     Mode    State

--------- ---- -------------- ------  ------------

vlan1     2    0.0.0.0        Disable Initialize
```

```
vlan2     5    192.168.5.55   Enable  Initialize
```

The following example displays all statistical information about the VLAN 15 virtual router.

```
console#show vrrp interface vlan 15 stats
Vlan 15 – Group 5
UpTime.......................... 0 days 0 hrs 0 mins 0 secs
Protocol..................................... IP
State Transitioned to Master.................. 0
Advertisement Received........................ 0
Advertisement Interval Errors................. 0
Authentication Failure........................ 0
IP TTL Errors................................. 0
Zero Priority Packets Received................ 0
Zero Priority Packets Sent.................... 0
Invalid Type Packets Received................. 0
Address List Errors .......................... 0
Invalid Authentication Type................... 0
Authentication Type Mismatch.................. 0
Packet Length Errors.......................... 0
```

show vrrp interface brief

Use the **show vrrp interface brief** command in Privileged EXEC mode to display information about each virtual router configured on the switch. It displays information about each virtual router.

Syntax

show vrrp interface brief

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays all configuration information about the virtual router on the selected interface.

```
console#show vrrp interface brief

Interface VRID IP Address     Mode     State

--------- ---- -------------- ------  ------------

vlan1      2    0.0.0.0        Disable Initialize

vlan2      5    192.168.5.55   Enable  Initialize
```

show vrrp interface stats

Use the **show vrrp interface stats** command in User EXEC mode to display the statistical information about each virtual router configured on the switch.

Syntax

show vrrp interface stats vlan *vlan-id vr-id*

- *vlan-id* — Valid VLAN ID.
- *vr-id* — The virtual router identifier. (Range: 1-255)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays all statistical information about the VLAN 15 virtual router.

```
console#show vrrp interface stats vlan 15 5

UpTime..................... 0 days 0 hrs 0 mins 0 secs

Protocol..................................... IP

State Transitioned to Master.................. 0

Advertisement Received........................ 0

Advertisement Interval Errors................. 0

Authentication Failure........................ 0

IP TTL Errors................................. 0

Zero Priority Packets Received................ 0

Zero Priority Packets Sent.................... 0

Invalid Type Packets Received................. 0

Address List Errors .......................... 0

Invalid Authentication Type................... 0

Authentication Type Mismatch.................. 0

Packet Length Errors.......................... 0
```

Pingable VRRP Commands

ip vrrp accept-mode

Use the ip **vrrp accept-mode** command in Interface (VLAN) Configuration mode to enable the VRRP Master to accept ping packets sent to one of the virtual router's IP addresses. Use the **no** form of the command to disable responding to ping packets.

Syntax

ip vrrp *vrid* **accept-mode**

no vrrp *vrid* **accept-mode**

- vrid — Virtual router identification. (Range: 1-255)

Default Configuration

The default configuration is disabled.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

This command has no user guidelines.

show ip vrrp interface

Use the **show ip vrrp interface** command in User EXEC or Privileged EXEC mode to display the configured value for Accept Mode.

Syntax

show ip vrrp interface *interface-id vrid*

Syntax Description

Parameter	Description
interface-id	Any valid routing interface. See Interface Naming Conventions for interface representation.
vrid	The virtual router identifier. (Range: 1-255)

Default Configuration

The command has no default configuration.

Command Mode

User EXEC, Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays all configuration information about the VLAN 15 virtual router.

```
console#show ip vrrp interface vlan2 1
Primary IP Address..... 10.10.10.1
VMAC Address..... 00:00:5E:00:01:01
Authentication Type..... None
Priority..... 100
Configured Priority..... 100
Advertisement Interval (secs)..... 1
Pre-empt Mode..... Enable
Administrative Mode..... Disable
Accept Mode..... Enable
State..... Initialized

Track Interface State Decrement Priority
--------------- ------------ ------------
No interfaces are tracked for this vrid and interface
combination.

Track Route(pfx/len) Reachable Decrement Priority
--------------- ------------ ------------
No routes are tracked for this vrid and interface
combination.
```

61

Utility Commands

This section of the document contains the following Utility command topics:

Auto-Install Commands	Line Commands	SDM Templates Commands	Telnet Server Commands
Captive Portal Commands	Management ACL Commands	Serviceability Tracing Packet Commands	Terminal Length Commands
CLI Macro Commands	Mode Commands	Sflow Commands	Time Ranges Commands
Clock Commands	Password Management Commands	SNMP Commands	–
Command Line Configuration Scripting Commands	PHY Diagnostics Commands	SSH Commands	User Interface Commands
Configuration and Image File Commands	–	Syslog Commands	Web Server Commands
Denial of Service Commands	RMON Commands	System Management Commands	–

62

Auto-Install Commands

Auto-Install provides automatic update of the image and configuration of PowerConnect devices on boot up from a TFTP server as controlled by received DHCP options. It plays a critical role in the PowerConnect offering of touchless or low-touch provisioning, in which configuration and imaging of a device is greatly simplified. This is highly desirable as device can be setup with minimum interaction from a skilled technician.

In PowerConnect devices, Auto-Install provides for network-based auto-configuration and auto-imaging. Other aspects provide support for auto-configuration and auto-imaging from attached devices.

Auto-Install is available on Dell PowerConnect devices as per the specification listed below.

Auto-Install features in this release include:

1. Support download of image from TFTP server using DHCP option 125. The image update can result in a downgrade or upgrade of the firmware on the switch or stack of switches.
2. Support for automatic download of a configuration file from a TFTP server when the device is booted with no saved configuration file located in designated storage. This release extends the designated storage to USB flash drives. In previous releases, the only supported storage was the device's embedded flash or non-volatile memory.
3. Support for automatic download of an image from a TFTP server in the following situations:
   a. When the device is booted with no saved configuration found in the designated storage areas.
   b. When the device is booted with a saved configuration that has Auto-Install enabled.

4 Support for the Auto-Install process from a TFTP server operationally enabling the DHCP client on designated management interfaces during the Auto-Install process. The end user configuration remains unchanged. Management interfaces include the service port or routing interfaces in a saved config.

Commands in this Chapter

This chapter explains the following commands:

boot auto-copy-sw	boot auto-copy-sw allow-downgrade
boot auto-copy-sw allow-downgrade	boot host autoreboot
boot host autoreboot	boot host autosave
boot host autosave	boot host dhcp
boot host dhcp	boot host retrycount
boot host retrycount	show auto-copy-sw
boot auto-copy-sw	show boot

boot auto-copy-sw

Use the **boot auto-copy-sw** command in Privileged EXEC mode to enable or disable Stack Firmware Synchronization.

Use the **no** form of the command to disable Stack Firmware Synchronization.

Syntax

boot auto-copy-sw

no boot auto-copy-sw

Parameter Description

This command does not require a parameter description.

Default Configuration

Stack firmware synchronization is disabled by default.

Command Mode

Global Config

User Guidelines

This command has no user guidelines.

boot auto-copy-sw allow-downgrade

Use the **boot auto-copy-sw allow-downgrade** command in Privileged EXEC mode to enable downgrading the firmware version on the stack member if the firmware version on the manager is older than the firmware version on the member.

Use the **no** form of the command to disable downgrading the image.

Syntax

boot auto-copy-sw allow-downgrade

no boot auto-copy-sw allow-downgrade

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is **Enable**.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

boot host autoreboot

Use the **boot host autoreboot** command in Global Configuration mode to enable rebooting the device (no administrative intervention) when the auto-image is successfully downloaded. Use the **no** form of this command to disable rebooting the device (no administrative intervention) when the auto-image is successfully downloaded.

Syntax

boot host autoreboot

no boot host autoreboot

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is enabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines

Example

```
console#
console#configure
console(config)#boot host autoreboot
console(config)#no boot host autoreboot
```

boot host autosave

Use the **boot host autosave** command in Global Configuration mode to enable automatically saving the downloaded configuration on the switch. Use the **no** form of this command to disable automatically saving the downloaded configuration on the switch.

Syntax

boot host autosave

no boot host autosave

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines

Example

```
console#
console#configure
console(config)#boot host auto-save
console(config)#no boot host auto-save
```

boot host dhcp

Use the **boot host dhcp** command in Global Configuration mode to enable Auto-Install and Auto Configuration on the switch. When a switch boots with a saved startup configuration that includes this command, the Auto-

Install process is triggered. Use the **no** form of this command to disable Auto-Install on the next reboot if the reboot occurs with a saved startup configuration. If you give this command while the Auto-Install process is running, the Auto-Install process terminates. The Auto-Install process has an internal timer that retries failed installations for ten minutes.

Syntax

boot host dhcp

no boot host dhcp

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is Enabled.

Command Mode

Global Configuration.

User Guidelines

This command has no user guidelines

Example

```
console#
console#configure
console(config)#boot host dhcp
console(config)#no boot host dhcp
```

boot host retrycount

The **boot host retrycount** command sets the number of attempts to download a configuration. Use the **no** form of this command to reset the number of attempts to download a configuration to the default.

Syntax

boot host retrycount *count*

no boot host retrycount

- *count* —The number of attempts to download a configuration (Range: 1–6).

Default Configuration

The default number of configuration download attempts is three.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines

Example

```
console#
console#configure
console(config)#boot host retrycount 5
console(config)#no boot host retrycount
```

show auto-copy-sw

Use the **show auto-copy-sw** command in Privileged EXEC mode to display Stack Firmware Synchronization configuration status.

Syntax

show auto-copy-sw

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The **show switch** command also displays the switch firmware synchronization status.

Example

```
console#show auto-copy-sw


Stack Firmware Synchronization


Synchronization:        Enabled
SNMP Trap status:       Enabled
Allow Downgrade:        Enabled
```

show boot

Use the **show boot** command in Privileged EXEC mode to display the auto install configuration and the status.

Syntax

show boot

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show boot
AutoInstall Mode..... Started
AutoSave Mode..... Enabled
AutoReboot Mode..... Enabled
AutoInstall Retry Count..... 3
AutoInstall State..... Waiting for boot options
```

63

Captive Portal Commands

The Captive Portal feature is a software implementation that blocks both wired and wireless clients from accessing the network until user verification has been established. Verification can be configured to allow access for both guest and authenticated users. Authenticated users must be validated against a database of authorized Captive Portal users before access is granted.

The Authentication server supports both HTTP and HTTPS web connections. In addition, Captive Portal can be configured to use an optional HTTP port (in support of HTTP Proxy networks) or an optional HTTPS port. If configured, this additional port or ports are then used exclusively by Captive Portal.

NOTE: This optional HTTP port is in addition to the standard HTTP port 80 which is currently being used for all other web traffic, and the optional HTTPS port is in addition to the standard HTTPS port 443 used for secure web traffic.

Commands in this Chapter

This chapter explains the following commands:

Captive Portal Global Commands

authentication timeout	https port
captive-portal	show captive-portal
enable	show captive-portal status
http port	

Captive Portal Configuration Commands

block	name (Captive Portal)
configuration	protocol
enable	redirect
group	redirect-url

interface	session-timeout
locale	verification

Captive Portal Client Connection Commands

captive-portal client deauthenticate	show captive-portal interface client status
show captive-portal client status	show captive-portal interface configuration status
show captive-portal configuration client status	

Captive Portal Local User Commands

clear captive-portal users	user-logout
no user	user name
show captive-portal user	user password
user group	user session-timeout

Captive Portal Status Commands

show captive-portal configuration	show captive-portal configuration locales
show captive-portal configuration interface	show captive-portal configuration status

Captive Portal User Group Commands

user group	user group name
user group moveusers	

Captive Portal Global Commands

authentication timeout

Use the **authentication timeout** command to configure the authentication timeout. If the user does not enter valid credentials within this time limit, the authentication page needs to be served again in order for the client to gain access to the network. Use the "no" form of this command to reset the authentication timeout to the default.

Syntax

authentication timeout *timeout*

no authentication timeout

- *timeout*—The authentication timeout (Range: 60–600 seconds).

Default Configuration

The default authentication timeout is 300 seconds.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#authentication timeout 600
console(config-CP)#no authentication timeout
```

captive-portal

Use the **captive-portal** command to enter the captive portal configuration mode.

Syntax

captive-portal

Default Configuration

There is no default configuration for this command.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#captive-portal
console(config-CP)#
```

enable

Use the **enable** command to globally enable captive portal. Use the "no" form of this command to globally disable captive portal.

Syntax

enable

no enable

Default Configuration

Captive Portal is disabled by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#enable
```

http port

Use the **http port** command to configure an additional HTTP port for captive portal to monitor. Use the "no" form of this command to remove the additional HTTP port from monitoring.

Syntax

http port *port-num*

no http port

- *port-num*—The port number to monitor (Range: 1–65535).

Default Configuration

Captive portal only monitors port 80 by default.

Command Mode

Captive Portal Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#http port 81
console(config-CP)#no http port
```

https port

Use the **https port** command to configure an additional HTTPS port for captive portal to monitor. Use the "no" form of this command to remove the additional HTTPS port from monitoring.

Syntax

https port *port-num*

no https port

- *port-num*—The port number to monitor (Range: 1–65535).

Default Configuration

Captive portal only monitors port 443 by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#https port 1443
console(config-CP)#no https port
```

show captive-portal

Use the **show captive-portal** command to display the status of the captive portal feature.

Syntax

show captive-portal

Default Configuration

There is no default configuration for this command

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal
Administrative Mode..................... Disabled
Operational Status...................... Disabled
Disable Reason.............. Administrator Disabled
Captive Portal IP Address.............. 1.2.3.4
```

show captive-portal status

Use the **show captive-portal status** command to report the status of all captive portal instances in the system.

Syntax

show captive-portal status

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal status


Additional HTTP Port........................... 81
Additional HTTP Secure Port.................... 1443
Authentication Timeout......................... 300
Supported Captive Portals...................... 10
```

```
Configured Captive Portals..................... 1
Active Captive Portals......................... 0
Local Supported Users.......................... 128
Configured Local Users......................... 3
System Supported Users......................... 1024
Authenticated Users............................ 0
```

Captive Portal Configuration Commands

The commands in this section are related to captive portal configurations.

block

Use the **block** command to block all traffic for a captive portal configuration. Use the "no" form of this command to unblock traffic.

Syntax

block

no block

Default Configuration

Traffic is not blocked by default.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#block
```

configuration

Use the **configuration** command to enter the captive portal instance mode. The captive portal configuration identified by CP ID 1 is the default CP configuration. The system supports a total of ten CP configurations. Use the "no" form of this command to delete a configuration. The default configuration (1) cannot be deleted.

Syntax

configuration *cp-id*

no configuration *cp-id*

- *cp-id*—Captive Portal ID (Range: 1–10).

Default Configuration

Configuration 1 is enabled by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#configuration 2
console(config-CP 2)#
```

enable

Use the **enable** command to enable a captive portal configuration. Use the "no" form of this command to disable a configuration.

Syntax

enable

no enable

Default Configuration

Configurations are enabled by default

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#no enable
```

group

Use the **group** command to configure the group number for a captive portal configuration. If a group number is configured, the user entry (Local or RADIUS) must be configured with the same name and the group to authenticate to this captive portal instance. Use the "no" form of this command to reset the group number to the default.

Syntax

group *group-number*

no group

- *group-number*—The number of the group to associate with this configuration (Range: 1–10).

Default Configuration

The default group number is 1.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#group 2
```

interface

Use the **interface** command to associate an interface with a captive portal configuration. Use the "no" form of this command to remove an association.

Syntax

interface *interface*

no interface *interface*

interface—An interface or range of interfaces.

Default Configuration

No interfaces are associated with a configuration by default.

Command Mode

Captive Portal Instance Config mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#interface 1/0/2
```

locale

The **locale** command is not intended to be a user command. The administrator must use the Web UI to create and customize captive portal web content. This command is primarily used by the show running-config command and process as it provides the ability to save and restore configurations using a text based format.

Syntax

locale *web-id*

- *web-id*—The locale number (Range: Only locale 1 is supported)

Default Configuration

Locale 1 is configured by default.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

name (Captive Portal)

Use the **name** command to configure the name for a captive portal configuration. Use the "no" form of this command to remove a configuration name.

Syntax

name *cp-name*

no name

- *cp-name*—CP configuration name (Range: 1–32 characters).

Default Configuration

Configuration 1 has the name "Default" by default. All other configurations have no name by default.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#name cp2
```

protocol

Use the **protocol** command to configure the protocol mode for a captive portal configuration.

Syntax

protocol { http | https }

Default Configuration

The default protocols mode is https.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#protocol http
```

redirect

Use the **redirect** command to enable the redirect mode for a captive portal configuration. Use the "no" form of this command to disable redirect mode.

Syntax

redirect

no redirect

Default Configuration

Redirect mode is disabled by default.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#redirect
```

redirect-url

Use the **redirect-url** command to configure the redirect URL for a captive portal configuration.

Syntax

redirect-url *url*

- *url*—The URL for redirection (Range: 1–512 characters).

Default Configuration

There is no redirect URL configured by default.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#redirect-url www.dell.com
```

session-timeout

Use the **session-timeout** command to configure the session timeout for a captive portal configuration. Use the "no" form of this command to reset the session timeout to the default.

Syntax

session-timeout *timeout*

no session-timeout

- *timeout*—Session timeout. 0 indicates timeout not enforced (Range: 0–86400 seconds).

Default Configuration

There is no session timeout by default.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#session-timeout 86400
console(config-CP 2)#no session-timeout
```

verification

Use the **verification** command to configure the verification mode for a captive portal configuration.

Syntax

verification { guest | local | radius }

- guest—Allows access for unauthenticated users (users that do not have assigned user names and passwords).
- local—Authenticates users against a local user database.
- radius—Authenticates users against a remote RADIUS database.

Default Configuration

The default verification mode is guest.

Command Mode

Captive Portal Instance mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP 2)#verification local
```

Captive Portal Client Connection Commands

captive-portal client deauthenticate

Use the **captive-portal client deauthenticate** command to deauthenticate a specific captive portal client.

Syntax

captive-portal client deauthenticate *macaddr*

- *macaddr*—Client MAC address.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

console#captive-portal client deauthenticate 0002.BC00.1290

show captive-portal client status

Use the **show captive-portal client status** command to display client connection details or a connection summary for connected captive portal users.

Syntax

show captive-portal client [*macaddr*] **status**

- *macaddr*—Client MAC address.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal client status
Client MAC Address Client IP Address Protocol Verification Session Time
------------------ ----------------- -------- ------------ ------------
0002.BC00.1290     10.254.96.47      https    Local        0d:00:01:20
0002.BC00.1291     10.254.96.48      https    Local        0d:00:05:20
0002.BC00.1292     10.254.96.49      https    Radius       0d:00:00:20

console#show captive-portal client 0002.BC00.1290 status
Client MAC Address..................... 0002.BC00.1290
Client IP Address...................... 10.254.96.47
Protocol Mode.......................... https
Verification Mode...................... Local
CP ID.................................. 1
CP Name................................ cp1
Interface.............................. 1/0/1
Interface Description.................. Unit: 1 Slot: 0 Port: 1 Gigabit -
Level
User Name.............................. user123
Session Time........................... 0d:00:00:13
```

show captive-portal configuration client status

Use the **show captive-portal configuration client status command** to display the clients authenticated to all captive portal configurations or a to specific configuration.

Syntax

show captive-portal configuration [*cp-id*] **client status**

- *cp-id*—Captive Portal ID.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal configuration client status
CP ID     CP Name     Client MAC Address Client IP Address Interface
----- --------------- ------------------ ----------------- ---------
1     cp1             0002.BC00.1290     10.254.96.47      1/0/1
                      0002.BC00.1291     10.254.96.48      1/0/2
2     cp2             0002.BC00.1292     10.254.96.49      1/0/3
3     cp3             0002.BC00.1293     10.254.96.50      1/0/4

console#show captive-portal configuration 1 client status
CP ID..................................... 1
CP Name................................... cp1
   Client           Client
 MAC Address      IP Address   Interface       Interface Description
-------------- --------------- --------- --------------------------------
0002.BC00.1290 10.254.96.47    1/0/1      Unit: 1 Slot: 0 Port: 1 Gigabit
0002.BC00.1291 10.254.96.48    1/0/2      Unit: 1 Slot: 0 Port: 2 Gigabit
```

show captive-portal interface client status

Use the **show captive-portal interface client status** command to display information about clients authenticated on all interfaces or a specific interface.

Syntax

show captive-portal interface {**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port*} **client status**

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal interface client status
                                                  Client           Client
Intf             Intf Description             MAC Address       IP Address
------ ----------------------------------- ----------------- ---------------
1/0/1   Unit: 1 Slot: 0 Port: 1 Gigabit     0002.BC00.1290    10.254.96.47
                                           0002.BC00.1291    10.254.96.48
1/0/2   Unit: 1 Slot: 0 Port: 2 Gigabit     0002.BC00.1292    10.254.96.49
1/0/3   Unit: 1 Slot: 0 Port: 3 Gigabit     0002.BC00.1293    10.254.96.50

console#show captive-portal interface 1/0/1 client status
Interface................................ 1/0/1
Interface Description..................... Unit: 1 Slot: 0 Port: 1 Gigabit

     Client            Client
   MAC Address       IP Address   CP ID       CP Name     Protocol Verification
----------------- --------------- ----- ----------------- -------- ---------
0002.BC00.1290     10.254.96.47   1     cp1               http     local
0002.BC00.1291     10.254.96.48   2     cp2               http     local
```

Captive Portal Interface Commands

show captive-portal interface configuration status

Use the **show captive-portal interface configuration status** command to display the interface to configuration assignments for all captive portal configurations or for a specific configuration.

Syntax

show captive-portal interface configuration [*cp-id*] **status**

- *cp-id*—Captive Portal ID.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal interface configuration status
CP ID      CP Name       Interface        Interface Description          Type
----- ----------------- --------- --------------------------------- -----
---
1     Default           1/0/1     Unit: 1 Slot: 0 Port: 1 Gigabit .. Physical

console#show captive-portal interface configuration 1 status
CP ID.................................. 1
CP Name................................ cp1

Interface        Interface Description          Type
--------- ---------------------------------- --------
1/0/1      Unit: 1 Slot: 0 Port: 1 Gigabit ... Physical
```

Captive Portal Local User Commands

clear captive-portal users

Use the **clear captive-portal users** command to delete all captive portal user entries.

Syntax

clear captive-portal users

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#clear captive-portal users
```

no user

Use the **no user** command to delete a user from the local user database. If the user has an existing session, it is disconnected.

Syntax

no user *user-id*

- *user-id*—User ID (Range: 1–128).

Default Configuration

There is no default configuration for this command.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#no user 1
```

show captive-portal user

Use the **show captive-portal user** command to display all configured users or a specific user in the captive portal local user database.

Syntax

show captive-portal user [user-id]

- *user-id*—User ID (Range: 1–128).

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal user
                              Session
User ID       User Name       Timeout   Group ID    Group
Name
------- -------------------- ------- ------------ --------
----
```

```
1       user123              14400     1           Default
2       user234              0         1           Default
                                       2           group2

console#show captive-portal user 1
User ID..................................... 1
User Name................................... user123
Password Configured......................... Yes
Session Timeout............................. 0

Group ID            Group Name
--------  --------------------------------
1         Default
2         group2
```

user group

Use the **user group** command to associate a group with a captive portal user. Use the "no" form of this command to disassociate a group and user. A user must be associated with at least one group so the last group cannot be disassociated.

Syntax

user *user-id* **group** *group-id*

- *user-id*—User ID (Range: 1–128).
- *group-id*—Group ID (Range: 1–10).

Default Configuration

A user is associated with group 1 by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#user 1 group 3
```

user-logout

Use the **user-logout** command in Captive Portal Instance mode to enable captive portal users to log out of the portal (versus having the session time out). Use the **no** form of the command to return the user logout configuration to the default.

Syntax

user-logout

no user-logout

Parameter Description

This command does not require a parameter description.

Default Configuration

User-logout is disabled by default.

Command Mode

Captive-portal Instance mode

User Guidelines

There are no user guidelines for this command.

Example

In this example, all classes of entries in the mac address-table are displayed.

```
console(config)#captive-portal
console(config-CP)#user 1 name asd
console(config-CP)#configuration 1
```

```
console(config-CP 1)#user-logout
console(config-CP 1)#no user-logout
```

user name

Use the **user name** command to modify the user name for a local captive portal user.

Syntax

user *user-id* **name** *name*

- *user-id*—User ID (Range: 1–128).
- *name*—user name (Range: 1–32 characters).

Default Configuration

There is no name for a user by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines.

Example

```
console(config-CP)#user 1 name johnsmith
```

user password

Use the **user password** command to create a local user or change the password for an existing user.

Syntax

user *user-id* **password** { *password* | **encrypted** *enc-password* }

- *user-id*—User ID (Range: 1–128).
- *password*—User password (Range: 8–64 characters).

- *enc-password*—User password in encrypted form.

Default Configuration

There are no users configured by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(Config-CP)#user 1 password
Enter password (8 to 64 characters): ********
Re-enter password: ********
```

user session-timeout

Use the **user session-timeout** command to set the session timeout value for a captive portal user. Use the "no" form of this command to reset the session timeout to the default.

Syntax

user *user-id* **session-timeout** *timeout*

no user *user-id* **session-timeout**

- *user-id*—User ID (Range: 1–128).
- *timeout*—Session timeout. 0 indicates use global configuration (Range: 0–86400 seconds).

Default Configuration

The global session timeout is used by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#user 1 session-timeout 86400
console(config-CP)#no user 1 session-timeout
```

Captive Portal Status Commands

show captive-portal configuration

Use the **show captive-portal configuration** command to display the operational status of each captive portal configuration.

Syntax

show captive-portal configuration *cp-id*

cp-id—Captive Portal ID.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal configuration 1
CP ID..................................... 1
CP Name................................... cp1
Operational Status........................ Disabled
Disable Reason............................ Administrator Disabled
Blocked Status............................ Not Blocked
```

```
Configured Locales......................... 1
Authenticated Users....................... 0
```

show captive-portal configuration interface

Use the **show captive-portal configuration interface** command to display information about all interfaces assigned to a captive portal configuration or about a specific interface assigned to a captive portal configuration.

Syntax

show captive-portal configuration *cp-id* **interface** [{**gigabitethernet** *unit/slot/port* | **tengigabitethernet** *unit/slot/port*}]

- *cp-id*—Captive Portal ID.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal configuration 1 interface
CP ID.................................... 1
CP Name................................... cp1


                                                Operational    Block
Interface        Interface Description                Status
Status
--------- ---------------------------------------- ------------ ---
------
1/0/1      Unit: 1 Slot: 0 Port: 1 Gigabit - Level  Disabled
Blocked
```

```
console#show captive-portal configuration 1 interface 1/0/1
CP ID..................................... 1
CP Name................................... cp1
Interface................................. 1/0/1
Interface Description..................... Unit: 1 Slot: 0 Port: 1
Gigab...
Operational Status........................ Disabled
Disable Reason............................ Interface Not Attached
Block Status.............................. Not Blocked
Authenticated Users....................... 0
```

show captive-portal configuration locales

Use the **show captive-portal configuration locales** command to display locales associated with a specific captive portal configuration.

Syntax

show captive-portal configuration *cp-id* **locales**

- *cp-id*—Captive Portal Configuration ID.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal configuration 1 locales
Locale Code
---------------
en
```

show captive-portal configuration status

Use the **show captive-portal configuration status** command to display information about all configured captive portal configurations or about a specific captive portal configuration.

Syntax

show captive-portal configuration [*cp-id*] **status**

- *cp-id*—Captive Portal ID.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console#show captive-portal configuration status
CP ID      CP Name        Mode    Protocol  Verification
-----  --------------  --------  --------  ------------
1      cp1             Enable    https     Guest
2      cp2             Enable    http      Local
3      cp3             Disable   https     Guest

console#show captive-portal configuration 1 status
CP ID..................................... 1
CP Name................................... cp1
Mode...................................... Enabled
Protocol Mode............................. https
Verification Mode......................... Guest
```

```
Group Name..................................... group123
Redirect URL Mode.............................. Enabled
Redirect URL................................... www.cnn.com
Session Timeout (seconds)...................... 86400
```

Captive Portal User Group Commands

user group

Use the **user group** command to create a user group. Use the "no" form of this command to delete a user group. The default user group (1) cannot be deleted.

Syntax

user group *group-id*

no user group *group-id*

group-id—Group ID (Range: 1–10).

Default Configuration

User group 1 is created by default and cannot be deleted.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#user group 2
console(config-CP)#no user group 2
```

user group moveusers

Use the **user group moveusers** command to move a group's users to a different group.

Syntax

user group *group-id* **moveusers** *new-group-id*

- *group-id*—Group ID (Range: 1–10).
- *new-group-id*—Group ID (Range: 1–10).

Default Configuration

There is no default configuration for this command.

Command Mode

Captive Portal Configuration mode

User Guidelines

The new group-id must already exist.

Example

```
console(config-CP)#user group 2 moveusers 3
```

user group name

Use the **user group name** command to configure a group name.

Syntax

user group *group-id* **name** *name*

- *group-id*—Group ID (Range: 1–10).
- *name*—Group name (Range: 1–32 characters).

Default Configuration

User groups have no names by default.

Command Mode

Captive Portal Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-CP)#user group 2 name group2
```

64

CLI Macro Commands

CLI Macros provides a convenient way to save and distribute common configurations. A CLI macro is a set of the CLI commands having a unique name. When a CLI macro is applied, the CLI commands contained within the macro are executed and added to the Running Configuration File. When the macro is applied to an interface, the existing configuration is not lost; the new commands are added configuration.

A CLI Macro may have keywords (variables) which are replaced by values provided when the macro is applied (up to 3 keywords per macro). Macros can be applied to specific interfaces, a range of interfaces, or the global configuration.

There are two types of Macros:

- Built-In Macros, or Default Macros – the predefined macros which cannot be changed or deleted.
- User-Defined Macros, or Custom Macros – the macros which allow the operator to bundle some pre-requisites or global configurations as a macro and then apply them to one or more interfaces at a time, which can then be copied or used by other switches. Up to 50 user-defined macros are supported.

The software includes 6 built-in macros:

- profile-global, the global configuration, used to enable RSTP and loop guard.
- profile-desktop, the interface configuration, for increased network security and reliability when connecting a desktop device, such as a PC, to a switch port.
- profile-phone, the interface configuration, used when connecting a desktop device such as a PC with an IP Phone to a switch port.
- profile-switch, the interface configuration, used when connecting an access switch and a distribution switch or between access switches.
- profile-router, the interface configuration, used when connecting the switch and a WAN router.

- profile-wireless, the interface configuration, used when connecting the switch and a wireless access point.
- profile-compellent-nas, the interface configuration, used when connecting the switch to a Dell Compellent NAS.

Commands in this Chapter

This chapter explains the following commands:

macro name	macro apply
macro global apply	macro trace
macro global trace	macro description
macro global description	show parser macro

macro name

Use the **macro name** command in Global Configuration mode to create a user-defined macro. Use the **no** form of the command to delete a macro.

Syntax

macro name *name*

no macro name *name*

Parameter Description

Parameter	Description
name	The name of the macro. A macro name can consist of any printable characters, including blanks. A macro name may be up to 31 characters in length. Embed the name in quotes if a blank is desired in the name. Use the **no** form of the command to delete a macro.

Default Configuration

The following macros are defined by default and may not be deleted or altered:

Macro	Default Definition
default global	:profile-global
default interface	:profile-desktop
default interface	:profile-phone
default interface	:profile-switch
default interface	:profile-router
default interface	:profile-wireless
default global	:profile-compellent-nas

Command Mode

Global Configuration mode

User Guidelines

Macros consist of text commands with one command per line. Enter the commands and terminate macro input mode by entering a single at sign (@) on a line by itself.

A macro may utilize up to 3 parameters. Parameters are text strings that begin with a dollar sign ($). Parameters are substituted by specifying the parameter on the command line when the macro is applied.

Macros may be applied to a specific interface, a range of interfaces, or to the global configuration. Up to 50 user-defined macros may be configured.

macro global apply

Use the **macro global apply** command in Global Configuration mode to apply a macro.

Syntax

macro global apply ***macro-name*** [parameter *value*] [parameter *value*][parameter *value*]

Parameter Description

Parameter	Description
macro-name	The name of the macro.
parameter	The name of the parameter recognized by the macro. The parameter must begin with a dollar sign ($).
value	The string to be substituted within the macro for the specified parameter name.

Default Configuration

No parameters are substituted unless supplied on the command line.

Command Mode

Global Configuration mode

User Guidelines

Commands applied are additive in nature. That is, they do not remove existing configuration information by default.

macro global trace

Use the **macro global trace** command in Global Configuration mode to apply and trace a macro. The trace command will display each line of the macro as it is executed and list any errors encountered.

Syntax

macro global trace *macro-name* [parameter *value*] [parameter *value*][parameter *value*]

Parameter Description

Parameter	Description
macro-name	The name of the macro.
parameter	The name of the parameter recognized by the macro. The parameter must begin with a dollar sign ($).

Parameter	Description
value	The string to be substituted within the macro for the specified parameter name.

Default Configuration

No parameters are substituted unless supplied on the command line.

Command Mode

Global Configuration mode

User Guidelines

The line number of the first error encountered is printed. The script is aborted after the first error.

Commands applied are additive in nature. That is, they do not remove existing configuration information by default.

macro global description

Use the **macro global description** command in Global Configuration mode to append a line to the global macro description. Use the **no** form of the command to clear the description.

Syntax

macro global description *line*

Parameter Description

Parameter	Description
line	The macro description. All text up to the new line is included in the description.

Default Configuration

There is no description by default.

Command Mode

Global Configuration mode

User Guidelines

This command is intended to give the administrator an easy way to remember which macros have been applied globally. All text up to the new line is included in the description. The line is appended to the global description.

macro apply

Use the **macro apply** command in Interface Configuration mode to apply a macro.

Syntax

macro apply *macro-name* [parameter *value*] [parameter *value*][parameter *value*]

Parameter Description

Parameter	Description
macro-name	The name of the macro.
parameter	The name of the parameter recognized by the macro. The parameter must begin with a dollar sign ($).
value	The string to be substituted within the macro for the specified parameter name.

Default Configuration

No parameters are substituted unless supplied on the command line.

Command Mode

Interface Configuration mode

User Guidelines

Commands applied are additive in nature. That is, they do not remove existing configuration information by default.

macro trace

Use the **macro trace** command in Interface Configuration mode to apply and trace a macro. The command will display each line of the macro as it is executed and list any errors encountered.

Syntax

macro trace *macro-name* [parameter *value*] [parameter *value*][parameter *value*]

no macro name *name*

Parameter Description

Parameter	Description
macro-name	The name of the macro.
parameter	The name of the parameter recognized by the macro. The parameter must begin with a dollar sign ($).
value	The string to be substituted within the macro for the specified parameter name.

Default Configuration

No parameters are substituted unless supplied on the command line.

Command Mode

Interface Configuration mode

User Guidelines

The line number of the first error encountered is printed. The script is aborted after the first error.

Commands applied are additive in nature. That is, they do not remove existing configuration information by default.

macro description

Use the **macro description** command in Interface Configuration mode to append a line to the macro description. Use the **no** form of the command to clear the description.

Syntax

macro description *line*

Parameter Description

Parameter	Description
line	The macro description. All text up to the new line is included in the description.

Default Configuration

There is no description by default.

Command Mode

Interface Configuration mode

User Guidelines

This command is intended to give the administrator an easy way to remember which macros have been applied to an interface. All text up to the new line is included in the description. The line is appended to the interface description.

show parser macro

Use the **show parser macro** command in Privileged EXEC mode to display information about defined macros.

Syntax

show parser macro [brief | description [interface *interface-id*] | name *macro*

Parameter Description

Parameter	Description
brief	Shows the list of defined macros and their type.
description	Shows the macro descriptions.
name	Shows an individual macro, including its contents.
macro	The name of the macro to display.
interface-id	The interface for which to show the macro description.

Default Configuration

No parameters are substituted unless supplied on the command line.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

65

Clock Commands

Real-time Clock

The PowerConnect supports a real-time clock that maintains the system time across reboots. The system time is used to timestamp messages in the logging subsystem as well as for the application of time based ACLs. The administrator has the ability to configure and view the current time, time zone, and summer time settings.

The earliest date that can be configured is Jan 1, 2010.

Simple Network Time Protocol

The Simple Network Time Protocol (SNTP) is widely used for synchronizing network resources. SNTP Version 4 is described in RFC 2030. SNTP is an adaptation of the Network Time Protocol (RFC 1305) useful for situations where the full performance of NTP is not justified. SNTP can operate in unicast mode (point-to-point) or broadcast mode (point-to-multipoint). Various NTP implementations can operate as either a client or a server. To an NTP or SNTP server, NTP and SNTP clients are indistinguishable. Likewise, to an NTP or SNTP client, NTP and SNTP servers are indistinguishable. Furthermore, any version of NTP is compatible with any other version of NTP. PowerConnect SNTP implements the client side of SNTP.

Support for IPv6 address configuration is provided to the existing SNTP client. The end user can configure either an IPv4 or IPv6 address or a host name for an SNTP server among the list of servers. In unicast mode, one of the servers from the list is selected as the active server to be used for polling based on priority and configured order. The servers are treated alike independent of IPv4 or IPv6 or hostname address formats.At any given point of time, the client operates in unicast or broadcast mode.In broadcast mode, SNTP client listens for server packets from IPv4 and IPv6 networks at the same time on port number 123.On IPv6 networks, the SNTP client listens to

the link-local scoped IANA multicast address ff02::101 (reserved for SNTP) for server packets.The client logic to handle packet contents doesn't change with support for IPv6 networks.

Commands in this Chapter

This chapter explains the following commands:

show sntp configuration	sntp trusted-key
show sntp server	sntp unicast client enable
show sntp status	clock timezone hours-offset
sntp authenticate	no clock timezone
sntp authentication-key	clock summer-time recurring
sntp broadcast client enable	clock summer-time date
sntp client poll timer	no clock summer-time
sntp server	show clock

show sntp configuration

Use the **show sntp configuration** command in Privileged EXEC mode to show the configuration of the Simple Network Time Protocol (SNTP).

Syntax

show sntp configuration

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the current SNTP configuration of the device.

```
console#show sntp configuration


Polling interval: 64 seconds
MD5 Authentication keys:
Authentication is not required for synchronization.
Trusted keys:
No trusted keys.
Unicast clients: Disable

Unicast servers:
Server          Key             Polling         Priority
---------       -----------     -----------     ----------
10.27.128.21    Disabled        Enabled         1
```

show sntp server

Use the show sntp server command in Privileged EXEC mode to display the pre-configured SNTP servers. The configured servers can be either IPv4 or IPv6 format.

Syntax

show sntp server

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Examples

```
console#show sntp server


Server Host Address:                2001::01
Server Type:                        IPv6
Server Stratum:                     2
Server Reference Id:                NTP Srv:
158.108.96.32
Server Mode:                        Server
Server Maximum Entries:             3
Server Current Entries:             2


SNTP Servers
------------


Host Address: 2001::01
Address Type: IPv6
Priority: 1
Version: 4
Port: 123
Last Update Time: Dec 22 11:10:00 2009
Last Attempt Time: Dec 22 11:10:00 2009
```

```
Last Update Status: Success
Total Unicast Requests: 955
Failed Unicast Requests: 1

--More-- or (q)uit

Host Address: 3.north-america.pool.ntp.org
Address Type: DNS
Priority: 1
Version: 4
Port: 123
Last Update Time: Dec 22 07:30:31 2009
Last Attempt Time: Dec 22 07:32:41 2009
Last Update Status: Server Unsynchronized
Total Unicast Requests: 157
Failed Unicast Requests: 2
```

show sntp status

Use the **show sntp status** command in Privileged EXEC mode to show the status of the Simple Network Time Protocol (SNTP).

Syntax

show sntp status

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following example shows the status of the SNTP.

```
console#show sntp status

Client Mode:                          Unicast
Last Update Time:                     MAR 30 21:21:20 2009

Unicast servers:
Server          Status         Last response
---------       -----------    -------------------------
192.168.0.1     Up             21:21:20 Mar 30 2009
```

sntp authenticate

Use the **sntp authenticate** command in Global Configuration mode to require server authentication for received Network Time Protocol (NTP) traffic. To disable the feature, use the **no** form of this command.

Syntax

sntp authenticate

no sntp authenticate

Default Configuration

No authentication.

Command Mode

Global Configuration mode

User Guidelines

The command is relevant for both Unicast and Broadcast.

Example

The following example, after defining the authentication key for SNTP, grants authentication.

```
console(config)# sntp authentication-key 8 md5 ClkKey
console(config)# sntp trusted-key 8
console(config)# sntp authenticate
```

sntp authentication-key

Use the **sntp authentication-key** command in Global Configuration mode to define an authentication key for Simple Network Time Protocol (SNTP). To remove the authentication key for SNTP, use the **no** form of this command.

Syntax

sntp authentication-key *key-number* **md5** *value*

no sntp authentication-key *number*

- *key-number* — number (Range: 1–4294967295)
- *value* — value (Range: 1-8 characters)

Default value

No authentication is defined.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Examples

The following examples define the authentication key for SNTP.

```
console(config)# sntp authentication-key 8 md5 ClkKey
console(config)# sntp trusted-key 8
```

```
console(config)# sntp authenticate
```

sntp broadcast client enable

Use the **sntp broadcast client enable** command in Global Configuration mode to enable a Simple Network Time Protocol (SNTP) Broadcast client. To disable an SNTP Broadcast client, use the **no** form of this command.

Syntax

sntp broadcast client enable

no sntp broadcast client enable

Default Configuration

The SNTP Broadcast client is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables a Simple Network Time Protocol (SNTP) Broadcast client.

```
console(config)# sntp broadcast client enable
```

sntp client poll timer

Use the **sntp client poll timer** command in Global Configuration mode to set the polling time for the Simple Network Time Protocol (SNTP) client. To return to the default settings, use the **no** form of this command.

Syntax

sntp client poll timer *seconds*

no sntp client poll timer

- *seconds* — Polling interval. (Range: 64-1024 seconds, in powers of 2)

Default Configuration

The polling interval is 64 seconds.

Command Mode

Global Configuration mode

User Guidelines

If a user enters a value which is not an exact power of two, the nearest power-of-two value is applied.

Example

The following example sets the polling time for the Simple Network Time Protocol (SNTP) client to 1024 seconds.

```
console(config)# sntp client poll timer 1024
```

sntp server

Use the **sntp server** command in Global Configuration mode to configure an SNTP server address or a host name. The server address can be either an IPv4 address or an IPv6 address. Use the **no** form of this command to unconfigure an SNTP server address or a host name.

Syntax

sntp server {ip-address | ipv6-address | hostname}

no sntp server {ip-address | ipv6-address | hostname}

- *ip-address* — IP address of the server.
- *hostname* — Hostname of the server. (Range: 1-158 characters)

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the device to accept Simple Network Time Protocol (SNTP) traffic from the server at IP address 192.1.1.1.

```
console(config)# sntp server 192.1.1.1
```

sntp trusted-key

Use the **sntp trusted-key** command in Global Configuration mode to authenticate the identity of a system to which Simple Network Time Protocol (SNTP) will synchronize. To disable authentication of the identity of the system, use the **no** form of this command.

Syntax

sntp trusted-key *key-number*

no sntp trusted-key *key-number*

- *key-number* — Key number of authentication key to be trusted. (Range: 1–4294967295)

Default Configuration

No keys are trusted.

Command Mode

Global Configuration mode

User Guidelines

This command is relevant for both received Unicast and Broadcast.

Example

The following defines SNTP trusted-key.

```
console(config)# sntp authentication-key 8 md5 ClkKey
console(config)# sntp trusted-key 8
console(config)# sntp authenticate
```

sntp unicast client enable

Use the **sntp unicast client enable** command in Global Configuration mode to enable a client to use Simple Network Time Protocol (SNTP) predefined Unicast clients. To disable an SNTP Unicast client, use the **no** form of this command.

Syntax

sntp unicast client enable

no sntp unicast client enable

Default Configuration

The SNTP Unicast client is disabled.

Command Mode

Global Configuration mode

User Guidelines

Use the **sntp server** command to define SNTP servers.

Examples

The following example enables the device to use Simple Network Time Protocol (SNTP) to request and accept SNTP traffic from servers.

```
console(config)# sntp unicast client enable
```

clock timezone hours-offset

Use the **clock timezone** [**hours-offset**] [minutes *minutes-offset*] [**zone** *acronym*] command to set the offset to Coordinated Universal Time (UTC). If the optional parameters are not specified, they will be read as either '0' or '\0, as appropriate.

Syntax

clock timezone hours-offset [**minutes** *minutes-offset*] [**zone** *acronym*]

- *hours-offset* — Hours difference from UTC. (Range: –12 to +13)
- *minutes-offset* — Minutes difference from UTC. (Range: 0–59)
- *acronym* — The acronym for the time zone. (Range: Up to four characters)

Command Mode

Global Configuration

Default Value

No default setting

User Guidelines

No specific guidelines

Example

```
console(config)#clock timezone -5 minutes 30 zone IST
```

no clock timezone

Use the **no clock timezone** command to reset the time zone settings.

Syntax

no clock timezone

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

This command has no specific user guidelines.

Example

```
console(config)#no clock timezone
```

clock summer-time recurring

Use the **clock summer-time recurring** {**usa** | **eu** | {*week day month hh:mm week day month hh:mm*}} [**offset** *offset*] [**zone** *acronym*] command to set the summertime offset to UTC recursively every year. If the optional parameters are not specified, they are read as either '0' or '\0', as appropriate.

Syntax

clock summer-time recurring {**usa** | **eu** | {*week day month hh:mm week day month hh:mm*}} [**offset** *offset*] [**zone** *acronym*]

- *week* — Week of the month. (Range: 1–5, first, last)
- *day* — Day of the week. (Range: The first three letters by name; sun, for example.)
- *month* — Month. (Range: The first three letters by name; jan, for example.)
- *hh:mm* — Time in 24-hour format in hours and minutes. (Range: hh: 0–23, mm: 0–59)
- *offset* — Number of minutes to add during the summertime. (Range:1–1440)
- *acronym* — The acronym for the time zone to be displayed when summertime is in effect. (Range: Up to four characters)

Default Value

No default setting

Command Mode

Global Configuration

User Guidelines

No specific guidelines

Examples

```
console(config)# clock summer-time recurring 1 sun jan
00:10 2 mon mar 10:00 offset 1 zone ABC
```

clock summer-time date

Use the **clock summer-time date** {**date** | **month**} {**month** | **date**} *year hh:mm* {**date** | **month**} {**month** | **date**} *year hh:mm* [**offset** *offset*] [**zone** *acronym*] command to set the summertime offset to UTC. If the optional parameters are not specified, they are read as either '0' or '\0', as appropriate.

Syntax

clock summer-time date {**date** | **month**} {**month** | **date**} *year hh:mm* {**date** | **month**} {**month** | **date**} *year hh:mm* [**offset** *offset*] [**zone** *acronym*]

- *date* — Day of the month. (Range: 1–31)
- *month* — Month. (Range: The first three letters by name; jan, for example.)
- *year* — Year. (Range: 2000–2097)
- *hh:mm* — Time in 24-hour format in hours and minutes. (Range: hh: 0–23, mm: 0–59)
- *offset* — Number of minutes to add during the summertime. (Range: 1–1440)
- *acronym* — The acronym for the time zone to be displayed when summertime is in effect. (Range: Up to four characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

No specific guidelines

Examples

```
console(config)# clock summer-time date 1 Apr 2007
02:00 28 Oct 2007 offset 90 zone EST
```

or

```
console(config)# clock summer-time date Apr 1 2007
02:00 Oct 28 2007 offset 90 zone EST
```

no clock summer-time

Use the **no clock summer-time** command to reset the summertime configuration.

Syntax Description

no clock summer-time

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

No specific guidelines

Example

```
console(config)#no clock summer-time
```

show clock

Use the **show clock** command in Privileged EXEC or User EXEC mode to display the time and date from the system clock. Use the **show clock detail** command to show the time zone and summertime configuration.

Syntax Description

show clock [**detail**]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

The following example shows the time and date only.

```
console# show clock

15:29:03 PDT(UTC-7) Jun 17 2005

Time source is SNTP
```

The following example shows the time, date, timezone, and summertime configuration.

```
console# show clock detail

15:29:03 PDT(UTC-7) Jun 17 2005

Time source is SNTP

Time zone:

Acronym is PST

Offset is UTC-7

Summertime:
```

```
Acronym is PDT
Recurring every year.
Begins at first Sunday of April at 2:00.
Ends at last Sunday of October at 2:00.
Offset is 60 minutes.
```

The following example displays the time and date from the system clock

```
console>show clock
15:29:03 Jun 17 2002
Time source is SNTP
```

66

Command Line Configuration Scripting Commands

The Configuration Scripting feature allows the user to generate text-formatted files representing the current system configuration. These configuration script files can be uploaded to a computer and edited, then downloaded to the system and applied to the system. This feature allows the flexibility of creating command configuration scripts that can be applied to several switches with minor or no modifications.

Commands applied from a script are additive in nature. That is, they modify, but do not automatically replace the current configuration. Any valid command can be placed in a script, including show commands.

Scripts execute in Privileged EXEC mode. The script author must add a command (configure) in order to enter Global Configuration mode.

Commands in this Chapter

This chapter explains the following commands:

script apply	script show
script delete	script validate
script list	

script apply

Use the **script apply** command in Privileged EXEC mode to apply the commands in the script to the switch.

Syntax

script apply *scriptname*

- *scriptname* — Name of the script file to apply. (Range 1–31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example applies the *config.scr* script to the switch.

```
console#script apply config.scr
```

script delete

Use the **script delete** command in Privileged EXEC mode to delete a specified script.

Syntax

script delete {*scriptname* | **all**}

- *scriptname* — Script name of the file being deleted. (Range 1-31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example deletes all scripts from the switch.

```
console#script delete all
```

script list

Use the **script list** command in Privileged EXEC mode to list all scripts present on the switch as well as the remaining available space.

Syntax

script list

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays all scripts present on the switch.

```
console#script list

Configuration Script Name Size(Bytes)

-------------------------------- -----------

0 configuration script(s) found.

2048 Kbytes free.
```

script show

Use the **script show** command in Privileged EXEC mode to display the contents of a script file.

Syntax

script show *scriptname*

- *scriptname* — Name of the script file to be displayed. (Range: 1-31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the contents of the script file *config.scr*.

```
console#script show config.scr
interface gigabitethernet 1/0/1
ip address 176.242.100.100 255.255.255.0
exit
```

script validate

Use the **script validate** command in Privileged EXEC mode to validate a script file by parsing each line in the script file.The validate option is intended for use as a tool in script development. Validation identifies potential problems though it may not identify all problems with a given script.

Syntax

script validate *scriptname*

- *scriptname* — Name of the script file being validated. (Range: 1-31 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example validates the contents of the script file *config.scr*.

```
console#script validate config.scr
```

67

Configuration and Image File Commands

File System Commands

CLI commands allow the user to show the contents of the current directory in the flash file system (**dir** command). These files may also be deleted from the flash using the **delete** command or renamed with the **rename** command. Also, the syntax of the **copy** command has been changed slightly to add additional flash targets and sources for the above commands.

Command Line Interface Scripting

The configuration scripting feature allows the user to save the current PowerConnect configuration in text format. To modify the configuration script file, follow these procedures:

1. Upload the file to a personal computer.
2. Edit the file.
3. Download the file to a PowerConnect switch.
4. Apply it to the PowerConnect system. With this feature in place, the PowerConnect administrator has the flexibility of creating configuration scripts and then applying the scripts to several devices.

Commands in this Chapter

This chapter explains the following commands:

boot system	filedescr
clear config	rename
copy	show backup-config
delete	show bootvar

delete backup-config	show running-config
delete backup-image	show startup-config
delete startup-config	37 : exit
dir	write
erase	

boot system

Use the **boot system** command in Privileged EXEC mode to specify the system image that the device loads at startup.

Syntax

boot system [**unit-id**][**image1 | image2**]

- **image1 | image2** — Image file.

Parameter Description

Parameter	Description
image1	Marks the given image as active for subsequent reboots.
image2	Marks the given image as active for subsequent reboots.
unit	Unit to be used for this operation. If absent, command executes on this node.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

Use the **show bootvar** command to find out which image is the active image.

Example

The following example loads system image **image1** for the next device startup.

```
console# boot system image1
```

clear config

Use the **clear config** command in Privileged EXEC mode to restore the switch to the default configuration.

Syntax

clear config

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example restores the switch to its default configuration.

```
console#clear config
```

copy

Use the **copy** command in Privileged EXEC mode to copy files within the switch and to upload and download files from and to the switch.

Syntax

copy *source-url destination-url*

Parameter Description

Parameter	Description	
source-url	The location URL or or reserved keyword of the source file being copied. (Range: 1-160 characters.)	
	List of valid source parameters for uploading from the switch:	
	backup-config	Uploads Backup Config file.
	image	Uploads code file by xmodem or tftp.
	operational-log	Uploads Operational Log file.
	running-config	Copies system config file.
	script	Uploads Configuration Script file.
	startup-config	Uploads Startup Config file.
	startup-log	Uploads Startup Log file.
	Valid source URLs for downloading to the switch:	
	xmodem	
	tftp://{*ipaddress* | *hostname*}/*filepath*/*filename* scp://{*user@ipaddresss* | *hostname*}/*filepath*/*filename* sftp://{*user@ipaddress* | *hostname*}/*filepath*/*filename* ftp://{*user@ipaddress* | *hostname*}/*filepath*/*filename* flash://*filename* usb://*filepath*/*filename*	

Parameter	Description	
destination-url	The URL or reserved keyword of the destination file. (Range: 1-160 characters.	
	List of valid destination parameters for downloading to the switch:	
	backup-config	Downloads config file using xmodem, sftp, or tftp.
	image	Downloads code file by xmodem, ftp, sftp, or tftp.
	script	Downloads configuration script by xmodem, sftp, or tftp.
	startup-config	Downloads config file using xmodem or tftp.
	ias-users	Downloads the ias-users database file.
	Valid destination URLs for uploading from the switch:	
	xmodem	
	tftp://{*ipaddress* | *hostname*}/*filepath*/*filename* scp://{*user@ipaddresss* | *hostname*}/*filepath*/*filename* sftp://{*user@ipaddress* | *hostname*}/*filepath*/*filename* flash://*filename* usb://*filename/filename*	

The following list describes syntax keywords.

- *source-url* — The location URL or reserved keyword of the source file being copied. (Range: 1–160 characters.)
- *destination-url* — The URL or reserved keyword of the destination file. (Range: 1–160 characters.)
- *ipaddr* — The IPv4 or IPv6 address of the server.
- *hostname* — Hostname of the server. (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes.
- *filepath* — The path to the file on the server.
- *filename* — The name of the file on the server.
- *username* — The user name for logging into the remote server via SSH.

The following table lists and describes reserved keywords.

Reserved Keyword	Description
running-config	Represents the current running configuration file.
startup-config	Represents the startup configuration file.
startup-log	Represents the startup syslog file. This can only be the source of a copy operation.
operational-log	Represents the operational syslog file. This can only be the source of a copy operation.
script *scriptname*	Represents a CLI script file.
image	Represents the software image file. When "image" is the target of a copy command, it refers to the backup image. When "image" is the source of a copy command, it refers to the active image. If this is destination, the file will be distributed to all units in the stack.
ftp:	Source or destination URL for an FTP network server. The syntax for this alias is ftp:*//ipaddr/filepath/filename image*.
tftp:	Source or destination URL for a TFTP network server. The syntax for this alias is tftp:[[*//location*]*/directory*]*/filename*. An out-of-band IP address can be specified as described in the User Guidelines.
xmodem:	Source for the file from a serial connection that uses the Xmodem protocol.
usb:	Source or destination URL for a file on a mounted USB file system. Sub-directories are not supported on USB devices.
flash:	Source or destination URL for the switch flash-based file system.
backup-config	Represents the backup configuration file.
unit	Indicates which unit in the stack is the target of the copy command.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

When copying files from the switch, match a source parameter with a destination URL. When copying to the switch, match a source URL to a destination parameter. FTP is only supported for image download to the switch. URLs may not exceed 160 characters in length, including filename, file path, hostname, ip address, user, and reserved keywords.

Examples

Example – Backing up the running-config

```
console#copy running-config backup-config

This operation may take a few minutes.

Management interfaces will not be available during
this time.

Are you sure you want to save? (y/n) y

Configuration saved!
```

Example – Downloading new code to the switch

```
console#copy tftp://10.27.65.61/PC7000v20100911_2.stk image
Transfer Mode................................ TFTP
Server IP Address............................ 10.27.65.61
File Path.................................... ./
File Name.................................... PCM7000v20100911_2.stk
Data Type.................................... Code
Local Filename............................... image

Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y
```

```
TFTP code transfer starting

9392640 bytes transferred...
File contents are valid.

File transfer operation completed successfully.

console#show bootvar

Image Descriptions

 image1 : default image
 image2 :


 Images currently available on Flash

--------------------------------------------------------------------
 unit      image1      image2     current-active        next-active
--------------------------------------------------------------------

    1    M.9.11.2    M.9.11.3 image1             image1


After the file transfer completes, use the boot system command to
select the new image to run.
```

Example – Downloading and applying ias users file

```
console#copy tftp://10.131.17.104/aaa_users.txt ias-users
Transfer Mode.............................. TFTP
Server IP Address.......................... 10.131.17.104
File Path.................................. ./
File Name.................................. aaa_users.txt
Data Type.................................. IAS Users
```

```
Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y

File transfer operation completed successfully.

Validating and updating the users to the IAS users database.

Updated IAS users database successfully.
```

Example – USB copy operations

```
console#copy usb://start-config startup-config
console#copy operational-log usb://olog.txt
console#copy usb://backup-config.txt backup-config
console#copy image usb://image1.stk
console#copy flash://crashdump.0 usb://crashdump.0
```

delete

Use the **delete** command to delete files from flash.

Syntax

delete *file*

- *file* — Name of the file to be deleted.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#delete file1.scr
Delete file1.scr (Y/N)?y
```

delete backup-config

Use the **delete backup-config** command in Privileged EXEC mode to delete the backup-config file.

Syntax

delete backup-config

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example deletes the backup-config file.

```
console#delete backup-config
Delete backup-config (Y/N)?y
```

delete backup-image

Use the **delete backup-image** command in Privileged EXEC mode to delete a file from a flash memory device.

Syntax

delete *backup-image*

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

NOTE: The active image cannote be deleted.

Example

The following example deletes test file in Flash memory.

```
console#delete backup-image
Delete: image2 (y/n)?
```

delete startup-config

Use the **delete startup-config** command in Privileged EXEC mode to delete the startup-config file.

Syntax

delete startup-config

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If the startup-config file is not present when system reboots, it reboots with default settings.

Example

The following example deletes the startup-config file.

```
console# delete startup-config
Delete startup-config (y/n)?
```

dir

Use the **dir** command to print the contents of the flash file system.

Syntax

dir

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#dir
    0  drwx                2048 Jan 13 2031 17:19:54 .
    0  drwx                2048 Jan 10 2031 15:58:10 ..
    0  -rwx                 256 Jan 22 2005 08:00:48 vpd.bin
    0  -rwx               16380 Jan 10 2031 15:58:18 log2.bin
    0  -rwx                  72 Jan 10 2031 15:58:14 boot.dim
    0  -rwx                   0 Jan 10 2031 15:58:18 slog2.txt
    0  -rwx               53205 Jan 22 2005 09:45:04 rc.soc
    0  -rwx                 148 Jan 10 2031 15:58:22 hpc_broad.cfg
    0  -rwx               11224 Jan 22 2005 09:45:04 helixmem.soc
--More-- or (q)uit
console#
```

erase

Use the **erase** command to erase the startup configuration, the backup configuration, or the backup image.

Syntax

erase {startup-config | backup-image | backup-config}

Syntax Description

Parameter	Description
startup-config	Erases the contents of the startup configuration file.
backup-image	Erase the backup image.
backup-config	Erases the backup configuration.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

filedescr

Use the **filedescr** command in Privileged EXEC mode to add a description to a file. Use the **no** version of this command to remove the description from the filename.

Syntax

filedescr {image 1 | image2} *description*

no filedescr {image 1 | image2}

- **image1 | image2** — Image file.
- *description* — Block of descriptive text. (Range: 0-128 characters)

Default Configuration

No description is attached to the file.

Command Mode

Privileged EXEC mode

User Guidelines

The description accepts any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the description. The CLI does not filter illegal combinations of characters on entry and may accept entries up to the first illegal character or reject the entry entirely.

Example

The following example attaches a file description to image2.

```
console#filedescr image2 "backedup on 03-22-05"
```

rename

Use the **rename** command in Privileged EXEC mode to rename a file present in flash.

Syntax

rename *source dest*

- *source* — Source file name
- *dest* — Destination file name

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#rename file1.scr file2.scr
```

show backup-config

Use the **show backup-config** command in Privileged EXEC mode to display the contents of the backup configuration file.

Syntax

show backup-config

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example shows backup-config data.

```
console#show backup-config
software version 1.1
hostname device
interface gigabitethernet 1/0/1
ip address 176.242.100.100 255.255.255.0
duplex full
speed 1000
```

```
exit
interface gigabitethernet 1/0/2
ip address 176.243.100.100 255.255.255.0
duplex full
speed 1000
exit
```

show bootvar

Use the **show bootvar** command in User EXEC mode to display the active system image file that the device loads at startup.

Syntax

show bootvar [*unit*]

- *unit*—Unit number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the active system image file that the device loads at startup.

```
console>show bootvar

Image Descriptions
 image1 : default image
 image2 :
```

```
 Images currently available on Flash

--------------------------------------------------------------------
 unit      image1      image2     current-active       next-active
--------------------------------------------------------------------

    1     0.31.0.0    0.31.0.0             image2           image2
```

show running-config

Use the **show running-config** command in Privileged EXEC mode to display the contents of the currently running configuration file, including banner configuration. The command only displays the configurations that are non-default.

NOTE: All non-default configurations for the Captve Portal branding images and encoded Unicode are not displayed via the standard show running-config command. If desired, you can view this data in the script files or by using the all mode for the show running-config command. In addition, please note that this non-readable data is contained and displayed at the end of the script files.

Syntax

show running-config [*all* | *scriptname*]

- *all*—To display or capture the commands with settings and configuration that are equal to the default value, include the *all* option.
- *scriptname*—If the optional *scriptname* is provided, the output is redirected to a script file.

NOTE: If you issue the **show running-config** command from a serial connection, access to the switch through remote connections (such as Telnet) is suspended while the output is being generated and displayed.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console# show running-config
...
line ssh
no exec-banner
exit
line telnet
no login-banner
exit
banner exec "===exec====="
banner login "===login====="
banner motd "===motd====="
exit
```

show startup-config

Use the **show startup-config** command in Privileged EXEC mode to display the startup configuration file contents.

Syntax

show startup-config

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the contents of the startup-config file.

```
1 : !Current Configuration:
2 : !System Description "Powerconnect 8024F, 4.1.0.6, VxWorks 6.6"
3 : !System Software Version 4.1.0.6
4 : !Cut-through mode is configured as disabled
5 : !
6 : configure
7 : vlan database
8 : vlan 3,1000-1001
9 : vlan routing 1001 1
10 : vlan routing 3 2
11 : exit
12 : stack
13 : member 1 2    ! PC8024F
14 : exit
15 : interface vlan 3
16 : exit
17 : interface vlan 1001
18 : ip address dhcp
19 : exit
20 : username "lvl7" password 5f4dcc3b5aa765d61d8327deb882cf99 privilege
15 encrypted
21 : !
22 : interface Te1/0/3
```

23 : channel-group 1 mode auto

24 : exit

25 : !

26 : interface Te1/0/4

27 : channel-group 1 mode auto

28 : exit

29 : !

30 : interface Te1/0/17

31 : switchport mode general

32 : switchport general pvid 1001

33 : switchport general allowed vlan add 1000-1001

34 : switchport general allowed vlan remove 1

35 : exit

36 : snmp-server community "public" rw

37 : exit

update bootcode

Use the **update bootcode** command in Privileged EXEC mode to update the bootcode on one or more switches. For each switch, the bootcode is extracted from the active image and programmed to flash.

Syntax

update bootcode [*unit*]

- *unit*—Unit number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If *unit* is not specified, all units are updated.

Example

The following example updates the bootcode on unit 2.

```
console#update bootcode 2
```

write

Use the **write** command to copy the running configuration image to the startup configuration.

Syntax

write

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

Usage Guidelines

This command is equivalent to the **copy running-config startup-config** command functionally.

Example

```
console#write
console#
```

68

Denial of Service Commands

The following list shows the DoS attack detection PowerConnect supports. Some platforms do not support detection for all of the DoS attack types in the list.

- SIP=DIP:
  - Source IP address = Destination IP address.
- First Fragment:
  - TCP Header size smaller then configured value.
- TCP Fragment:
  - IP Fragment Offset = 1.
- TCP Flag:
  - TCP Flag SYN set and Source Port < 1024 or TCP Control Flags = 0 and
  - TCP Sequence Number = 0 or TCP Flags FIN, URG, and PSH set and
  - TCP Sequence Number = 0 or TCP Flags SYN and FIN set.
- L4 Port:
  - Source TCP/UDP Port = Destination TCP/UDP Port.
- ICMP:
  - Limiting the size of ICMP Ping packets.
- SMAC=DMAC:
  - Source MAC address = Destination MAC address.
- TCP Port:
  - Source TCP Port = Destination TCP Port.
- UDP Port:
  - Source UDP Port = Destination UDP Port.
- TCP Flag & Sequence:

  - TCP Flag SYN set and Source Port < 1024 or TCP Control Flags = 0 and
  - TCP Sequence Number = 0 or TCP Flags FIN, URG, and PSH set and
  - TCP Sequence Number = 0 or TCP Flags SYN and FIN set.
- TCP Offset:
  - Checks for TCP header offset =1.
- TCP SYN:
  - TCP Flag SYN set.
- TCP SYN & FIN:
  - TCP Flags SYN and FIN set.
- TCP FIN & URG & PSH:
  - TCP Flags FIN and URG and PSH set and TCP Sequence Number = 0.
- ICMP V6:
  - Limiting the size of ICMPv6 Ping packets.
- ICMP Fragment:
  - Checks for fragmented ICMP packets.

Commands in this Chapter

This chapter explains the following commands:

dos-control firstfrag
dos-control icmp
dos-control l4port
dos-control sipdip
dos-control tcpflag
dos-control tcpfrag
ip icmp echo-reply
ip icmp error-interval
ip unreachables
ip redirects
ipv6 icmp error-interval
ipv6 unreachables
show dos-control

dos-control firstfrag

Use the **dos-control firstfrag** command in Global Configuration mode to enable Minimum TCP Header Size Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having a TCP Header Size smaller than the configured value, the packets are dropped.

Syntax

dos-control firstfrag [*size*]

no dos-control firstfrag

- *size*—TCP header size. (Range: 0-255). The default TCP header size is 20. ICMP packet size is 512.

Default Configuration

Denial of Service is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example defines a minimum TCP header size of 20. Packets entering with a smaller header size are dropped.

```
console(config)#dos-control firstfrag 20
```

dos-control icmp

Use the **dos-control icmp** command in Global Configuration mode to enable Maximum ICMP Packet Size Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If ICMP Echo Request (PING) packets ingress having a size greater than the configured value, the packets are dropped.

Syntax

dos-control icmp [*size*]

no dos-control icmp

- *size* — Maximum ICMP packet size. (Range: 0-16376). If size is unspecified, the value is 512.

Default Configuration

Denial of Service is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example activates the Maximum ICMP Packet Denial of Service protection with a maximum packet size of 1023.

```
console(config)#dos-control icmp 1023
```

dos-control l4port

Use the **dos-control l4port** command in Global Configuration mode to enable L4 Port Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having Source TCP/UDP Port Number equal to Destination TCP/UDP Port Number, the packets are dropped.

Syntax

dos-control l4port

no dos-control l4port

Default Configuration

Denial of Service is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example activates L4 Port Denial of Service protection.

```
console(config)#dos-control l4port
```

dos-control sipdip

Use the **dos-control sipdip** command in Global Configuration mode to enable Source IP Address = Destination IP Address (SIP=DIP) Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress with SIP=DIP, the packets is dropped if the mode is enabled.

Syntax

dos-control sipdip

no dos-control sipdip

Default Configuration

Denial of Service is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example activates SIP=DIP Denial of Service protection.

```
console(config)#dos-control sipdip
```

dos-control tcpflag

Use the **dos-control tcpflag** command in Global Configuration mode to enable TCP Flag Denial of Service protections. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having TCP Flag SYN set and a source port less than 1024, having TCP Control Flags set to 0 and TCP Sequence Number set to 0, having TCP Flags FIN, URG, and PSH set and TCP Sequence Number set to 0, or having TCP Flags SYN and FIN both set, the packets are dropped.

Syntax

dos-control tcpflag

no dos-control tcpflag

Default Configuration

Denial of Service is disabled.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

The following example activates TCP Flag Denial of Service protections.

```
console(config)#dos-control tcpflag
```

dos-control tcpfrag

Use the **dos-control tcpfrag** command in Global Configuration mode to enable TCP Fragment Denial of Service protection. If the mode is enabled, Denial of Service prevention is active for this type of attack. If packets ingress having IP Fragment Offset equal to one (1), the packets are dropped.

Syntax

dos-control tcpfrag

no dos-control tcpfrag

Default Configuration

Denial of Service is disabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example activates TCP Fragment Denial of Service protection.

```
console(config)#dos-control tcpfrag
```

ip icmp echo-reply

Use the **ip icmp echo-reply** command to enable or disable the generation of ICMP Echo Reply messages. Use the **no** form of this command to prevent the generation of ICMP Echo Replies.

Syntax

ip icmp echo-reply

no ip icmp echo-reply

Default Configuration

ICMP Echo Reply messages are enabled by default.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ip icmp echo-reply
```

ip icmp error-interval

Use the **ip icmp error-interval** command to limit the rate at which IPv4 ICMP error messages are sent. The rate limit is configured as a token bucket with two configurable parameters: Burst-size and burst-interval.

To disable ICMP rate limiting, set burst-interval to zero. Use the **no** form of this command to return burst-interval and burst-size to their default values.

Syntax

ip icmp error-interval *burst-interval* [*burst-size*]

no ip icmp error-interval

- *burst-interval* — How often the token bucket is initialized (Range: 0–2147483647 milliseconds).
- *burst-size* — The maximum number of messages that can be sent during a burst interval (Range: 1–200).

Default Configuration

Rate limiting is enabled by default.

The default burst-interval is 1000 milliseconds.

The default burst-size is 100 messages.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command

Example

```
console(config)#ip icmp error-interval 1000 20
```

ip unreachables

Use the **ip unreachables** command to enable the generation of ICMP Destination Unreachable messages. Use the **no** form of this command to prevent the generation of ICMP Destination Unreachable messages.

Syntax

ip unreachables

no ip unreachables

Default Configuration

ICMP Destination Unreachable messages are enabled.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan10)#ip icmp unreachables
```

ip redirects

Use the **ip redirects** command to enable the generation of ICMP Redirect messages. Use the **no** form of this command to prevent the sending of ICMP Redirect Messages. In global configuration mode, this command affects all interfaces. In interface configuration mode, it only affects that interface.

Syntax

ip redirects

no ip redirects

Default Configuration

ICMP Redirect messages are enabled by default.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan10)#ip redirects
```

ipv6 icmp error-interval

Use the **icmp error-interval** command to limit the rate at which ICMP error messages are sent. The rate limit is configured as a token bucket with two configurable parameters: Burst-size and burst interval. Use the **no** form of this command to return burst-interval and burst-size to their default values. To disable ICMP rate limiting, set burst-interval to zero.

Syntax

ipv6 icmp error-interval *burst-interval* [*burst-size*]

no ipv6 icmp error-interval

- *burst-interval* — How often the token bucket is initialized (Range: 0–2147483647 milliseconds).
- *burst-size* — The maximum number of messages that can be sent during a burst interval (Range: 1–200).

Default Configuration

Rate limiting is enabled by default.

The default burst-interval is 1000 milliseconds.

The default burst-size is 100 messages.

Command Mode

Global Configuration mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config)#ipv6 icmp error-interval 2000 20
```

ipv6 unreachables

Use the **ipv6 unreachables** command to enable the generation of ICMPv6 Destination Unreachable messages. Use the **no** form of this command to prevent the generation of ICMPv6 Destination Unreachable messages.

Syntax

ipv6 unreachables

no ipv6 unreachables

Default Configuration

ICMPv6 Destination Unreachable messages are enabled by default.

Command Mode

Interface Configuration (VLAN) mode

User Guidelines

There are no user guidelines for this command.

Example

```
console(config-if-vlan10)#ipv6 unreachables
```

show dos-control

Use the **show dos-control** command in Privileged EXEC mode to display Denial of Service configuration information.

Syntax

show dos-control

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

The following example displays Denial of Service configuration information.

```
console#show dos-control
SIPDIP Mode.............................Disable
First Fragment Mode.....................Disable
Min TCP Hdr Size........................20
TCP Fragment Mode..... Disable
TCP Flag Mode...........................Disable
L4 Port Mode............................Disable
ICMP Mode...............................Disable
Max ICMP Pkt Size.......................512
```

69

Line Commands

This chapter explains the following commands:

exec-timeout	line
history	show line
history size	speed

Authentication commands related to line configuration mode are in AAA Commands.

exec-timeout

Use the **exec-timeout** command in Line Configuration mode to set the interval that the system waits for user input before timeout. The exec-timeout command is also used by the web for timing out web sessions. To restore the default setting, use the **no** form of this command.

Syntax

exec-timeout *minutes* [*seconds*]

no exec-timeout

- *minutes* — Integer that specifies the number of minutes. (Range: 0–65535)
- *seconds* — Additional time intervals in seconds. (Range: 0–59)

Default Configuration

The default configuration is 10 minutes.

Command Mode

Line Configuration mode

User Guidelines

To specify no timeout, enter the **exec-timeout 0** command.

Example

The following example configures the interval that the system waits until user input is detected to 20 minutes.

```
console(config)#line console
console(config-line)#exec-timeout 20
```

history

Use the **history** command in Line Configuration mode to enable the command history function. To disable the command history function, use the **no** form of this command.

Syntax

history

no history

Default Configuration

The default value for this command is *enabled*.

Command Mode

Line Interface mode

User Guidelines

This command has no user guidelines.

Example

The following example disables the command history function for the current terminal session.

```
console(config-line)# no history
```

history size

Use the **history size** command in Line Configuration mode to change the command history buffer size for a particular line. To reset the command history buffer size to the default setting, use the **no** form of this command.

Syntax

history size *number-of-commands*

no history size

Parameter Description

Parameter	Description
number-of-commands	Specifies the number of commands the system may record in its command history buffer. (Range: 0-216)

Default Configuration

The default command history buffer size is 10.

Command Mode

Line Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the command history buffer size to 20 commands for the current terminal session.

```
console(config-line)#history size 20
```

line

Use the **line** command in Global Configuration mode to identify a specific line for configuration and enter the line configuration command mode.

Syntax

line {**console** | **telnet** | **ssh**}

- **console** — Console terminal line.
- **telnet** — Virtual terminal for remote console access (Telnet).
- **ssh** — Virtual terminal for secured remote console access (SSH).

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

The default authentication list for telnet and SSH is enableNetList. The enableNetList uses a single method: enable. This implies that users accessing the switch via telnet or SSH must have an enable password defined in order to access privileged mode. Alternatively, the administrator can set the telnet and ssh lists to enableList, which has the enable and none methods defined.

Examples

The following example sets the telnet authentication list to enableList:

```
console(config)#line telnet

console(config-telnet)#enable authentication
enableList
```

The following example enters Line Configuration mode to configure Telnet.

```
console(config)#line telnet

console(config-line)#
```

show line

Use the **show line** command in User EXEC mode to display line parameters.

Syntax

show line [**console** | **telnet** | **ssh**]

- **console** — Console terminal line.
- **telnet** — Virtual terminal for remote console access (Telnet).
- **ssh** — Virtual terminal for secured remote console access (SSH).

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
The following example displays the line configuration.
console>show line
Console configuration:
Interactive timeout: Disabled
History: 10
Baudrate: 9600
Databits: 8
Parity: none
Stopbits: 1
Telnet configuration:
Interactive timeout: 10 minutes 10 seconds
History: 10
SSH configuration:
```

```
Interactive timeout: 10 minutes 10 seconds
History: 10
```

speed

Use the **speed** command in Line Configuration mode to set the line baud rate. Use the **no** form of the command to restore the default settings.

Syntax

speed {*bps*}

no speed

- *bps* — Baud rate in bits per second (bps). The options are 2400, 9600, 19200, 38400, 57600, and 115200.

Default Configuration

This default speed is 9600.

Command Mode

Line Interface (console) mode

User Guidelines

This configuration applies only to the current session.

Example

The following example configures the console baud rate to 9600.

```
console(config-line)#speed 9600
```

70

Management ACL Commands

In order to ensure the security of the switch management features, the administrator may elect to configure a management access control list. The Management Access Control and Administration List (ACAL) component is used to ensure that only known and trusted devices are allowed to remotely manage the switch via TCP/IP. Management ACLs are only configurable on IP (in-band) interfaces, not on the service port.

When a Management ACAL is enabled, incoming TCP packets initiating a connection (TCP SYN) and all UDP packets will be filtered based on their source IP address and destination port. Additionally, other attributes such as incoming port (or port-channel) and VLAN ID can be used to determine if the traffic should be allowed to the management interface. When the component is disabled, incoming TCP/UDP packets are not filtered and are processed normally.

There is also an option to restrict all the above packets from the network interface. This is done by specifying "console only" in the MACAL component. If this is enabled, the systems management interface is only accessible via the serial port. All TCP SYN packets and UDP packets are dropped except UDP packets sent to the DHCP Server or DHCP Client ports.

Commands in this Chapter

This chapter explains the following commands:

deny (management)	permit (management)
management access-class	show management access-class
management access-list	show management access-list

deny (management)

Use the **deny** command in Management Access-List Configuration mode to set conditions for the management access list.

Syntax

deny [**gigabitethernet** *unit/slot/port* | **vlan** *vlan-id* | **port-channel** *port-channel-number*| **tengigabitethernet** *unit/slot/port*] [**service** *service*] [**priority** *priority*]

deny ip-source *ip-address* [**mask** *mask* | *prefix-length*] [**gigabitethernet** *unit/slot/port* | **vlan** *vlan-id* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*] [**service** *service*] [**priority** *priority*]

- **gigabitethernet** *unit/slot/port* — A valid 1-gigabit Ethernet-routed port number.
- **vlan** *vlan-id* — A valid VLAN number.
- **port-channel** *port-channel-number* — A valid routed port-channel number.
- **tengigabitethernet** *unit/slot/port* — A valid 10-gigabit Ethernet-routed port number.
- *ip-address* — Source IP address.
- **mask** *mask* — Specifies the network mask of the source IP address.
- **mask** *prefix-length* — Specifies the number of bits that comprise the source IP address prefix. The prefix length must be preceded by a forward slash (/). (Range: 0–32)
- **service** *service* — Indicates service type. Can be one of the following: **telnet**, **ssh**, **http**, **https**, **tftp**, **snmp**, **sntp**, or **any**. The **any** keyword indicates that the service match for the ACL is effectively "don't care".
- **priority** *priority* — Priority for the rule. (Range: 1–64)

Default Configuration

This command has no default configuration.

Command Mode

Management Access-list Configuration mode

User Guidelines

Rules with **gigabitethernet**, **tengigabitethernet**, **vlan**, and **port-channel** parameters are valid only if an IP address is defined on the appropriate interface. Ensure that each rule has a unique priority.

Example

The following example shows how all ports are denied in the access-list called *mlist*.

```
console(config)# management access-list mlist
console(config-macal)# deny
```

management access-class

Use the **management access-class** command in Global Configuration mode to restrict management connections. To disable restriction, use the **no** form of this command.

Syntax

management access-class {**console-only** | *name*}

no management access-class

- *name* — A valid access-list name. (Range: 1–32 characters)
- **console-only** — The switch can be managed only from the console.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures an access-list called *mlist* as the management access-list.

```
console(config)# management access-class mlist
```

management access-list

Use the **management access-list** command in Global Configuration mode to define an access list for management, and enter the access-list for configuration. Once in the access-list configuration mode, the denied or permitted access conditions are configured with the **deny** and **permit** commands. To remove an access list, use the **no** form of this command.

Syntax

management access-list *name*

no management access-list *name*

- *name* — The access list name. (Range: 1–32 printable characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command enters the access-list configuration mode, where the denied or permitted access conditions with the **deny** and **permit** commands must be defined.

If no match criteria are defined the default is **deny**.

If reentering to an access-list context, the new rules are entered at the end of the access-list.

Use the **management access-class** command to select the active access-list.

The active management list cannot be updated or removed.

Management access list names can consist of any printable character, including blanks. Enclose the name in quotes to embed blanks in the name.

Examples

The following example shows how to configure two management interfaces, gigabit Ethernet 1/0/1 and gigabit Ethernet 2/0/9.

```
console(config)#management access-list mlist
console(config-macal)# permit gigabitethernet 1/0/1 priority 1
console(config-macal)# permit gigabitethernet 2/0/9 priority 1
console(config-macal)# exit
console(config)#management access-class mlist
```

The following example shows how to configure all the interfaces to be management interfaces except for two interfaces, gigabit Ethernet 1/0/1 and gigabit Ethernet 2/0/9.

```
console(config)# management access-list mlist
console(config-macal)# deny gigabitethernet 1/0/1 priority 1
console(config-macal)# deny gigabitethernet 2/0/9 priority 2
console(config-macal)# permit priority 2
console(config-macal)# exit
console(config) # management access-class mlist
```

permit (management)

Use the **permit** command in Management Access-List configuration mode to set conditions for the management access list.

Syntax

permit ip-source *ip-address* [**mask** *mask* | *prefix-length*] [**gigabitethernet** *unit/slot/port* | **vlan** *vlan-id* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*] [**service** *service*] [**priority** *priority-value*]

permit {**gigabitethernet** *unit/slot/port* | **vlan** *vlan-id* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port*} [**service** *service*] [**priority** *priority-value*]

permit service *service* [**priority** *priority-value*]

permit priority *priority-value*

- **gigabitethernet** *unit/slot/port* — A valid 1-gigabit Ethernet-routed port number.
- **vlan** *vlan-id* — A valid VLAN number.
- **port-channel** *port-channel-number* — A valid port channel number.
- **tengigabitethernet** *unit/slot/port* — A valid 10-gigabit Ethernet-routed port number.
- *ip-address* — Source IP address.
- **mask** *mask* — Specifies the network mask of the source IP address.
- **mask** *prefix-length* — Specifies the number of bits that comprise the source IP address prefix. The prefix length must be preceded by a forward slash (/). (Range: 0–32)
- **service** *service* — Indicates service type. Can be one of the following: **telnet**, **ssh**, **http**, **https**, **tftp**, **snmp**, **sntp**, or **any**. The **any** keyword indicates that the service match for the ACL is effectively "don't care".
- **priority** *priority-value* — Priority for the rule. (Range: 1 – 64)

Default Configuration

This command has no default configuration.

Command Mode

Management Access-list Configuration mode

User Guidelines

Rules with **gigabitethernet**, **tengigabitethernet**, **vlan**, and **port-channel** parameters are valid only if an IP address is defined on the appropriate interface. Ensure that each rule has a unique priority.

Examples

The following example shows how to configure two management interfaces, gigabit Ethernet 1/0/1 and gigabit Ethernet 2/0/9.

```
console(config)#management access-list mlist
console(config-macal)# permit gigabitethernet 1/0/1 priority 1
console(config-macal)# permit gigabitethernet 2/0/9 priority 1
console(config-macal)# exit
```

```
console(config)# management access-class mlist
```

The following example shows how to configure all the interfaces to be management interfaces except for two interfaces, gigabit Ethernet 1/0/1 and 2/0/9.

```
console(config)# management access-list mlist
console(config-macal)# deny gigabitethernet 1/0/1 priority 1
console(config-macal)# deny gigabitethernet 2/0/9 priority 2
console(config-macal)# permit priority 2
console(config-macal)# exit
console(config)# management access-class mlist
```

show management access-class

Use the **show management access-class** command in Privileged EXEC mode to display information about the active management access list.

Syntax

show management access-class

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the management access-list information.

```
console# show management access-class
Management access-class is enabled, using access list mlist
```

show management access-list

Use the **show management access-list** command in Privileged EXEC mode to display management access-lists.

Syntax

show management access-list [*name*]

- *name* — A valid access list name. (Range: 1–32 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the active management access-list.

```
console# show management access-list
mlist
-----
permit priority 1 gigabitethernet 1/0/1
permit priority 2 gigabitethernet 2/0/1
! (Note: all other access implicitly denied)
```

71

Mode Commands

This chapter explains the following commands:

configure terminal	do

configure terminal

Use the **configure terminal** command to get to the configure line. This command is equivalent to the **configure** command.

Syntax

configure terminal

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

Example

```
console#conf t
console(config)#

console#configure terminal
console(config)#
```

do

Use the **do** command to execute commands available in Privileged EXEC mode from Global Configuration and other modes. Command completion using the space bar is not available when using this command. When in

modes other than Global Configuration mode, the **do** command will not appear in the list of commands shown in the help, nor will prompting be available.

Syntax

do *line*

- *line* — Command to be executed. It should be an unambiguous command from the Privileged EXEC mode. Commands such as **configure**, **devshell**, and hidden commands are forbidden.

Default Configuration

This command has no default configuration.

Command Mode

All except Privileged EXEC and User EXEC modes.

Example

```
console(config)#do show ip interface


Default Gateway.............................. 192.168.21.0
Burned In MAC Address........................ 001E.C9AA.AF51

Routing Interfaces:

Interface    State   IP Address      IP Mask         Method
----------   -----   --------------- --------------- -------
Vl1          Down    192.168.21.1    255.255.255.0   None
```

72

Password Management Commands

The Password Management component supports the features below. Passwords are masked when entered by the user and in the running config.

Configurable Minimum Password Length

The administrator has the option of requiring user passwords to be a minimum length. The administrator can choose to have the switch enforce a minimum length between 8 and 64 characters. The default minimum length is 8 although there is no default password (zero length string).

Password History

Keeping a history of previous passwords ensures that users cannot reuse passwords often. The administrator can configure the switch to store up to 10 of the last passwords for each user. The default operation is that no history is stored.

Password Aging

The switch can implement an aging process on passwords and require users to change them when they expire. The administrator can configure the switch to force a password change between 1 and 365 days. By default, password aging is disabled. When a password expires, the user must enter a new password before continuing.

User Lockout

The administrator may choose to strengthen the security of the switch by enabling the user lockout feature. A lockout count between 1 and 5 attempts can be configured. When a lockout count is configured, then a user that is logging in must enter the correct password within that count. Otherwise, that user is locked out form further remote switch access. Only an administrator with read/write access can reactivate that user. The user lockout feature is disabled by default. The user lockout feature applies to all users on all ports.

The administrator can access the serial port even if he/she is locked out and reset the password or clear the config to regain control of the switch. This ensures that if a hacker tries to log in as **admin** and causes the account to be locked out, then the administrator with physical access to the switch can still log in and reactivate the admin account.

Password Strength

Password Strength is a measure of the effectiveness of a password in resisting guessing and brute-force attacks. The strength of a password is a function of length, complexity and randomness. Using strong passwords lowers overall risk of a security breach. The scope of this feature is to enforce a baseline Password Strength for all locally administered users.

The feature doesn't affect users with an existing password until their password ages out. Password Strength is only enforced when a user is configuring a new password or changing their existing password. The default action is **Disabled** in FP and is independent of any platform. The network operator has to take care that the Password Strength check is **Disabled** before downloading scripts containing old users to avoid password configuration failure for such users.

Password Strength Definition:

The feature ensures that any password configured on the switch for local administration purpose is a Strong password and it must conform to each of the following characteristics:

- Minimum number of uppercase letters.
- Minimum number of lowercase letters.
- Minimum number of numeric characters.
- Minimum number of special characters from the set (`!"?$?% ^ & * ( ) _ - + = { [}] : ; @ ' ~ # | \ < , > . ? /).
- Does not contain the associated login name.
- Maximum number of consecutive characters (such as abcd).
- Maximum number of consecutive numbers (such as 1234).
- Maximum number of repetition of characters or numbers (such as 1111 or aaaa).

Configuring minimum value of 0 for the above parameters means no restriction on that set of characters and configuring maximum of 0 means disabling the restriction (or no limit on the maximum number of course limited by minimum password length).

The Password strength feature applies to all login passwords (user, line and enable).

Commands in this Chapter

This chapter explains the following commands for viewing and configuring properties of passwords:

passwords aging	passwords strength minimum special-characters
passwords history	passwords strength max-limit consecutive-characters
passwords lock-out	passwords strength max-limit repeated-characters
passwords min-length	passwords strength minimum character-classes
passwords strength-check	passwords strength exclude-keyword
passwords strength minimum uppercase-letters	enable password encrypted
passwords strength minimum lowercase-letters	show passwords configuration
passwords strength minimum numeric-characters	show passwords result

NOTE: To change a password, use the **passwords** command, which is described in AAA Commands.

passwords aging

Use the **passwords aging** command in Global Configuration mode to implement aging on passwords for local users. When a user's password expires, the user is prompted to change it before logging in again. Use the **no** form of this command to set the password aging to the default value.

Syntax

passwords aging *1-365*

no passwords aging

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is 0.

Command Mode

Global Configuration mode

User Guidelines

A value of 0 days disables password aging.

Example

The following example sets the password age limit to 100 days.

```
console(config)#passwords aging 100
```

passwords history

As administrator, use the **passwords history** command in Global Configuration mode to set the number of previous passwords that are stored for each user account. When a local user changes his or her password, the user is not able to reuse any password stored in password history. This setting ensures that users do not reuse their passwords often. The default is 0. Use the **no** form of this command to set the password history to the default value of 0.

Syntax

passwords history *0-10*

no passwords history

Parameter Description

This command does not require a parameter description.

Default Configuration

The default value is 0.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the number of previous passwords remembered by the system at 10.

```
console(config)#passwords history 10
```

passwords lock-out

Use the **passwords lock-out** command in Global Configuration mode to strengthen the security of the switch by locking user accounts that have failed login due to wrong passwords. When a lockout count is configured, a user who is logging in must enter the correct password within that count. Otherwise that user is locked out from further switch access. Only a user with read/write access can reactivate a locked user account. Password lockout does not apply to logins from the serial console. Use the **no** form of this command to set the password lockout count to the default value.

Syntax

passwords lock-out *1-5*

no passwords lock-out

Parameter Description

This command does not require a parameter description.

Default Behavior

The default value is 0 or no lockout count is enforced.

Command Mode

Global Configuration mode.

User Guidelines

Password lockout only applies to users with authentication configured to local. RADIUS or TACACS authenticated users will use policies configured on the respective RADIUS/TACACS servers.

Example

The following example sets the number of user attempts before lockout at 2.

```
console(config)#passwords lock-out 2
```

passwords min-length

Use the **passwords min-length** command in Global Configuration mode to enforce a minimum length password length for local users. The value also applies to the **enable** password. The valid range is 8–64. The default is 8. Use the **no** version of this command to set the minimum password length to 8.

Syntax

passwords min-length *length*

no passwords min-length

- *length* — The minimum length of the password (Range: 8–64 characters)

Default Configuration

By default, the minimum password length is 8 characters.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures user **bob** with password **xxxyymmmm** and user level 15.

```
(config)# username bob password xxxyyymmm level 15
```

passwords strength-check

Use the **passwords strength-check** command in Global Configuration mode to enable the Password Strength feature. The command is used to enable the checking of password strength during user configuration. Use the **no** form of the command to disable the Password Strength feature.

Syntax

passwords strength-check

no passwords strength-check

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The password strength feature is disabled by default.

Command Mode

Global Configuration

User Guidelines

This command enables/disables enforcement of password strength checking policy as configured by the following commands:

```
passwords strength minimum uppercase-letters
passwords strength minimum lowercase-letters
passwords strength minimum special-characters
passwords strength minimum numeric-characters
passwords strength max-limit consecutive-characters
passwords strength max-limit repeated-characters
passwords strength minimum character-classes
```

passwords strength minimum uppercase-letters

Use this command to enforce a minimum number of uppercase letters that a password must contain. The valid range is 0–16. The default is 1. A minimum of 0 means no restriction on that set of characters. Use the **no** form of the command to reset the minimum uppercase letters to the default value.

Syntax

passwords strength minimum uppercase-letters *0–16*

no passwords strength minimum uppercase-letters

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 1.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config)#passwords strength minimum uppercase-
letters 6
```

passwords strength minimum lowercase-letters

Use this command to enforce a minimum number of lowercase letters that a password must contain. The valid range is 0–16. The default is 1. A setting of 0 means no restriction. Use the **no** form of this command to reset the minimum lowercase letters to the default value.

Syntax

passwords strength minimum lowercase-letters *0–16*

no passwords strength minimum lowercase-letters

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 1.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config)#passwords strength minimum lowercase-
letters 6
```

passwords strength minimum numeric-characters

Use this command to enforce a minimum number of numeric numbers that a password should contain. The valid range is 0–16. The default is 1. A minimum of 0 means no restriction on that set of characters. Use the **no** form of this command to reset the minimum numeric characters to the default value.

Syntax

passwords strength minimum numeric–characters *0–16*

no passwords strength minimum numeric–characters

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 1.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config)#passwords strength minimum
numeric-characters 6
```

passwords strength minimum special-characters

Use this command to enforce a minimum number of special characters that a password may contain. The valid range is 0–16. The default is 1. A setting of 0 means no restriction. Special characters are one of the following characters (` ! $ % ^ & * ( ) _ - + = { [}] : ; @ ' ~ # | \ < , > . /) Use the **no** form of this command to reset the minimum special characters to the default value.

Syntax

passwords strength minimum special–characters *0–16*

no passwords strength minimum special–characters

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 1.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config)#passwords strength minimum
special-characters 6
```

passwords strength max-limit consecutive-characters

Use this command to enforce a maximum number of consecutive characters that a password can contain. If a user enters a password that has more consecutive characters than the configured limit, the system rejects the password. The valid range of consecutive characters is 0–15. The default is 0.

A maximum of 0 means there is no restriction on consecutive characters. Examples of consecutive characters are ABCDEF or 123456 or !"#$%&'(). Use the **no** form of this command to reset the maximum consecutive characters accepted to the default value.

Syntax

passwords strength max-limit consecutive–characters *0–15*

no passwords strength max-limit consecutive-characters

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 0.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

console(config)#passwords strength max-limit consecutive-characters 3

passwords strength max-limit repeated-characters

Use this command to enforce a maximum repeated characters that a password should contain. If password has repetition of characters more than the configured max-limit, it fails to configure. The valid range is 0-15. The default is 0. A maximum of 0 means again disabling the restriction. Use the **no** form of this command to reset the maximum repeated characters to the default value.

Syntax

passwords strength max-limit repeated-characters *0-15*

no passwords strength max-limit repeated-characters

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 0.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

console(config)# passwords strength max-limit repeated-characters 3

passwords strength minimum character-classes

Use this command to enforce a minimum number of character classes that a password should contain. Character classes are uppercase letters, lowercase letters, numeric characters and special characters. The valid range is 0-4. The default is 0. If a value of 0 is configured then no character class checking is performed, i.e. for special characters, uppercase characters, lower-case characters, etc. Use the **no** form of this command to reset the minimum character-classes to the default value.

Syntax

passwords strength minimum character-classes *0-4*

no passwords strength minimum character–classes

Parameter Description

This command does not require parameter descriptions.

Default Behavior

The default value is 1.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config)#passwords strength minimum character-
classes 4
```

passwords strength exclude-keyword

Use this command to exclude the keyword while configuring the password. The password does not accept the keyword in any form (inbetween the string, case insensitive and reverse) as a substring. You can configure up to a maximum of three keywords. Use the **no** form of this command to reset the restriction for a given string or all the strings configured.

Syntax

passwords strength exclude–keyword *string*

no passwords strength exclude–keyword [*string*]

Parameter Description

This command does not require parameter descriptions.

Default Behavior

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config)#passwords strength exclude-keyword
brcm
```

enable password encrypted

This command is used by an Administrator to transfer the enable password between devices without having to know the password. The *password* parameter must be exactly 128 hexadecimal characters.

Syntax

enable password encrypted *password*

Parameter Description

This command does not require parameter descriptions.

Default Behavior

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

show passwords configuration

Use the **show passwords configuration** command in Privileged EXEC mode to display the configured password management settings.

Syntax

show passwords configuration

Parameter Description

The following fields are displayed by this command.

Parameter	Description
Minimum Password Length	Minimum number of characters required when changing passwords.
Password History	Number of passwords to store for reuse prevention.
Password Aging	Length in days that a password is valid.
Lockout Attempts	Number of failed password login attempts before lockout.
Minimum Password Uppercase Letters	Minimum number of uppercase characters required when configuring passwords.
Minimum Password Lowercase Letters	Minimum number of uppercase characters required when configuring passwords.
Minimum Password Numeric Characters	Minimum number of numeric characters required when configuring passwords.
Maximum Password Consecutive Characters	Maximum number of consecutive characters required that the password should contain when configuring passwords.
Maximum Password Repeated Characters	Maximum number of repetition of characters that the password should contain when configuring passwords.
Minimum Password Character Classes	Minimum number of character classes (uppercase, lowercase, numeric and special) required when configuring passwords.
Password Exclude-Keywords	Minimum number of character classes (uppercase, lowercase, numeric and special) required when configuring passwords.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the command output.

```
console#show passwords configuration
Passwords Configuration
-----------------------
Minimum Password Length..................... 8
Password History............................ 0
Password Aging (days)....................... 0
Lockout Attempts............................ 0
Password Strength Check..................... Enable
Minimum Password Uppercase Letters.......... 4
Minimum Password Lowercase Letters.......... 4
Minimum Password Numeric Characters......... 3
Minimum Password Special Characters......... 3
Maximum Password Consecutive Characters..... 3
Maximum Password Repeated Characters........ 3
Minimum Password Character Classes.......... 4
Password Exclude Keywords................... brcm, brcm1,brcm2
```

show passwords result

Use the **show passwords result** command in Privileged EXEC mode to display the last password set result information.

Syntax

show passwords result

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the command output.

```
console#show passwords result
Last User whose password is set ..................  brcm
Password strength check ........................... Enable
Last Password Set Result:
Reason for failure: Could not set user password! Password
should contain at least 4 uppercase letters.
```

73

PHY Diagnostics Commands

This chapter explains the following commands:

show copper-ports tdr	test copper-port tdr
show fiber-ports optical-transceiver	

show copper-ports tdr

Use the **show copper-ports tdr** command in Privileged EXEC mode to display the stored information regarding cable lengths.

Syntax

show copper-ports tdr [*interface*]

- *interface* — A valid Ethernet port. The full syntax is *unit / port.*

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The copper-related commands do not apply to the stacking, CX-4, or 10GBaseT ports associated with these plug-in modules.

The maximum length of the cable for the Time Domain Reflectometry (TDR) test is 120 meters. Disable green-mode on the port in order to obtain accurate results.

Example

The following example displays the last TDR tests on all ports.

```
console#show copper-ports tdr
Port   Result    Length [meters]   Date
----   --------  ---------------   ---------------
1/0/1   OK
1/0/2   Short     50                13:32:00 23 July 2004
1/0/3   Test has not been performed
1/0/4   Open      128               13:32:08 23 July 2004
1/0/5   Fiber     -                  -
```

show fiber-ports optical-transceiver

Use the **show fiber-ports optical-transceiver** command in Privileged EXEC mode to display the optical transceiver diagnostics.

Syntax

show fiber-ports optical-transceiver [*interface*]

- *interface* — A valid Ethernet port. The full syntax is *unit / port.*

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The show fiber ports command is only applicable to the SFP combo ports and XFP ports (not the ports on the SFP+ plug-in module).

Examples

The following examples display the optical transceiver diagnostics.

```
console#show fiber-ports optical-transceiver
Port         Temp   Voltage  Current  Output   Input  TX     LOS
                                       Power    Power  Fault
-----------  ------  -------  -------  ------  -----  -----  ---
1/0/3         w       OK       E        OK      OK     OK     OK
1/0/4         OK      OK       OK       OK      OK     E      OK
1/0/1         Copper
Temp - Internally measured transceiver temperature
Voltage - Internally measured supply voltage
Current - Measured TX bias current
Output Power - Measured TX output power in milliWatts
Input Power - Measured RX received power in milliWatts
TX Fault - Transmitter fault
LOS - Loss of signal
```

test copper-port tdr

Use the **test copper-port tdr** command in Privileged EXEC mode to diagnose with Time Domain Reflectometry (TDR) technology the quality and characteristics of a copper cable attached to a port.

Syntax

test copper-port tdr *interface*

- *interface* — A valid Ethernet port. The full syntax is *unit/port*.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines.

During the test, shut down the port under test unless it is a combo port with an active fiber port.

NOTE: The maximum distance VCT can function is 120 meters.

Examples

The following example results in a report on the cable attached to port 1/0/3.

```
console#test copper-port tdr 1/0/3
Cable is open at 64 meters
```

The following example results in a failure to report on the cable attached to port 2/0/3.

```
console#test copper-port tdr 2/0/3
Can’t perform the test on fiber ports
```

74

RMON Commands

The PowerConnect SNMP component includes an RMON (remote monitoring) agent. RMON is a base technology used by network management applications to manage a network. Troubleshooting and network planning can be accomplished through the network management applications. The network monitor monitors traffic on a network and records selected portions of the network traffic and statistics. The collected traffic and statistics are retrieved using SNMP. The data collected is defined in the RMON MIB, RFC 2819. A device that supports gathering and reporting the RMON data is referred to as an RMON probe or RMON Agent. An RMON probe provides RMON data to an RMON Manager for analysis and presentation to the user. An RMON probe may be embedded in an existing network device or stand-alone.

Commands in this Chapter

This chapter explains the following commands:

rmon alarm	show rmon collection history
rmon collection history	show rmon events
rmon event	show rmon history
show rmon alarm	show rmon log
show rmon alarms	show rmon statistics

rmon alarm

Use the **rmon alarm** command in Global Configuration mode to configure alarm conditions. To remove an alarm, use the **no** form of this command. See also the related show rmon alarm command.

Syntax

rmon alarm *number variable interval* {delta | absolute} *rising-threshold value* [event-number] *falling-threshold value* [event-number] [owner *string*] [startup *direction*]

no rmon alarm *number*

Syntax Description

Parameter	Description
number	The alarm index. (Range: 1–65535)
variable	A fully qualified SNMP object identifier that resolves to a particular instance of a MIB object.
interval	The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. (Range: 1–2147483647)
rising-threshold value	Rising Threshold value. (Range: -2147483648 – 2147483647)
falling-threshold value	Falling Threshold value. (Range: -2147483648 – 2147483647)
event-number	The index of the Event that is used when a rising or falling threshold is crossed. (Range: 1- 65535)
delta	The sampling method for the selected variable and calculating the value to be compared against the thresholds. If the method is delta, the selected variable value at the last sample is subtracted from the current value, and the difference compared with the thresholds.
absolute	The sampling method for the selected variable and calculating the value to be compared against the thresholds. If the method is absolute, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval.

Parameter	Description
startup direction	The alarm that may be sent when this entry is first set to valid. If the first sample (after this entry becomes valid) is greater than or equal to the rising-threshold, and direction is equal to rising or rising-falling, then a single rising alarm is generated. If the first sample (after this entry becomes valid) is less than or equal to the falling-threshold, and direction is equal to falling or rising-falling, then a single falling alarm is generated.
owner string	Enter a name that specifies who configured this alarm. If unspecified, the name is an empty string.

Default Configuration

No alarms are configured.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the following alarm conditions:

- Alarm index — `1`
- Variable identifier — `1.3.6.1.2.1.2.2.1.10.5`
- Sample interval — `10 seconds`
- Rising threshold — `500000`
- Falling threshold — `10`
- Rising threshold event index — `1`
- Falling threshold event index — `1`

```
console(config)#rmon alarm 1 1.3.6.1.2.1.2.2.1.1.10.5 10
50000 10 1 1
```

rmon collection history

Use the **rmon collection history** command in Interface Configuration mode to enable a Remote Monitoring (RMON) MIB history statistics group on an interface. To remove a specified RMON history statistics group, use the **no** form of this command. Also see the show rmon collection history command.

Syntax

rmon collection history *index* [**owner** *ownername*] [**buckets** *bucket-number*] [**interval** *seconds*]

no rmon collection history *index*

- *index* — The requested statistics index group. (Range: 1–65535)
- **owner** *ownername* — Records the RMON statistics group owner name. If unspecified, the name is an empty string.
- **buckets** *bucket-number* — A value associated with the number of buckets specified for the RMON collection history group of statistics. If unspecified, defaults to 50. (Range: 1 - 65535)
- **interval** *seconds* — The number of seconds in each polling cycle. If unspecified, defaults to 1800. (Range: 1–3600)

Default Configuration

The **buckets** configuration is 50. The **interval** configuration is 1800 seconds.

Command Mode

Interface Configuration (gigabitethernet, port-channel, tengigabitethernet) mode.

User Guidelines

This command cannot be executed on multiple ports using the **interface range** command.

Example

The following example enables a Remote Monitoring (RMON) MIB history statistics group on port 1/0/8 with the index number "1" and a polling interval period of 2400 seconds.

```
console(config)#interface gigabitethernet 1/0/8
console(config-if-1/0/8)#rmon collection history 1
interval 2400
```

rmon event

Use the **rmon event** command in Global Configuration mode to configure an event. To remove an event, use the **no** form of this command. See also the show rmon events command.

Syntax

rmon event number [log] [trap *community*] [description *string*] [owner *string*]

no rmon event *number*

Parameter Description

Parameter	Description
number	The event index. (Range: 1–65535)
log	An entry is made in the log table for each event.
trap	An SNMP trap is sent to one or more management stations.
community	If an SNMP trap is to be sent, it is sent to the SNMP community specified by this octet string. (Range: 0-127 characters)
description string	A comment describing this event. (Range 0-127 characters)
owner string	Enter a name that specifies who configured this event. If unspecified, the name is an empty string.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures an event with the trap index of 10.

```
console(config)#rmon event 10 log
```

show rmon alarm

Use the **show rmon alarm** command in User EXEC mode to display alarm configuration. Also see the rmon alarm command.

Syntax

show rmon alarm *number*

- *number* — Alarm index. (Range: 1–65535)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays RMON 1 alarms.

```
console> show rmon alarm 1

Alarm 1

-------

OID: 1.3.6.1.2.1.2.2.1.10.1

Last sample Value: 878128
```

```
Interval: 30
Sample Type: delta
Startup Alarm: rising
Rising Threshold: 8700000
Falling Threshold: 78
Rising Event: 1
Falling Event: 1
Owner: CLI
```

The following table describes the significant fields shown in the display:

Field	Description
Alarm	Alarm index.
OID	Monitored variable OID.
Last Sample Value	The statistic value during the last sampling period. For example, if the sample type is delta, this value is the difference between the samples at the beginning and end of the period. If the sample type is absolute, this value is the sampled value at the end of the period.
Interval	The interval in seconds over which the data is sampled and compared with the rising and falling thresholds.
Sample Type	The method of sampling the variable and calculating the value compared against the thresholds. If the value is **absolute**, the value of the variable is compared directly with the thresholds at the end of the sampling interval. If the value is **delta**, the value of the variable at the last sample is subtracted from the current value, and the difference compared with the thresholds.
Startup Alarm	The alarm that may be sent when this entry is first set. If the first sample is greater than or equal to the rising threshold, and startup alarm is equal to rising or rising and falling, then a single rising alarm is generated. If the first sample is less than or equal to the falling threshold, and startup alarm is equal falling or rising and falling, then a single falling alarm is generated.

Field	Description
Rising Threshold	A sampled statistic threshold. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, a single event is generated.
Falling Threshold	A sampled statistic threshold. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, a single event is generated.
Rising Event	The event index used when a rising threshold is crossed.
Falling Event	The event index used when a falling threshold is crossed.
Owner	The entity that configured this entry.

show rmon alarms

Use the **show rmon alarms** command in User EXEC mode to display the alarms summary table.

Syntax

show rmon alarms

Default Configuration

This command has no arguments or keywords.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays the alarms summary table:

```
console> show rmon alarms

Index   OID                         Owner
```

```
-----   ---------------------  -------
1       1.3.6.1.2.1.2.2.1.10.1  CLI
2       1.3.6.1.2.1.2.2.1.10.1  Manager
3       1.3.6.1.2.1.2.2.1.10.9  CLI
```

The following table describes the significant fields shown in the display:

Field	Description
Index	An index that uniquely identifies the entry.
OID	Monitored variable OID.
Owner	The entity that configured this entry.

show rmon collection history

Use the **show rmon collection history** command in User EXEC mode to display the requested group of statistics. Also see the rmon collection history command.

Syntax

show rmon collection history [{**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }]

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays all RMON group statistics.

```
console> show rmon collection history
Index   Interface   Interval   Requested   Granted   Ow
ner
                                Samples     Samples
-------------------------------------------------------
-----
1         1/0/1         30          50          50       C
LI
2         1/0/1        1800         50          50       M
anager
```

The following table describes the significant fields shown in the display:

Field	Description
Index	An index that uniquely identifies the entry.
Interface	The sampled Ethernet interface.
Interval	The interval in seconds between samples.
Requested Samples	The requested number of samples to be saved.
Granted Samples	The granted number of samples to be saved.
Owner	The entity that configured this entry.

show rmon events

Use the **show rmon events** command in User EXEC mode to display the RMON event table. Also see the rmon event command.

Syntax

show rmon events

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the RMON event table.

```
console> show rmon events
Index Description   Type    Community   Owner   Last time sent
-----  -----------   ----   ---------   ------  -------------------
1     Errors        Log     CLI                 Jan 18 2005  23:58:17
2     High Broadcast Log-Trap  switch   Manager Jan 18 2005  23:59:48
```

The following table describes the significant fields shown in the display:

Field	Description
Index	An index that uniquely identifies the event.
Description	A comment describing this event.
Type	The type of notification that the device generates about this event. Can have the following values: **none**, **log**, **trap**, **log-trap**. In the case of log, an entry is made in the log table for each event. In the case of trap, an SNMP trap is sent to one or more management stations.
Community	If an SNMP trap is to be sent, it is sent to the SNMP community specified by this octet string.
Owner	The entity that configured this event.
Last time sent	The time this entry last generated an event. If this entry has not generated any events, this value is zero.

show rmon history

Use the **show rmon history** command in User EXEC mode to display RMON Ethernet Statistics history. Also see the rmon collection history command.

Syntax

show rmon history *index* [**throughput | errors | other**] [**period** *seconds*]

- *index* — The requested set of samples. (Range: 1–65535)
- **throughput** — Displays throughput counters.
- **errors** — Displays error counters.
- **other** — Displays drop and collision counters.
- **period** *seconds* — Specifies the requested period time to display. (Range: 0–2147483647)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Examples

The following example displays RMON Ethernet Statistics history for "throughput" on index number 1.

```
console> show rmon history 1 throughput
Sample Set: 1 Owner: CLI
Interface:  1/0/1 interval: 1800
Requested samples: 50       Granted samples: 50
Maximum table size: 270
Time                Octets     Packets     Broadcast  Multicast   %
------------------- ---------  ----------- ------     -------- --
09-Mar-2005  18:29:32 303595962  357568      3289       7287   19
09-Mar-2005  18:29:42 287696304  275686      2789       5878   20
```

The following example displays RMON Ethernet Statistics history for errors on index number 1.

```
console> show rmon history 1 errors
Sample Set: 1             Owner: Me
Interface:  1/0/1         interval: 1800
Requested samples: 50     Granted samples: 50
Maximum table size: 500 (800 after reset)

Time       CRC Undersize  Oversize  Fragments  Jabbers
          Align
-----------------------------------------------------
09-Mar-2005 1       1       0        49         0
18:29:32
09-Mar-2005 1       1       0        27         0
18:29:42
```

The following example displays RMON Ethernet Statistics history for "other" on index number 1.

```
console> show rmon history 1 other
Sample Set: 1               Owner: Me
Interface:  1/0/1 Interval: 1800
Requested samples: 50       Granted samples: 50
Maximum table size: 270
Time                    Dropped     Collisions
-------------------     ----------- -----------
10-Mar-2005  22:06:00     3           0
10-Mar-2005  22:06:20     3           0
```

The following table describes the significant fields shown in the display:

Field	Description
Time	Date and Time the entry is recorded.
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
Packets	The number of packets (including bad packets) received during this sampling interval.
Broadcast	The number of good packets received during this sampling interval that were directed to the Broadcast address.
Multicast	The number of good packets received during this sampling interval that were directed to a Multicast address. This number does not include packets addressed to the Broadcast address.
%	The best estimate of the mean physical layer network utilization on this interface during this sampling interval, in hundredths of a percent.
CRC Align	The number of packets received during this sampling interval that had a length (excluding framing bits but including FCS octets) between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Undersize	The number of packets received during this sampling interval that were less than 64 octets long (excluding framing bits but including FCS octets) and were otherwise well formed.
Oversize	The number of packets received during this sampling interval that were longer than 1518 octets (excluding framing bits but including FCS octets) but were otherwise well formed.
Fragments	The total number of packets received during this sampling interval that were less than 64 octets in length (excluding framing bits but including FCS octets) had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error), or a bad FCS with a non-integral number of octets (AlignmentError). It is normal for etherHistoryFragments to increment because it counts both runts (which are normal occurrences due to collisions) and noise hits.

Field	Description
Jabbers	The number of packets received during this sampling interval that were longer than 1518 octets (excluding framing bits but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Dropped	The total number of events in which packets were dropped by the probe due to lack of resources during this sampling interval. This number is not necessarily the number of packets dropped. It is just the number of times this condition has been detected.
Collisions	The best estimate of the total number of collisions on this Ethernet segment during this sampling interval.

show rmon log

Use the **show rmon log** command in User EXEC mode to display the RMON logging table.

Syntax

show rmon log [*event*]

- *event* — Event index. (Range: 1–65535)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following examples display the RMON logging table.

```
console> show rmon log

Maximum table size: 100
```

```
Event Description     Time
----- -----------     --------------------
1     Errors          Jan 18 2005  23:48:19
1     Errors          Jan 18 2005  23:58:17
2     High Broadcast  Jan 18 2005  23:59:48
console> show rmon log
Maximum table size: 100 (100 after reset)
Event Description     Time
----- -----------     --------------------
1     Errors          Jan 18 2005  23:48:19
1     Errors          Jan 18 2005  23:58:17
2     High Broadcast  Jan 18 2005  23:59:48
```

The following table describes the significant fields shown in the display:

Field	Description
Event	An index that uniquely identifies the event.
Description	A comment describing this event.
Time	The time this entry was created.

show rmon statistics

Use the **show rmon statistics** command in User EXEC mode to display RMON Ethernet Statistics.

Syntax

show rmon statistics {**gigabitethernet** *unit/slot/port* | **port-channel** *port-channel-number* | **tengigabitethernet** *unit/slot/port* }

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays RMON Ethernet Statistics for port 1/0/1.

```
console> show rmon statistics gigabitethernet 1/0/1
Port 1/0/1
Dropped: 8
Octets: 878128 Packets: 978
Broadcast: 7 Multicast: 1
CRC Align Errors: 0 Collisions: 0
Undersize Pkts: 0 Oversize Pkts: 0
Fragments: 0 Jabbers: 0
64 Octets: 98 65 to 127 Octets: 0
128 to 255 Octets: 0 256 to 511 Octets: 0
512 to 1023 Octets: 491 1024 to 1518 Octets: 389
```

The following table describes the significant fields shown in the display:

Field	Description
Dropped	The total number of events in which packets are dropped by the probe due to lack of resources. This number is not always the number of packets dropped; it is the number of times this condition has been detected.

Field	Description
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
Packets	The total number of packets (including bad packets, Broadcast packets, and Multicast packets) received.
Broadcast	The total number of good packets received and directed to the Broadcast address. This does not include Multicast packets.
Multicast	The total number of good packets received and directed to a Multicast address. This number does not include packets directed to the Broadcast address.
CRC Align Errors	The total number of packets received with a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but with either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Undersize Pkts	The total number of packets received less than 64 octets long (excluding framing bits, but including FCS octets) and otherwise well formed.
Oversize Pkts	The total number of packets received longer than 1518 octets (excluding framing bits, but including FCS octets) and otherwise well formed.
Fragments	The total number of packets received less than 64 octets in length (excluding framing bits but including FCS octets) and either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Jabbers	The total number of packets received longer than 1518 octets (excluding framing bits, but including FCS octets), and either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Collisions	The best estimate of the total number of collisions on this Ethernet segment.
64 Octets	The total number of packets (including bad packets) received that are 64 octets in length (excluding framing bits but including FCS octets).

Field	Description
65 to 127 Octets	The total number of packets (including bad packets) received that are between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
128 to 255 Octets	The total number of packets (including bad packets) received that are between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
256 to 511 Octets	The total number of packets (including bad packets) received that are between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
512 to 1023 Octets	The total number of packets (including bad packets) received that are between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
1024 to 1518 Octets	The total number of packets (including bad packets) received that are between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

75

SDM Templates Commands

On PowerConnect devices, the total available H/W route entries are divided statically (at compile-time) among IPV4 and IPv6 routes. If a switch is deployed in network environments where no IPv6 routes are needed, then H/W resources allocated for IPv6 routes are unused.

The Switch Performance Optimization feature enables the operator to optimize resources for IPv4 only routing environments depending on the how the switch is used in the network at runtime. The operator can choose between Ipv4-only (where all the routing table entries are reserved for IPv4 Routes) or IPv4/IPv6 (Default) mode.

Commands in this Chapter

This chapter explains the following commands:

sdm prefer	show sdm prefer

sdm prefer

Use the **sdm prefer** command in Global Config mode to change the template that will be active after the next reboot. To revert to the default template after the next reboot, use the **no** form of this command.

Syntax

sdm prefer {dual-ipv4-and-ipv6 default|ipv4-routing {default|data-center}}

Parameter Description

Parameter	Description
dual-ipv4-and-ipv6	This keyword filters subsequent template choices to those that support both IPv4 and IPv6. There is only one such template. It is selected using the keyword **default**.
ipv4-routing	This keyword filters subsequent template choices to those that support IPv4 and not IPv6. The default IPv4-only template maximizes the number of IPv4 unicast routes, while limiting the number of ECMP next hops in each route to 4. The data-center template supports increases the number of ECMP next hops to 16 and reduces the number of routes.

Default Configuration

The system defaults to the dual IPv4 and IPv6 template.

Command Mode

Global Config

User Guidelines

SDM templates enable you to reallocate system resources to support a different mix of features. After setting the template, you must reboot in order for the configuration change to take effect.

If you attach a unit to a stack and its template does not match the stack's template, then the new unit will automatically reboot using the template used by other stack members. To avoid the automatic reboot, you may first set the template to the template used by existing members of the stack. Then power off the new unit, attach it to the stack, and power it on.

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	Changes to the running SDM preferences have been stored, but cannot take effect until the next reload. Use the **show sdm prefer** command below to see what SDM preference is currently active.

Message Type	Message Description
Error Completion Message	None

show sdm prefer

Use the **show sdm prefer** command in Privileged EXEC mode to view the currently active SDM template and its scaling parameters, or to view the scaling parameters for an inactive template.

Syntax

show sdm prefer [dual-ipv4-and-ipv6 default|ipv4-routing {default|data-center}]

Parameter Description

Parameter	Description
dual-ipv4-and-ipv6 default	List the scaling parameters for the template supporting IPv4 and IPv6.
ipv4-routing default	List the scaling parameters for the IPv4-only template maximizing the number of unicast routes.
ipv4-routing data-center	List the scaling parameters for the IPv4-only template supporting more ECMP next hops.

The following table explains the output parameters.

Parameter	Description
ARP Entries	The maximum number of entries in the IPv4 Address Resolution Protocol (ARP) cache for routing interfaces.
IPv4 Unicast Routes	The maximum number of IPv4 unicast forwarding table entries.
IPv6 NDP Entries	The maximum number of IPv6 Neighbor Discovery Protocol (NDP) cache entries.
IPv6 Unicast Routes	The maximum number of IPv6 unicast forwarding table entries.
ECMP Next Hops	The maximum number of next hops that can be installed in the IPv4 and IPv6 unicast forwarding tables.

Parameter	Description
IPv4 Multicast Routes	The maximum number of IPv4 multicast forwarding table entries.
IPv6 Multicast Routes	The maximum number of IPv6 multicast forwarding table entries.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

When invoked with no optional keywords, this command lists the currently active template, and the template that will become active on the next reboot, if it is different from the currently active template. If the system boots with a non-default template, and you clear the template configuration, either using the **no sdm prefer** command or by deleting the startup configuration, the **show sdm prefer** command lists the default template as the next active template. To list the scaling parameters of a specific template, use that template's keyword as an argument to the command.

The following table lists the completion messages.

Message Type	Message Description
Successful Completion Message	Changes to the running SDM preferences have been stored, but cannot take effect until the next reload. Use the **show sdm prefer** command to see what SDM preference is currently active.
Error Completion Message	None

Examples

This example shows the current SDM template. The user has not changed the next active SDM template.

```
console# show sdm prefer

The current template is the Dual IPv4 and IPv6
template.


ARP Entries.................................6144

IPv4 Unicast Routes.........................8160

IPv6 NDP Entries............................2560

IPv6 Unicast Routes.........................4096

ECMP Next Hops..............................4

IPv4 Multicast Routes.......................1536

IPv6 Multicast Routes.......................512
```

Now the user sets the next active SDM template for optimal performance for IPv4 routing.

```
console# configure

console(config)#sdm prefer ipv4-routing default


Changes to the running SDM preferences have been
stored, but cannot take effect until the next reload.

Use 'show sdm prefer' to see what SDM preference is
currently active.


config# show sdm prefer


The current template is the Dual IPv4 and IPv6
template.
```

```
ARP Entries.................................6144
IPv4 Unicast Routes.........................8160
IPv6 NDP Entries............................2560
IPv6 Unicast Routes.........................4096
ECMP Next Hops..............................4
IPv4 Multicast Routes.......................1536
IPv6 Multicast Routes.......................512

On the next reload, the template will be the IPv4-
routing Default template.
```

To list the scaling parameters for the data center template, invoke the command with the **ipv4-routing data-center** keywords.

```
config# show sdm prefer ipv4-routing data-center

Scaling parameters for the IPv4 data center template:

ARP Entries.................................6144
IPv4 Unicast Routes.........................8160
IPv6 NDP Entries............................0
IPv6 Unicast Routes.........................0
ECMP Next Hops..............................16
IPv4 Multicast Routes.......................2048
IPv6 Multicast Routes.......................0
```

76

Serviceability Tracing Packet Commands

Debug commands cause the output of the enabled trace to display on a serial port or telnet console. Note that the output resulting from enabling a debug trace always displays on the serial port. The output resulting from enabling a debug trace displays on all login sessions for which any debug trace has been enabled. The configuration of a debug command remains in effect the whole login session.

The output of a debug command is always submitted to the syslog utility at a DEBUG severity level. As such, it can be forwarded to a syslog server, stored in the buffer log, or otherwise processed in accordance with the configuration of the syslog utility. Configuration of console logging in the syslog utility is not required in order to view the output of debug traces.

Debug commands are provided in the normal CLI tree. Debug settings are not persistent and are not visible in the running configuration. To view the current debug settings, use the show debug command.

The output of debug commands can be large and may adversely affect system performance.

Enabling debug for all IP packets can cause a serious impact on the system performance; therefore, it is limited by ACLs. This means debug can be enabled for IP packets that conform to the configured ACL. This also limits the feature availability to only when the QoS component is available. Debug for VRRP and ARP are available on routing builds.

Commands in this Chapter

This chapter explains the following commands:

debug arp	debug ip igmp	debug ipv6 pimdm	debug rip
debug auto-voip	debug ip mcache	debug ipv6 pimsm	debug sflow
debug clear	debug ip pimdm packet	debug isdp	debug spanning-tree

debug console	debug ip pimsm packet	debug lacp	debug vrrp
debug dot1x	debug ip vrrp	debug mldsnooping	show debugging
debug igmpsnooping	debug ipv6 dhcp	debug ospf	
debug ip acl	debug ipv6 mcache	debug ospfv3	
debug ip dvmrp	debug ipv6 mld	debug ping	

NOTE: Debug commands are not persistent across resets.

debug arp

Use the **debug arp** command to enable tracing of ARP packets. Use the "no" form of this command to disable tracing of ARP packets.

Syntax

debug arp

no debug arp

Default Configuration

ARP packet tracing is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug arp
```

debug auto-voip

Use the **debug auto-voip** command to enable Auto VOIP debug messages. Use the optional parameters to trace H323, SCCP, or SIP packets respectively. Use the "no" form of this command to disable Auto VOIP debug messages.

Syntax

debug auto-voip [**H323** | **SCCP** | **SIP**]

no debug auto-voip [**H323** | **SCCP** | **SIP**]

Default Configuration

Auto VOIP tracing is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug auto-voip
```

debug clear

Use the **debug clear** command to disable all debug traces.

Syntax

debug clear

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug clear
```

debug console

Use the **debug console** to enable the display of "debug" trace output on the login session in which it is executed. Debug console display must be enabled in order to view any trace output. The output of debug trace commands appears on all login sessions for which debug console has been enabled. The configuration of this command remains in effect for the life of the login session. The effect of this command is not persistent across resets.

Syntax

debug console

Default Configuration

Display of debug traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug console
```

debug dot1x

Use the **debug dot1x** command to enable dot1x packet tracing. Use the "no" form of this command to disable dot1x packet tracing.

Syntax

debug dot1x packet [**receive** | **transmit**]

no debug dot1x packet [**receive** | **transmit**]

Default Configuration

Display of dot1x traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug dot1x packet
```

debug igmpsnooping

Use the **debug igmpsnooping** to enable tracing of IGMP Snooping packets transmitted and/or received by the switch. IGMP Snooping should be enabled on the device and the interface in order to monitor packets for a particular interface.

Syntax

debug igmpsnooping packet [**receive** | **transmit**]

no debug igmpsnooping packet [**receive** | **transmit**]

Default Configuration

Display of IGMP Snooping traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug igmpsnooping packet
```

debug ip acl

Use the **debug ip acl** command to enable debug of IP Protocol packets matching the ACL criteria. Use the "no" form of this command to disable IP ACL debugging.

Syntax

debug ip acl *acl*

no debug ip acl *acl*

- *acl* — The number of the IP ACL to debug.

Default Configuration

Display of IP ACL traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ip  acl 1
```

debug ip dvmrp

Use the **debug ip dvmrp** to trace DVMRP packet reception and transmission. The **receive** option traces only received DVMRP packets and the **transmit** option traces only transmitted DVMRP packets. When neither keyword is used in the command, all DVMRP packet traces are dumped. Vital

information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

Syntax

debug ip dvmrp packet [**receive** | **transmit**]

no debug ip dvmrp packet [**receive** | **transmit**]

Default Configuration

Display of DVMRP traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ip  dvmrp packet
```

debug ip igmp

Use the **debug ip igmp** command to trace IGMP packet reception and transmission. The **receive** option traces only received IGMP packets and the **transmit** option traces only transmitted IGMP packets. When neither keyword is used in the command, then all IGMP packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable IGMP traces.

Syntax

debug ip igmp packet [**receive** | **transmit**]

no debug ip igmp packet [**receive** | **transmit**]

Default Configuration

Display of IGMP traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ip igmp packet
```

debug ip mcache

Use the **debug ip mcache** command for tracing MDATA packet reception and transmission. The **receive** option traces only received data packets and the **transmit** option traces only transmitted data packets. When neither keyword is used in the command, then all data packet traces are dumped. Vital information such as source address, destination address, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable MDATA tracing.

Syntax

debug ip mcache packet [**receive** | **transmit**]

no debug ip mcache packet [**receive** | **transmit**]

Default Configuration

Display of MDATA traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ip mcache packet
```

debug ip pimdm packet

Use the **debug ip pimdm packet** command to trace PIMDM packet reception and transmission. The **receive** option traces only received PIMDM packets and the **transmit** option traces only transmitted PIMDM packets. When neither keyword is used in the command, then all PIMDM packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

Use the **no** form of this command to disable debug tracing of PIMDM packet reception and transmission.

Syntax

debug ip pimdm packet [**receive** | **transmit**]

no debug ip pimdm packet [**receive** | **transmit**]

Default Configuration

Display of PIMDM traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ip pimdm packet
```

debug ip pimsm packet

Use the **debug ip pimsm** command to trace PIMSM packet reception and transmission. The **receive** option traces only received PIMSM packets and the **transmit** option traces only transmitted PIMSM packets. When neither keyword is used in the command, then all PIMSM packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the **no** form of this command to disable debug tracing of PIMSM packet reception and transmission.

Syntax

debug ip pimsm packet [**receive** | **transmit**]

no debug ip pimsm packet [**receive** | **transmit**]

Default Configuration

Display of PIMSM traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ip pimsm packet
```

debug ip vrrp

Use the **debug ip vrrp** command to enable VRRP debug protocol messages. Use the "no" form of this command to disable VRRP debug protocol messages.

Syntax

debug ip vrrp

no debug ip vrrp

Default Configuration

Display of VRRP traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

```
console#debug ip vrrp
```

debug ipv6 dhcp

Use the **debug ipv6 dhcp** command in Privileged EXEC mode to display debug information about DHCPv6 client activities and to trace DHCPv6 packets to and from the local DHCPv6 client. To disable debugging, use the **no** form of the command.

Syntax

debug ipv6 dhcp

no debug ipv6 dhcp

Parameter Description

This command does not require a parameter description.

Default Configuration

Debugging for the DHCP for IPv6 is disabled by default.

Command Mode

Privileged EXEC

User Guidelines

DHCPv6 client already has packet tracing. This command turns the packet tracing on.

Examples

```
console#debug ipv6 dhcp
```

debug ipv6 mcache

Use the **debug ipv6 mcache** command to trace MDATAv6 packet reception and transmission. The **receive** option traces only received data packets and the **transmit** option traces only transmitted data packets. When neither keyword is used in the command, then all data packet traces are dumped. Vital information such as source address, destination address, packet length, and the interface on which the packet is received or transmitted is displayed on the console.

Syntax

debug ipv6 mcache packet [**receive** | **transmit**]

no debug ipv6 mcache packet [**receive** | **transmit**]

Default Configuration

Display of MDATA traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

Example

```
console#debug ipv6 mcache packet
```

debug ipv6 mld

Use the **debug ipv6 mld** command to trace MLD packet reception and transmission. The **receive** option traces only received MLD packets and the **transmit** option traces only transmitted MLD packets. When neither keyword

is used in the command, then all MLD packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable MLD tracing.

Syntax

debug ipv6 mld packet [**receive** | **transmit**]

no debug ipv6 mld packet [**receive** | **transmit**]

Default Configuration

Display of MLD traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ipv6 mld packet
```

debug ipv6 pimdm

Use the **debug ipv6 pimdm** command to trace PIMDMv6 packet reception and transmission. The **receive** option traces only received PIMDMv6 packets and the **transmit** option traces only transmitted PIMDMv6 packets. When neither keyword is used in the command, then all PIMDMv6 packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable PIMDMv6 tracing.

Syntax

debug ipv6 pimdm packet [**receive** | **transmit**]

no debug ipv6 pimdm packet [**receive** | **transmit**]

Default Configuration

Display of PIMDMv6 traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ipv6 pimdm packet
```

debug ipv6 pimsm

Use the **debug ipv6 pimsm** command to trace PIMSMv6 packet reception and transmission. The **receive** option traces only received PIMSMv6 packets and the **transmit** option traces only transmitted PIMSMv6 packets. When neither keyword is used in the command, then all PIMSMv6 packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable PIMSMv6 tracing.

Syntax

debug ipv6 pimsm packet [**receive** | **transmit**]

no debug ipv6 pimsm packet [**receive** | **transmit**]

Default Configuration

Display of PIMSMv6 traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ipv6 pimsm packet
```

debug isdp

Use the **debug isdp** command to trace ISDP packet reception and transmission. The **receive** option traces only received ISDP packets and the **transmit** option traces only transmitted ISDP packets. When neither keyword is used in the command, then all ISDP packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable ISDP tracing.

Syntax

debug isdp packet [**receive** | **transmit**]

no debug isdp packet [**receive** | **transmit**]

Default Configuration

Display of ISDP traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug isdp packet
```

debug lacp

Use the **debug lacp** command to enable tracing of LACP packets received and transmitted by the switch. Use the "no" form of this command to disable tracing of LACP packets.

Syntax

debug lacp packet

no debug lacp packet

Default Configuration

Display of LACP traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug lacp packet
```

debug mldsnooping

Use the **debug mldsnooping** command to trace MLD snooping packet reception and transmission. The **receive** option traces only received MLD snooping packets and the **transmit** option traces only transmitted MLD snooping packets. When neither keyword is used in the command, then all MLD snooping packet traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable tracing of MLD Snooping packets.

Syntax

debug mldsnooping packet [**receive** | **transmit**]

no debug mldsnooping packet [**receive** | **transmit**]

Default Configuration

Display of MLD Snooping traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug mldsnooping
```

debug ospf

Use the **debug ospf** command to enable tracing of OSPF packets received and transmitted by the switch. Use the "no" form of this command to disable tracing of OSPF packets.

Syntax

debug ospf packet

no debug ospf packet

Default Configuration

Display of OSPF traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ospf packet
```

debug ospfv3

Use the **debug ospfv3** command to enable tracing of OSPFv3 packets received and transmitted by the switch. Use the "no" form of this command to disable tracing of OSPFv3 packets.

Syntax

debug ospfv3 packet

no debug ospfv3 packet

Default Configuration

Display of OSPFv3 traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug ospfv3 packet
```

debug ping

Use the **debug ping** command to enable tracing of ICMP echo requests and responses. This command traces pings on the network port and on the routing interfaces. Use the "no" form of this command to disable tracing of ICMP echo requests and responses.

Syntax

debug ping packet

no debug ping packet

Default Configuration

Display of ICMP echo traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

The following example displays.

```
console#debug ping packet
```

debug rip

Use the **debug rip** command to enable tracing of RIP requests and responses. Use the "no" form of this command to disable tracing of RIP requests and responses.

Syntax

debug rip packet

no debug rip packet

Default Configuration

Display of RIP traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug rip packet
```

debug sflow

Use the **debug sflow** command to enable sFlow debug packet trace. Use the "no" form of this command to disable sFlow packet tracing.

Syntax

debug sflow packet

no debug sflow packet

Default Configuration

Display of sFlow traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug sflow packet
```

debug spanning-tree

Use the d**ebug spanning-tree** command to trace spanning tree BPDU packet reception and transmission. The **receive** option traces only received spanning tree BPDUs and the **transmit** option traces only transmitted BPDUs. When neither keyword is used in the command, all spanning tree BPDU traces are dumped. Vital information such as source address, destination address, control packet type, packet length, and the interface on which the packet is received or transmitted is displayed on the console. Use the "no" form of this command to disable tracing of spanning tree BPDUs.

Syntax

debug spanning-tree bpdu [**receive** | **transmit**]

no debug spanning-tree bpdu [**receive** | **transmit**]

Default Configuration

Display of spanning tree BPDU traces is disabled by default.

Command Mode

Privileged EXEC mode.

Usage Guidelines

There are no usage guidelines for this command.

Example

```
console#debug spanning-tree bpdu
```

debug vrrp

Use the **debug vrrp** command in Privileged EXEC mode to enable VRRP debug protocol messages. Use the **no** form of this command to disable VRRP debug protocol messages.

Syntax

debug vrrp all

no debug vrrp all

Default Configuration

The display of VRRP traces is disabled by default.

Command Mode

Privileged EXEC mode.

User Guidelines

This command has no user guidelines.

show debugging

Use the **show debugging** command to display packet tracing configurations.

Syntax

show debugging

no show debugging

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

Usage Guidelines

Enabled packet tracing configurations are displayed.

Example

```
console #debug arp
Arp packet tracing enabled.

console #show debugging
Arp packet tracing enabled.
```

77

Sflow Commands

sFlow® is the standard for monitoring high-speed switched and routed networks. sFlow technology is built into network equipment and gives complete visibility into network activity, enabling effective management and control of network resources.

The sFlow monitoring system consists of an sFlow Agent (embedded in a switch or router or in a stand-alone probe) and a central sFlow Collector. The sFlow Agent uses sampling technology to capture traffic statistics from the device it is monitoring. sFlow datagrams are used to forward the sampled traffic statistics immediately to an sFlow Collector for analysis.

The sFlow Agent supports two forms of sampling: statistical packet-based sampling of switched or routed Packet Flows and time-based sampling of counters.

Commands in this Chapter

This chapter explains the following commands:

sflow destination	show sflow agent
sflow polling	show sflow destination
sflow polling (Interface Mode)	show sflow polling
sflow sampling	show sflow polling
sflow sampling (Interface Mode)	

sflow destination

Use the **sflow destination** command to configure the sFlow collector parameters (owner string, receiver timeout, maxdatagram, ip address and port). Use the "no" form of this command to set receiver parameters to the default or remove a receiver.

Syntax

sflow *rcvr_index* **destination** { *ip-address* [*port*] | **maxdatagram** *size* | **owner** *"owner_string"* **timeout** *rcvr_timeout*}

no sflow *rcvr_index* **destination** [*ip-address* | **maxdatagram** | **owner**]

- *rcvr_index*—The index of this sFlow Receiver (Range: 1–8).
- *ip-address*—The sFlow receiver IP address. If set to 0.0.0.0, no sFlow datagrams will be sent.
- *size*—The maximum number of data bytes that can be sent in a single sample datagram. The management entity should set this value to avoid fragmentation of the sFlow datagrams. (Range: 200–9116 bytes).
- *owner_string*—The identity string for the receiver, the entity making use of this sFlowRcvrTable entry. The default is an empty string. The empty string indicates that the entry is currently unclaimed and the receiver configuration is reset to the default values. An entity wishing to claim an sFlowRcvrTable entry must ensure that the entry is unclaimed before trying to claim it. The entry is claimed by setting the owner string to a non-null value. The entry must be claimed before assigning a receiver to a sampler or poller. (Range: 1–127 characters).
- *rcvr_timeout*—The time, in seconds, remaining before the sampler or poller is released and stops sending samples to the receiver. A management entity wanting to maintain control of the sampler is responsible for setting a new value before the old one expires. (Range: 0–4294967295 seconds).
- *port*—The destination Layer4 UDP port for sFlow datagrams. (Range: 1–65535).

Default Configuration

No receivers are configured by default.

The default IP address is 0.0.0.0

The default maximum datagram size is 1400.

The default owner string is the empty string.

The default receiver timeout is 0.

The default port is 6343.

Command Mode

Global Configuration mode.

User Guidelines

An sflow destination entry must have an owner name defined in order for polling or sampling to be configured. The last set of command parameters are optional in the **no** form of the command.

Example

```
console(config)#sflow 1 destination owner 1 timeout
2000


console(config)#sflow 1 destination maxdatagram 500


console(config)#sflow 1 destination 30.30.30.1 560
```

sflow polling

Use the **sflow polling** command to enable a new sflow poller instance for this data source if rcvr_idx is valid. Use the "no" form of this command to reset poller parameters to the defaults.

Syntax

sflow *rcvr-index* **polling** {**gigabitethernet | tengigabitethernet**} *interface-list poll-interval*

no sflow *rcvr-index* **polling** {**gigabitethernet | tengigabitethernet**} *interfaces*

- *rcvr-index* — The sFlow Receiver associated with the poller (Range: 1–8).
- *interface-list* — The list of interfaces to poll in unit/slot/port format.
- *poll-interval* — The sFlow instance polling interval. A poll interval of 0 disables counter sampling. A value of *n* means once in *n* seconds a counter sample is generated. (Range: 0–86400).

Default Configuration

There are no pollers configured by default.

The default poll interval is 0.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config)#sflow 1 polling gigabitethernet
1/0/1-10 200
```

sflow polling (Interface Mode)

Use the **sflow polling** command in Interface Mode to enable a new sflow poller instance for this data source if rcvr_idx is valid. Use the "no" form of this command to reset poller parameters to the defaults.

Syntax

sflow *rcvr-index* **polling** *poll-interval*

no sflow *rcvr-index* **polling**

- *rcvr-index* — The sFlow Receiver associated with the poller (Range: 1 - 8).
- *poll-interval* — The sFlow instance polling interval. A poll interval of 0 disables counter sampling. A value of n means once in n seconds a counter sample is generated. (Range: 0 - 86400).

Default Configuration

There are no pollers configured by default.

The default poll interval is 0.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-1/0/2)#sflow 1 polling 6055
```

sflow sampling

Use the **sflow sampling** command to enable a new sflow sampler instance for this data source if rcvr_idx is valid. Use the "no" form of this command to reset sampler parameters to the default.

Syntax

sflow *rcvr-index* **sampling** {**gigabitethernet | tengigabitethernet**} *interfac-list sampling-rate* [*size*]

no sflow *rcvr-index* **sampling** {**gigabitethernet | tengigabitethernet**} *interface-list*

- *rcvr-index*—The sFlow Receiver for this sFlow sampler to which flow samples are to be sent. If no receiver is configured, then no packets will be sampled. Only active receivers can be set. If a receiver expires, then all samplers associated with the receiver will also expire. (Range: 1–8).
- *interface-list* — The list of interfaces to poll in unit/slot/port format.
- *sampling-rate*—The statistical sampling rate for packet sampling from this source. A sampling rate of 1 counts all packets. A rate of 0 disables sampling. A value of n means that out of n incoming packets, 1 packet will be sampled. (Range: 1024–65536).
- *size*—The maximum number of bytes that should be copied from the sampler packet (Range: 20–256 bytes).

Default Configuration

There are no samplers configured by default.

The default sampling rate is 0.

The default maximum header size is 128.

Command Mode

Global Configuration mode.

User Guidelines

This command has no user guidelines.

Example

```
console(config)#sflow 1 sampling gigabitethernet
1/0/2 1500 50
```

sflow sampling (Interface Mode)

Use the **sflow sampling** command in Interface Mode to enable a new sflow sampler instance for this data source if rcvr_idx is valid. Use the "no" form of this command to reset sampler parameters to the default.

Syntax

sflow *rcvr-index* **sampling** *sampling-rate* [*size*]

no sflow *rcvr-index* **sampling**

- *rcvr-index* — The sFlow Receiver for this sFlow sampler to which flow samples are to be sent. If no receiver is configured, then no packets will be sampled. Only active receivers can be set. If a receiver expires, then all samplers associated with the receiver will also expire. (Range: 1 - 8).
- *sampling-rate* — The statistical sampling rate for packet sampling from this source. A sampling rate of 1 counts all packets. A rate of 0 disables sampling. A value of n means that out of n incoming packets, 1 packet will be sampled. (Range: 1024 - 65536).
- *size* — The maximum number of bytes that should be copied from the sampler packet (Range: 20 - 256 bytes).

Default Configuration

There are no samplers configured by default.

The default sampling rate is 0.

The default maximum header size is 128.

Command Mode

Interface Configuration (Ethernet) mode

User Guidelines

This command has no user guidelines.

Example

```
console(config-if-1/0/15)#sflow 1 sampler 1500 50
```

show sflow agent

Use the **show sflow agent** command to display the sflow agent information.

Syntax

show sflow agent

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

The following fields are displayed:

sFlow Version	Uniquely identifies the version and implementation of this MIB. The version string must have the following structure: MIB Version; Organization; Software Revision where: MIB Version: 1.3, the version of this MIB. Organization: Dell Corp. Revision: 1.0
IP Address	The IP address associated with this agent.

Example

```
console#show sflow agent

sFlow Version..................... 1.3;Dell Corp.;10.23.18.28
IP Address........................ 0.0.0.0
```

show sflow destination

Use the **show sflow destination** command to display all the configuration information related to the sFlow receivers.

Syntax

show sflow *rcvr-index* **destination**

- *rcvr index*—The index of the sFlow Receiver to display (Range: 1–8).

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

The following fields are displayed:

Receiver Index	The sFlow Receiver associated with the sampler/poller.
Owner String	The identity string for receiver, the entity making use of this sFlowRcvrTable entry.
Time Out	The time (in seconds) remaining before the receiver is released and stops sending samples to sFlow receiver.
Max Datagram Size	The maximum number of bytes that can be sent in a single sFlow datagram.
Port	The destination Layer4 UDP port for sFlow datagrams.

Example

```
console# show sflow 2 destination
```

```
 Receiver Owner    Time out   Max Datagram Port  IP Address
 Index    String              Size
 -------- -------- ---------- ------------ ----- --------------------------
2                0          1400         6343  0.0.0.0
```

show sflow polling

Use the **show sflow polling** command to display the sFlow polling instances created on the switch.

Syntax

show sflow *rcvr-index* **polling** [{**gigabitethernet** | **tengigabitethernet**} *interface-list*]

- *rcvr-index* — The sFlow Receiver associated with the poller (Range: 1–8).
- *interface-list* — The list of interfaces to poll, in unit/slot/port format.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

The following fields are displayed:

Poller Data Source	The sFlowDataSource (unit/slot/port) for this sFlow sampler. This agent will support Physical ports only.
Receiver Index	The sFlowReceiver associated with this sFlow counter poller.
Poller Interval	The number of seconds between successive samples of the counters associated with this data source.

Example

```
console# show sflow 1 polling
```

```
Poller          Receiver  Poller
Data Source     Index     Interval
-----------     -------   -------
1/0/1            1         0
```

show sflow sampling

Use the **show sflow sampling** command to display the sFlow sampling instances created on the switch.

Syntax

show sflow *rcvr-index* **sampling** [{**gigabitethernet** | **tengigabitethernet**} *interface-list*]

- *rcvr-index* — The sFlow Receiver associated with the poller (Range: 1–8).
- *interface-list* — The list of interfaces on which data is sampled.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

The following fields are displayed:

Sampler Data Source	The sFlowDataSource (unit/slot/port) for this sFlow sampler. This agent will support Physical ports only.
Receiver Index	The sFlowReceiver configured for this sFlow sampler.
Packet Sampling Rate	The statistical sampling rate for packet sampling from this source.
Max Header Size	The maximum number of bytes that should be copied from a sampled packet to form a flow sample.

Example

```
console# #show sflow 1 sampling

 Sampler       Receiver  Packet           Max Header
 Data Source   Index     Sampling Rate    Size
 ------------  -------   -------------    ----------
1/0/1          1         0                128
```

78

SNMP Commands

The SNMP component provides a machine-to-machine interface for the PowerConnect product family. This includes the ability to configure the network device, view settings and statistics, and upload or download code or configuration images. The agent includes a get-bulk command to reduce network management traffic when retrieving a sequence of Management Information Base (MIB) variables and an elaborate set of error codes for improved reporting to the network control station. The extensible and advanced design of the PowerConnect SNMP makes adding remote manageability to networked devices undemanding. The agent allows a network control station to retrieve reports from the networked device. These reports are based upon the defined objects in the MIB. The agent queries, reports, and sets MIB variables based upon directions from the network control station or upon preset conditions.

Commands in this Chapter

This chapter explains the following commands:

show snmp	snmp-server community-group	snmp-server user
show snmp engineID	snmp-server contact	snmp-server view
show snmp filters	snmp-server enable traps	snmp-server v3-host
show snmp group	snmp-server engineID local	–
show snmp user	snmp-server filter	–
show snmp views	snmp-server group	–
show trapflags	snmp-server host	–
snmp-server community	snmp-server location	–

show snmp

Use the **show snmp** command in Privileged EXEC mode to display the SNMP communications status.

Syntax

show snmp

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the SNMP communications status.

```
Console # show snmp
Community-String Community-Access View name     IP address
---------------- ---------------- ----------    ----------
public             read only        user-view      All
private            read write       Default       172.16.1.1
private           su               DefaultSuper  172.17.1.1



Community-String Group name  IP address
---------------- ---------   ----------
public           user-group   All

Traps are enabled.
Authentication trap is enabled.

Version 1,2 notifications
Target Address  Type    Community  Version  UDP  Filter TO  Retries
                                             Port name   Sec
-------------- ------  --------- -------  ---- ------ --- -----
```

```
192.122.173.42   Trap    public      2      162  filt1    15   3
192.122.173.42  Inform  public     2     162  filt2   15   3


Version 3 notifications
Target Address  Type  Username  Security  UDP  Filter  TO  Retries
                                Level   Port name   Sec
-------------- ----- --------  -------- ---- ------ --- ------
192.122.173.42 Inform   Bob     Priv    162  filt31 15    3
System Contact: Robert
System Location: Marketing
```

show snmp engineID

Use the **show snmp engineID** command in Privileged EXEC mode to display the ID of the local Simple Network Management Protocol (SNMP) engine.

Syntax

show snmp engineID

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the SNMP engine ID.

```
console# show snmp engineID
Local SNMP engineID: 08009009020C0B099C075878
```

show snmp filters

Use the **show snmp filters** command in Privileged EXEC mode to display the configuration of filters.

Syntax

show snmp filters *filtername*

- *filtername* — Specifies the name of the filter. (Range: 1-30)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following examples display the configuration of filters with and without a filter name specification.

```
console # show snmp filters
 Name                      OID Tree             Type
------------------- ----------------------------------
user-filter1          1.3.6.1.2.1.1             Included
user-filter1          1.3.6.1.2.1.1.7           Excluded
user-filter2          1.3.6.1.2.1.2.2.1.*.1     Included


console # show snmp filters user-filter1

Name                      OID Tree             Type
------------------- ----------------------------------
```

```
user-filter1          1.3.6.1.2.1.1          Included
user-filter1          1.3.6.1.2.1.1.7        Excluded
```

show snmp group

Use the **show snmp group** command in Privileged EXEC mode to display the configuration of groups.

Syntax

show snmp group [*groupname*]

- *groupname* — Specifies the name of the group. (Range: 1-30)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The group name accepts any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may accept entries up to the first illegal character or reject the entry entirely.

Example

The following examples display the configuration of views.

```
console# show snmp group
    Name            Security                    Views
                Model  Level         Read    Write    Notify
----------------- -----  ------        -------- -------- --
----
user-group        V3    Auth-Priv     Default    ""       ""
```

```
managers-group     V3    NoAuth-priv   Default   Default   ""
managers-group     V3    NoAuth-priv   Default    ""       ""

console# show snmp groups user-group

    Name             Security                      Views
                     Model   Level           Read    Write
Notify
----------------- ------  ------       -------- -------- --
-----
user-group           V3   Auth-Priv     Default    ""       ""
```

The following table contains field descriptions.

Field	Description
Name	Name of the group
Security Model	SNMP model in use (v1, v2 or v3)
Security Level	Authentication of a packet with encryption. Applicable only to SNMP Version 3 security model.
Views	• Read–A string that is the name of the view that enables you only to view the contents of the agent. If unspecified, all the objects except the community-table and SNMPv3 user and access tables are available. • Write–A string that is the name of the view that enables you to enter data and manage the contents of the agent. • Notify–A string that is the name of the view that enables you to specify an inform or a trap.

show snmp user

Use the **show snmp user** command in Privileged EXEC mode to display the configuration of users.

Syntax

show snmp user [*username*]

- *username* — Specifies the name of the user. (Range: 1-30)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

The user name accepts any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may accept entries up to the first illegal character or reject the entry entirely.

Example

The following example displays the configuration of users with the user name specified.

```
Console # show snmp user
     Name         Group Name    Auth Priv
                                Meth Meth    Remote Engine ID
--------------- --------------- ---- ---- -------------------
bob              user-group       MD5  DES  800002a20300fce3900106
john             user-group       SHA  DES  800002a20300fce3900106

Console # show snmp users bob
    Name          Group Name    Auth Priv
                                Meth Meth   Remote Engine ID
--------------- --------------- ---- ---- -------------------
bob              user-group       MD5  DES  800002a20300fce3900106
```

show snmp views

Use the **show snmp views** command in Privileged EXEC mode to display the configuration of views.

Syntax

show snmp views [*viewname*]

- *viewname* — Specifies the name of the view. (Range: 1-30)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following examples display the configuration of views with and without a view name specified.

```
console# show snmp views

Name          OID Tree                 Type
------------  -----------------------  ---------
user-view1    1.3.6.1.2.1.1            Included
user-view1    1.3.6.1.2.1.1.7          Excluded
user-view2    1.3.6.1.2.1.2.2.1.*.1    Included
```

show trapflags

Use the **show trapflags** command in Privileged EXEC mode to display SNMP traps globally or to display specific SNMP traps.

Syntax

show trapflags [acl | auto-copy-sw | captive-portal *cp-type* | dot1q | dvrmp | link | maclock | multiple-users | ospf *ospftype*| ospfv3 *ospfv3type*| pim | poe | snmp authentication | spanning-tree |stack | vrrp]

Syntax Description

Show trapflags with no other arguments shows the trap status for all components. Use the more specific form to display the trap status for an individual component. Only one component argument may be given.

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

```
console#show trapflags

Authentication Flag.................Enable

Link Up/Down Flag...................Enable

Multiple Users Flag.................Enable

Spanning Tree Flag..................Enable

ACL ................................Enable

Dot1q.............................. Enable

VRRP .............................. Enable
```

```
Power Over Ethernet ..............  Enable
MAC Locking ......................  Enable
DVMRP Traps.......................  Disable
OSPFv2 Traps......................  Disable
PIM Traps.........................  Disable
OSPFv3 Traps......................  Disable
CP Traps..........................  Disable

console#show trapflags ospf
OSPF Traps:
errors:
all.............................Disabled
authentication failure...........Enabled
bad packet.......................Enabled
config error.....................Enabled
virt authentication failure .....Disabled
virt bad packet..................Disabled
virt config error................Disabled
if-rx: if-rxpacket...............Disabled
lsa: lsamaxage...................Disabled
lsaoriginate.....................Disabled
overflow: lsdboverflow...........Enabled
lsdb-approaching-overflow........Enabled
retransmit:
packets..........................Disabled
virtpackets......................Disabled
```

```
rtb: rtb-entryinfo..............Disabled
state-change:
all.............................Disabled
if state change.................Enabled
neighbor state change...........Enabled
virtif state change.............Disabled
virtneighbor state change.......Disabled
```

snmp-server community

Use the **snmp-server community** command in Global Configuration mode to set up the community access string to permit access to the SNMP protocol. To remove the specified community string, use the **no** form of this command.

Syntax

snmp-server community *string* {**ro** | **rw** | **su**} [**view** *view-name*] [**ipaddress** *ipaddress*]

no snmp-server community *string*

Parameter Description

Parameter	Description
string	Permits access to the SNMP protocol. (Range: 1-20 characters)
ro	Indicates read-only access.
rw	Indicates read-write access.
su	Indicates SNMP administrator access.
ipaddress	Specifies the IP address of the management station. If no IP address is specified, all management stations are permitted.
view-name	Specifies the name of a previously defined view. For information on views, see the User Guidelines below. (Range: 1-30 characters)

Default Configuration

No community is defined. Default to read–only access if not specified.

Command Mode

Global Configuration mode

User Guidelines

You can not specify *viewname* for su, which has an access to the whole MIB. You can use the view name to restrict the access rights of a community string. When it is specified:

- An internal security name is generated.
- The internal security name for SNMPv1 and SNMPv2 security models is mapped to an internal group name.
- The internal group name for SNMPv1 and SNMPv2 security models is mapped to a view name. If **ro** is specified, then read-view and notify-view are mapped. If **rw** is specified, then read-view, notify-view, and write-view are mapped.

The community name may include any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may accept entries up to the first illegal character or reject the entry entirely.

Example

The following example configures community access string **public** to permit administrative access to SNMP at an administrative station with IP address 192.168.1.20.

```
console(config)# snmp-server community public su
ipaddress 192.168.1.20
```

snmp-server community-group

Use the **snmp-server community-group** command in Global Configuration mode to map the internal security name for SNMP v1 and SNMP v2 security models to the group name. To remove the specified community string, use the **no** form of this command.

Syntax

snmp-server community-group *community-string group-name* [**ipaddress** *ip-address*]

- *community-string — Community string that acts like a password and permits access to the SNMP protocol. (Range: 1-20 characters)*
- *group-name* — Name of a previously defined group. The group defines the objects available to the community. (Range: 1-30 characters)
- ip-address — Management station IP address. Default is all IP addresses.

Default Configuration

No community group is defined.

Command Mode

Global Configuration mode

User Guidelines

The *group-name* parameter can be used to restrict the access rights of a community string. When it is specified, the software:

- Generates an internal security-name.
- Maps the internal security-name for SNMPv1 and SNMPv2 security models to the group-name.

Example

The following example maps a community access string dell_community to group dell_group.

```
console(config)# snmp-server community-group
dell_community dell_group 192.168.29.1
```

snmp-server contact

Use the **snmp-server contact** command in Global Configuration mode to set up a system contact (sysContact) string. To remove the system contact information, use the **no** form of the command.

Syntax

snmp-server contact *text*

no snmp-server contact

- *text* — Character string, 0 to 160 characters, describing the system contact information.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays setting up the system contact point as "Dell_Technical_Support".

```
console(config)# snmp-server contact
Dell_Technical_Support
```

snmp-server enable traps

Use the **snmp-server enable traps** command in Global Configuration mode to enable sending SNMP traps globally or to enable sending individual SNMP traps. Use the **no** form of this command to disable sending SNMP traps individually or globally.

Syntax

snmp-server enable traps [acl | all | boot auto-copy-sw | captive-portal *cp-type* | dot1q | dvrmp | link | maclock | multiple-users | ospf *ospftype* | ospfv3 *ospfv3type* |pim |poe | snmp authentication | spanning-tree | stack |vrrp]

no snmp-server enable traps [acl | all| boot auto-copy-sw | captive-portal *cp-type* | dot1q | dvrmp | link | maclock| multiple-users | ospf *ospftype* | ospfv3 *ospfv3type* | pim | poe | snmp authentication | spanning-tree |stack|vrrp]

- cp-type - { all, client-auth-failure, client-connect, client-db-full, client-disconnect }
- ospftype - { all | errors { all | authentication failure | bad packet | config error | virt authentication failure | virt bad packet | virt config error } | lsa { all | lsa-maxage | lsa-originate } | overflow { all | lsdb-overflow | lsdbapproaching- overflow } | retransmit {all | packets | virt-packets } | state-change { all | if state change | neighbor state change | virtifstate change | virtneighbor state change }}
- ospfv3type - {all | errors { all | bad packet | config error | virt bad packet | virt config error } | lsa { all | lsa-maxage | lsa-originate } | overflow { all | lsdb-overflow | lsdb-approaching-overflow } | retransmit {all | packets | virt-packets } | state-change { all | if state change | neighbor state change | virtif state change | virtneighbor state change }}

Parameter Description

Parameter	Description
acl	Enable traps on ACL match events.
all	Enable all traps (not recommended).
boot auto-copy-sw	Enable traps on automatic download of switch software.
captive-portal	Enable captive-portal traps.
dot1q	Enable traps on VLAN configuration failures.
dvmrp	Enable dvmrp traps.
maclock	Enable traps on MAC locking violations.

Parameter	Description
ospf	Enable OSPF event traps.
ospfv3	Enable OSPFv3 event traps.
pim	Enable pim traps (pim-sm and pim-dm).
poe	Enable poe traps.
port-aggregator lag-failover	Enable traps for LAG failover on port-aggregator links.
snmp authentication	Enable snmp authentication traps.
spanning-tree	Enable traps on topology changes.
stack	Enable stack firmware synchronization traps.
vrrp	Enable vrrp traps.

Default Configuration

SNMP authentication, link, multiple-user, spanning-tree, dot1q, mac lock violation, and ACL traps are enabled by default.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the options for the **snmp-server enable traps** command.

```
console(config)#snmp-server enable traps ?

<cr>                          Press enter to execute the command.
acl                           acl
all                           Enable/Disable all Traps.
authentication                To enable the device to send SNMP
traps when
```

	authentication fails.
dvmrp	dvmrp
link Up/Down trap flag.	Enable/Disable switch level Link
multiple-users multiple logins	Enable/Disable sending traps when
	active.
ospf	Enable/Disable OSPF Traps.
ospfv3	Enable/Disable OSPF Traps.
pim	pim
spanning-tree Tree traps.	Enable/Disable sending Spanning

snmp-server engineID local

Use the **snmpserver engineID local** command in Global Configuration mode to specify the Simple Network Management Protocol (SNMP) engine ID on the local device.

To remove the configured engine ID, use the **no** form of this command.

Syntax

snmp-server engineID local {*engineid-string* | **default** }

no snmp-server engineID local

- engineid-string — The character string that identifies the engine ID. The engine ID is a concatenated hexadecimal string. Each byte in hexadecimal character strings is two hexadecimal digits. Each byte can be separated by a period or colon. (Range: 6-32 characters)
- default — The engineID is created automatically, based on the device MAC address.

Default Configuration

The *engineID* is not configured.

Command Mode

Global Configuration mode

User Guidelines

If you want to use SNMPv3, you need to specify an engine ID for the device. You can specify your own ID or use a default string that is generated using the MAC address of the device. If the SNMPv3 engine ID is deleted, or the configuration file is erased, then SNMPv3 cannot be used. Since the EngineID should be unique within an administrative domain, the following guidelines are recommended:

1. For standalone devices use the default keyword to configure the Engine ID.
2. For stackable systems, configure your own EngineID, and verify that is unique within your administrative domain.

Changing the value of snmpEngineID has important side-effects. A user's password (entered on the command line) is converted to an MD5 or SHA security digest. This digest is based on both the password and the local engine ID. The command line password is then destroyed, as required by RFC 2274. Because of this deletion, if the local value of engineID changes, the security digests of SNMPv3 users will be invalid, and the users will have to be reconfigured.

Example

The following example configures the Engine ID automatically.

```
console(config)# snmp-server engineID local default
```

snmp-server filter

Use the **snmp-server filter** command in Global Configuration mode to create or update a Simple Network Management Protocol (SNMP) server filter entry. To remove the specified SNMP server filter entry, use the **no** form of this command.

Syntax

snmp-server filter *filter-name oid-tree* {**included** | **excluded**}

no snmp-server filter *filter-name* [*oid-tree*]

- *filter-name* — Specifies the label for the filter record that is being updated or created. The name is used to reference the record. (Range: 1-30 characters.)
- *oid-tree* — Specifies the object identifier of the ASN.1 subtree to be included or excluded from the view. To identify the subtree, specify a text string consisting of numbers, such as `1.3.6.2.4`, or a word, such as `system`. Replace a single subidentifier with the asterisk (*) wildcard to specify a subtree family; for example, `1.3.*.4`.
- **included** — Indicates that the filter type is included.
- **excluded** — Indicates that the filter type is excluded.

Default Configuration

No filter entry exists.

Command Mode

Global Configuration mode

User Guidelines

This command can be entered multiple times for the same filter record. Later lines take precedence when an object identifier is included in two or more lines.

The filter name may include any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may accept entries up to the first illegal character or reject the entry entirely.

Examples

The following example creates a filter that includes all objects in the MIB-II system group except for sysServices (System 7) and all objects for interface 1 in the MIB-II interfaces group.

```
console(config)# snmp-server filter user-filter
system included
```

```
console(config)# snmp-server filter user-filter
system.7 excluded

console(config)# snmp-server filter user-filter
ifEntry.*.1 included
```

snmp-server group

Use the **snmp-server group** command in Global Configuration mode to configure a new Simple Management Protocol (SNMP) group or a table that maps SNMP users to SNMP views. To remove a specified SNMP group, use the **no** form of this command.

Syntax

snmp-server group *groupname* { **v1** | **v2** | **v3** { **noauth** | **auth** | **priv** } [**notify** *notifyview*] } [**context** *contextname*] [**read** *readview*] [**write** *writeview*]

no snmp-server group *groupname* { **v1** | **v2** | **v3** { **noauth** | **auth** | **priv** } } [**context** *contextname*]

- *groupname* — Specifies the name of the group. (Range: 1-30 characters.)
- **v1** — Indicates the SNMP Version 1 security model.
- **v2** — Indicates the SNMP Version 2 security model.
- **v3** — Indicates the SNMP Version 3 security model.
- **noauth** — Indicates no authentication of a packet. Applicable only to the SNMP Version 3 security model.
- **auth** — Indicates authentication of a packet without encrypting it. Applicable only to the SNMP Version 3 security model.
- **priv** — Indicates authentication of a packet with encryption. Applicable only to the SNMP Version 3 security model.
- *contextname* — Provides different views of the system and provides the user a way of specifying that context.
- *notifyview* — Defines a string that is the name of the view that enables specifying an inform or a trap. If unspecified, nothing is defined for the notify view. (Range: 1-30 characters.)

- *readview* — A string that is the name of the view that enables the you to view only the contents of the agent. If unspecified, all the objects except for the community-table and SNMPv3 user and access tables are available. (Range: 1-30 characters.)
- *writeview* — A string that is the name of the view that enables the user to enter data and configure the contents of the agent. If unspecified, nothing is defined for the write view. (Range: 1-30 characters.)

Default Configuration

No group entry exists. There will be some default groups for Read/Write/Super users. These groups cannot be deleted or modified by the user. This command is used only to configure the user-defined groups.

Command Mode

Global Configuration Mode

User Guidelines

View-name should be an existing view created using the **snmp-server view** command. If there are multiple records with the same view-name, then the argument specified in this command points to first view-name in the table.

Example

The following example attaches a group called **user-group** to SNMPv3 and assigns to the group the privacy security level and read access rights to a view called **user-view**.

```
console(config)# snmp-server group user-group v3 priv
read user-view
```

snmp-server host

Use the **snmp-server host** command in Global Configuration mode to specify the recipient of Simple Network Management Protocol notifications. To remove the specified host, use the **no** form of this command. This command enters the user into SNMP-host configuration mode.

Syntax

snmp-server host *host-addr* [**informs** [**timeout** *seconds*] [**retries** *retries*] | **traps version** {1 | 2 }]] **community-string** [**udp-port** *port*] [**filter** *filtername*]

no snmp-server host *host-addr* { **traps** | **informs** }

Parameter Description

Parameter	Description
host-addr	Specifies the IP address of the host (targeted recipient) or the name of the host. (Range:1-158 characters)
community-string	Specifies a password-like community string sent with the notification operation. (Range: 1-20 characters)
traps	Indicates that SNMP traps are sent to this host.
version 1	Indicates that SNMPv1 traps will be used.
version 2	Indicates that SNMPv2 traps will be used.
informs	Indicates that SNMPv2 informs are sent to this host.
seconds	Number of seconds to wait for an acknowledgment before resending informs. The default is 15 seconds. (Range: 1-300 characters.)
retries	Maximum number of times to resend an inform request. The default is 3 attempts. (Range: 0-255 characters.)
port	UDP port of the host to use. The default is 162. (Range: 1-65535 characters.)
filtername	A string that is the name of the filter that defines the filter for this host. If unspecified, does not filter anything (Range: 1-30 characters.)

Default Configuration

The default configuration is 3 retries, and 15 seconds timeout. This command is disabled by default. No notifications are sent.

If you enter this command with no keywords, the default is to send all trap types to the host. No informs are sent to this host. If no version keyword is present, the default is Version 1.

Command Mode

Global Configuration mode

User Guidelines

If a DNS host name is entered instead of an IP address, the switch attempts to resolve the host name immediately using DNS. Use the ip domain-lookup command on page 490 and the ip name-server command on page 492 to enable resolution of DNS host names.

Example

The following example enables SNMP traps for host 192.16.12.143.

```
console(config)# snmp-server host 192.16.12.143
Dell_powerconnect traps v2
```

snmp-server location

Use the **snmp-server location** command in Global Configuration mode to set the system location string. To remove the location string, use the **no** form of this command.

Syntax

snmp-server location *text*

no snmp-server location

- *text* — Character string describing the system location. (Range: 1 to 255 characters.)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the device location as "New_York".

```
console(config)# snmp-server location New_York
```

snmp-server user

Use the **snmp-server user** command in Global Configuration mode to configure a new SNMP Version 3 user. To delete a user, use the **no** form of this command.

Syntax

snmp-server user *username groupname* [**remote** *engineid-string*] [{ **auth-md5** *password* | **auth-sha** *password* | **auth-md5-key** *md5-key* | **auth-sha-key** *sha-key* } [**priv-des** *password* | **priv-des-key** *des-key*]]

no snmp-server user *username*

- *username* — Specifies the name of the user on the host that connects to the agent. (Range: 1-30 characters.)
- *groupname* — Specifies the name of the group to which the user belongs. (Range: 1-30 characters.)
- *engineid-string* — Specifies the engine ID of the remote SNMP entity to which the user belongs. The engine ID is a concatenated hexadecimal string. Each byte in the hexadecimal character string is two hexadecimal digits. The remote engine id designates the remote management station, and should be defined to enable the device to receive acknowledgements to "informs." (Range: 5-32 characters.)
- **auth-md5** — The HMAC-MD5-96 authentication level.
- **auth-sha** — The HMAC-SHA-96 authentication level.
- *password* — A password. (Range: 1 to 32 characters.)
- auth-**md5-key** — The HMAC-MD5-96 authentication level. Enter a pregenerated MD5 key.
- auth-**sha-key** — The HMAC-SHA-96 authentication level. Enter a pregenerated SHA key.
- *md5-key* — Character string—length 32 hex characters.
- *sha-key* — Character string—length 48 characters.

- **priv-des** — The CBC-DES Symmetric Encryption privacy level. Enter a password.
- **priv-des-key** — The CBC-DES Symmetric Encryption privacy level. The user should enter a pregenerated MD5 or SHA key depending on the authentication level selected.
- *des-key* — The pregenerated DES encryption key. Length is determined by authentication method selected—32 hex characters if MD5 Authentication is selected, 48 hex characters if SHA Authentication is selected.

Default Configuration

No user entry exists.

Command Mode

Global Configuration mode

User Guidelines

If the SNMP local engine ID is changed, configured users will no longer be able to connect and will need to be reconfigured.

Example

The following example configures an SNMPv3 user "John" in group "user-group".

```
console(config)# snmp-server user John user-group
```

snmp-server view

Use the **snmp-server view** command in Global Configuration mode to create or update a Simple Network Management Protocol (SNMP) server view entry. To delete a specified SNMP server view entry, use the **no** form of this command.

Syntax

snmp-server view *view-name oid-tree* { **included** | **excluded** }

no snmp-server view *view-name* [*oid-tree*]

- *view-name* — Specifies the label for the view record that is being created or updated. The name is used to reference the record. (Range: 1-30 characters.)
- *oid-tree* — Specifies the object identifier of the ASN.1 subtree to be included or excluded from the view. To identify the subtree, specify a text string consisting of numbers, such as `1.3.6.2.4`, or a word, such as `system`. Replace a single subidentifier with the asterisk (*) wildcard to specify a subtree family; for example `1.3.*.4`.
- **included** — Indicates that the view type is included.
- **excluded** — Indicates that the view type is excluded.

Default Configuration

A view entry does not exist.

Command Mode

Global Configuration mode

User Guidelines

This command can be entered multiple times for the same view record.

The view name accepts any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal combinations of characters on entry and may accept entries up to the first illegal character or reject the entry entirely.

Examples

The following example creates a view that includes all objects in the MIB-II system group except for sysServices (System 7) and all objects for interface 1 in the MIB-II interface group.

```
console(config)# snmp-server view user-view system
included

console(config)# snmp-server view user-view system.7
excluded
```

```
console(config)# snmp-server view user-view
ifEntry.*.1 included

console(config)#snmp-server view "A beautiful view!"
1.1.2.1 included
```

snmp-server v3-host

Use the **snmp-server v3-host** command in Global Configuration mode to specify the recipient of Simple Network Management Protocol Version 3 (SNMPv3) notifications. To remove the specified host, use the **no** form of this command.

Syntax

snmp-server v3-host {*ip-address* | *hostname*} *username* {**traps** | **informs**} [**noauth** | **auth** | **priv**] [**timeout** *seconds*] [**retries** *retries*] [**udpport** *port*] [**filter** *filtername*]

no snmp-server v3-host *ip-address* {**traps** | **informs**}

- *ip-address* — Specifies the IPv4 address of the host (targeted recipient).
- *hostname* — Specifies the name of the host. (Range: 1-158 characters.) The command allows spaces in the host name when specified in double quotes. For example, #snmp-server v3-host “host name”.
- *username* — Specifies user name used to generate the notification. (Range: 1-30 characters.)
- **traps** — Indicates that SNMP traps are sent to this host.
- **informs** — Indicates that SNMPv2 informs are sent to this host.
- **noauth** — Specifies sending of a packet without authentication.
- **auth** — Specifies authentication of a packet without encrypting it
- **priv** — Specifies authentication and encryption of a packet.
- *seconds* — Number of seconds to wait for an acknowledgment before resending informs. This is not allowed for hosts configured to send traps. The default is 15 seconds. (Range: 1-300 seconds.)
- *retries* — Maximum number of times to resend an inform request. This is not allowed for hosts configured to send traps. The default is 3 attempts. (Range: 0-255 retries.)

- *port* — UDP port of the host to use. The default is 162. (Range: 1-65535.)
- *filtername* — A string that is the name of the filter that define the filter for this host. If unspecified, does not filter anything. (Range: 1-30 characters.)

Default Configuration

Default configuration is 3 retries and 15 seconds timeout.

Command Mode

Global Configuration mode

User Guidelines

The username can include any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the key. The surrounding quotes are not used as part of the key. The CLI does not filter illegal characters but may accept entries up to the first illegal character or reject the entry entirely.

Example

The following example identifies an SNMPv3 host.

```
console(config)# snmp-server v3-host 192.168.0.20
```

The following example shows the syntax of the no snmp-server host ip-address command.

```
console(config)#no snmp-server host 1.2.3.4 ?


informs     Sends SNMP informs to this host.
traps       Sends SNMP traps to this host.
```

79

SSH Commands

Management access to the switch is supported via telnet, SSH, or the serial console. The PowerConnect supports secure shell (SSH) and secure sockets layer (SSL) to help ensure the security of network transactions.

Keys and certificates can be generated externally (that is, offline) and downloaded to the target or generated directly by the PowerConnect.

Commands in this Chapter

This chapter explains the following commands:

crypto key generate dsa	key-string
crypto key generate rsa	show crypto key mypubkey
crypto key pubkey-chain ssh	show crypto key pubkey-chain ssh
ip ssh port	show ip ssh
ip ssh pubkey-auth	user-key
ip ssh server	

crypto key generate dsa

Use the **crypto key generate dsa** command in Global Configuration mode to generate DSA key pairs for your switch. A key pair is one public DSA key and one private DSA key. Use the **no** form of the command to remove the generated key from the local file system.

Syntax

crypto key generate dsa

no crypto key generate dsa

Default Configuration

DSA key pairs do not exist.

Command Mode

Global Configuration mode

User Guidelines

DSA keys are generated in pairs: one public DSA key and one private DSA key. If your switch already has DSA keys when you issue this command, you are warned and prompted to replace the existing keys. The keys are not saved in the switch configuration; they are saved in the file system and the private key is never displayed to the user. DSA keys, along with other switch credentials, are distributed to all units in a stack on a configuration save.

Example

The following example generates DSA key pairs.

```
console(config)#crypto key generate dsa
```

crypto key generate rsa

Use the **crypto key generate rsa** command in Global Configuration mode to generate RSA key pairs. Use the **no** form of the command to delete the key from the local file system.

Syntax

crypto key generate rsa

no crypto key generate rsa

Default Configuration

RSA key pairs do not exist.

Command Mode

Global Configuration mode

User Guidelines

RSA keys are generated in pairs: one public RSA key and one private RSA key. If your switch already has RSA keys when you issue this command, you are warned and prompted to replace the existing keys. The keys are not saved in

the switch configuration; they are saved in the file system and the private key is never displayed to the user. RSA keys, along with other switch credentials, are distributed to all units in a stack on a configuration save.

Example

The following example generates RSA key pairs.

```
console(config)#crypto key generate rsa
```

crypto key pubkey-chain ssh

Use the **crypto key pubkey-chain ssh** command in Global Configuration mode to enter public key configuration mode in order to manually specify public keys such as SSH client public keys.

Syntax

crypto key pubkey-chain ssh

Default Configuration

By default, this command has no public keys configured.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enters the SSH Public Key-chain configuration mode.

```
console#configure
console(config)#crypto key pubkey-chain ssh
console(config-pubkey-chain)#user-key bob rsa
console(config-pubkey-key)#key-String
```

```
AAAAB3NzaC1yc2EAAAADAQABAAABAQCvTnRwPWlAl4kpqIw9GBRon
ZQZxjHKcqKL6rMlQ+ZNXfZSkvHG+QusIZ/76ILmFT34v7u7ChFAE+
Vu4GRfpSwoQUvV35LqJJk67IOU/zfwOl1gkTwml75QR9gHujS6KwG
N2QWXgh3ub8gDjTSqMuSn/Wd05iDX2IExQWu08licglk02LYciz+Z
4TrEU/9FJxwPiVQOjc+KBXuR0juNg5nFYsY0ZCk0N/W9a/tnkm1sh
RE7Di71+w3fNiOA6w9o44t6+AINEICBCCA4YcF6zMzaT1wefWwX6f
+Rmt5nhhqdAtN/4oJfce166DqVX1gWmNzNR4DYDvSzg0lDnwCAC8Q
h
```

```
console(config-pubkey-key)#exit
```

ip ssh port

Use the **ip ssh port** command in Global Configuration mode to specify the TCP port to be used by the SSH server. To use the default port, use the **no** form of this command.

Syntax

ip ssh port *port-number*

no ip ssh port

- *port-number* — Port number for use by the SSH server. (Range: 1–65535)

Default Configuration

The default value is 22.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example specifies the port to be used by the SSH server as 8080.

```
console(config)#ip ssh port 8080
```

ip ssh pubkey-auth

Use the **ip ssh pubkey-auth** command in Global Configuration mode to enable public key authentication for incoming SSH sessions. To disable this function, use the **no** form of this command.

Syntax

ip ssh pubkey-auth

no ip ssh pubkey-auth

Default Configuration

The function is disabled.

Command Mode

Global Configuration mode

User Guidelines

AAA authentication is independent from this configuration.

Example

The following example enables public key authentication for incoming SSH sessions.

```
console(config)#ip ssh pubkey-auth
```

ip ssh server

Use the **ip ssh server** command in Global Configuration mode to enable the switch to be configured from SSH. To disable this function, use the **no** form of this command.

Syntax

ip ssh server

no ip ssh server

Default Configuration

This command is **enabled** by default.

Command Mode

Global Configuration mode

User Guidelines

To generate SSH server keys, use the commands **crypto key generate rsa**, and **crypto key generate dsa**.

Example

The following example enables the switch to be configured using SSH.

```
console(config)#ip ssh server
```

key-string

Use the **key-string** SSH Public Key Configuration mode to specify an SSH public key manually.

Syntax

key-string *key-string*

key-string row *key-string*

- **row** — To specify the SSH public key row by row.
- *key-string* — The UU-encoded DER format is the same format as the authorized keys file used by OpenSSH.

Default Configuration

By default, the key-string is empty.

Command Mode

SSH Public Key Configuration mode

User Guidelines

Use the **key-string row** command to specify which SSH public key you will configure interactively next. To complete the interactive command, you must enter **key-string row** with no characters.

Examples

The following example shows how to enter a public key string for a user called "bob."

```
console(config)#crypto key pubkey-chain ssh
console(config-pubkey-chain)#user-key bob rsa
console(config-pubkey-key)#key-string
AAAAB3NzaC1yc2EAAAADAQABAAABAQCvTnRwPWl
Al4kpqIw9GBRonZQZxjHKcqKL6rMlQ+
ZNXfZSkvHG+QusIZ/76ILmFT34v7u7ChFAE+
Vu4GRfpSwoQUvV35LqJJk67IOU/zfwOl1g
kTwml75QR9gHujS6KwGN2QWXgh3ub8gDjTSq
muSn/Wd05iDX2IExQWu08licglk02LYciz
+Z4TrEU/9FJxwPiVQOjc+KBXuR0juNg5nFYsY
0ZCk0N/W9a/tnkm1shRE7Di71+w3fNiOA
6w9o44t6+AINEICBCCA4YcF6zMzaT1wefWwX6f+
Rmt5nhhqdAtN/4oJfce166DqVX1gWmN
zNR4DYDvSzg0lDnwCAC8Qh
Fingerprint:
a4:16:46:23:5a:8d:1d:b5:37:59:eb:44:13:b9:33:e9

console(config)#crypto key pubkey-chain ssh
console(config-pubkey-chain)#user-key bob rsa
console(config-pubkey-key)#key-string row AAAAB3Nza
```

```
console(config-pubkey-key)#key-string row C1yc2
```

show crypto key mypubkey

Use the **show crypto key mypubkey** command in Privileged EXEC mode to display the SSH public keys of the switch.

Syntax

show crypto key mypubkey [**rsa** | **dsa**]

- **rsa** — RSA key.
- **dsa** — DSA key.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the SSH public keys on the switch.

```
console#show crypto key mypubkey rsa

 rsa key data:

ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAQEAu7WHtjQDUygjSQXHVgyqdUby

dxUXEAiDHXcWHVr0R/ak1HDQitBzeEv1vVEToEn5ddLmRhtIgRdKU
JHgBHJV

R2VaSN/WC0IK53j9re4B11AE+O3qAxwJs0KD7cTkvF9I+YdiXeOM8
VE4skkw

AiyLDNVWXgNQ6iat8+8Mjth+PIo5t3HykYUCkD8B1v93nzi/sr4hH
HJCdx7w
```

```
wRW3QtgXaGwYt2rdlr3x8ViAF6B7AKYd8xGVVjyJTD6TjrCRRwQHg
B/BHsFr

z/Rl1SYa0vFjel/7/0qaIDSHfHqWhajYkMa4xPOtIye7oqzAOm1b7
6l28uTB

luBEoLQ+PKOKMiK8sQ==

Fingerprint(hex):
58:7f:5c:af:ba:d3:60:88:42:00:b0:2f:f1:5a:a8:fc

Fingerprint(bubbleBabble): xodob-liboh-heret-tiver-
dyrib-godac-pynah-muzyt-mofim-bihog-cuxyx
```

show crypto key pubkey-chain ssh

Use the **show crypto key pubkey-chain ssh** command in Privileged EXEC mode to display SSH public keys stored on the switch.

Syntax

show crypto key pubkey-chain ssh [**username** *username*] [**fingerprint bubble-babble | hex**]

- *username* — Specifies the remote SSH client username. (Range: 1–48 characters)
- **bubble-babble** — Fingerprints in Bubble Babble format.
- **hex** — Fingerprint in Hex format. If fingerprint is unspecified, it defaults to Hex format.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays all SSH public keys stored on the switch.

```
console#show crypto key pubkey-chain ssh
Username  Fingerprint
--------  -----------------------------------------------
---
bob       9A:CC:01:C5:78:39:27:86:79:CC:23:C5:98:59:F1:86
john      98:F7:6E:28:F2:79:87:C8:18:F8:88:CC:F8:89:87:C8
```

The following example displays the SSH public called "dana."

```
console#show crypto key pubkey-chain ssh username dana
Username: dana
 rsa key data:
ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAIEAywqRKTRnexccxVUVTeMl+Gkh
imyUDhcTkgEfssLPMsgoXlTwzCE5+97UIIsSRKQQWR+pBNl45tCYd75LUofV
4LP6Lj1Q5Q0w5lBgiqC2MZ/iBHGSsHMAE0lpYtelZprDu4uiZHMuWezmdQp9
a1PU4jwQ22TlcfaUq3sqC3FMUoU=
 Fingerprint: 2f:09:e7:6f:c9:bf:ab:04:d4:6f:a0:eb:e8:df:7a:11
```

show ip ssh

Use the **show ip ssh** command in Privileged EXEC mode to display the SSH server configuration.

Syntax

show ip ssh

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the SSH server configuration.

```
console#show ip ssh
SSH server enabled. Port: 22
RSA key was generated.
DSA key was generated.
SSH Public Key Authentication is enabled.
Active incoming sessions:
IP Address    User Name             Idle Time       SessionTime
------------ -------------------  --------------  --------------
10.240.1.122  John                  00:00:00        00:00:08
```

user-key

Use the **user-key** command in SSH Public Key Chain Configuration mode to specify which SSH public key you are configuring manually. To remove a SSH public key, use the **no** form of this command.

Syntax

user-key *username* {**rsa** | **dsa**}

no user-key *username*

- *username* — Specifies the remote SSH client username. (Range: 1–48 characters)
- **rsa** — RSA key
- **dsa** — DSA key

Default Configuration

By default, there are no keys.

Command Mode

SSH Public Key Chain Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables a SSH public key to be manually configured for the SSH public key chain called "bob."

```
console(config)#crypto key pubkey-chain ssh
console(config-pubkey-chain)#user-key bob rsa
console(config-pubkey-key)#
```

80

Syslog Commands

The PowerConnect supports a centralized logging subsystem with support for local in memory logs, crash dump logs, and forwarding messages to syslog servers. All switch components use the logging subsystem. Components log messages to the logging component using one of the following severity levels:

- Emergency (0): system is unusable
- Alert (1): action must be taken immediately
- Critical (2): critical conditions
- Error (3): error conditions
- Warning (4): warning conditions
- Notice(5): normal but significant conditions
- Informational(6): informational messages
- Debug(7): debug-level messages

CLI Logged to Local File and Syslog Server

The PowerConnect Command Logging component logs all command line interface commands issued on the system. The command log messages are stored with the other system logs and provide the system operators with a detailed log of the commands executed.

CLI command logging is configured through any of the PowerConnect management interfaces. When the feature is enabled, all CLI commands are logged using the existing logging subsystems. By default, the feature is disabled.

The CLI command logging severity is set to SEVERITY_NOTICE. The logging severity is not modifiable by the administrator.

For example, the CLI log message for the user admin is:

```
<189> JAN 10 18:59:09 10.27.21.22-2
CMDLOGGER[209809328]: cmd_logger_api.c(83) 367 %%
CLI:EIA-232:----:configure
```

```
<190> JAN 10 18:59:17 10.27.21.22-2
CLI_WEB[209809328]: cmd_logger_api.c(260) 369 %%
[CLI:----:EIA-232] Access level of user admin has been
set to 15
```

If enabled, the CLI command logger subsystem begins to log commands immediately after the user is authenticated. After authentication, the CLI generates an explicit message and invokes the command logger. The format of the message at login is:

```
<189> JAN 10 18:58:56 10.27.21.22-2
CMDLOGGER[209809328]: cmd_logger_api.c(83) 361 %%
CLI:10.27.21.22:admin:User admin logged in
```

```
<190> JAN 10 18:58:56 10.27.21.22-2
CLI_WEB[209809328]: cmd_logger_api.c(260) 362 %%
[CLI:admin:10.27.21.22] User has successfully logged
in
```

The CLI command log subsystem also logs all user log out instances. The format of the log message is:

```
<190> JAN 10 19:01:04 10.27.21.22-2
CLI_WEB[209809328]: cmd_logger_api.c(260) 382 %%
[CLI:admin:10.27.21.22] User has logged out
```

Commands in this Chapter

This chapter explains the following commands:

clear logging	logging file
clear logging file	logging on
description	logging snmp
level	logging web-session
logging cli-command	port
logging	show logging
logging audit	show logging file
logging buffered	show syslog-servers

clear logging

Use the **clear logging** command in Privileged EXEC mode to clear messages from the internal logging buffer.

Syntax

clear logging

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example clears messages from the internal syslog message logging buffer.

```
console#clear logging
Clear logging buffer [y/n]
```

clear logging file

Use the **clear logging file** command in Privileged EXEC mode to clear messages from the logging file.

Syntax

clear logging file

Default Configuration

There is no default configuration for the command.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

The following example shows the **clear logging file** command and confirmation response.

```
console#clear logging file
Clear logging file [y/n]
```

description

Use the **description** command in Logging mode to describe the syslog server.

Syntax

description *description*

- *description* — Sets the description of the syslog server. (Range: 1-64 characters.)

Default Configuration

This command has no default value.

Command Mode

Logging mode

User Guidelines

After entering the view corresponding to a specific syslog server, the command can be executed to set the description of the server.

Example

The following example sets the syslog server description.

```
console(config-logging)#description "syslog server 1"
```

level

Use the **level** command in Logging mode to specify the severity level of syslog messages. To reset to the default value, use the **no** form of the command.

Syntax

level *level*

no level

Parameter Description

Parameter	Description
level	The severity level for syslog messages. (Range: **emergency, alert, critical, error, warning, notice, info, debug**)

Default Configuration

The default value for *level* is **info**.

Command Mode

Logging mode

User Guidelines

After entering the view corresponding to a specific syslog server, the command can be executed to set the severity level for syslog messages.

Example

The following example sets the syslog message severity level to alert.

```
console(config-logging)#level alert
```

logging cli-command

Use the **logging cli-command** in Global Configuration mode to enable CLI command logging.

Syntax

logging cli-command

no logging cli-command

Default Configuration

Disabled

Command Mode

Global Configuration

User Guidelines

See the CLI commands by using the show logging command.

Example

```
console(config)#logging cli-command
console(config)#do show logging


Logging is enabled
Console Logging: level warnings. Console Messages: 384 Dropped.
Buffer Logging: level informational. Buffer Messages: 71 Logged,
File Logging: level notActive. File Messages: 385 Dropped.
CLI Command Logging : enabled
Switch Auditing : enabled
Web Session Logging : disabled
SNMP Set Command Logging : disabled
Syslog server  hostname logging: informational. Messages: 0 dropped
Syslog server
a12345678901234567890123456789012345678901234567890123456789012
logging: informational. Messages: 0 dropped
170 Messages dropped due to lack of resources.
Buffer Log:
<189> JAN 10 18:59:09 10.27.21.22-2 CMDLOGGER[209809328]:
cmd_logger_api.c(83) 367 %% CLI:EIA-232:----:configure
```

```
<190> JAN 10 18:59:17 10.27.21.22-2 CLI_WEB[209809328]:
cmd_logger_api.c(260) 369 %% [CLI:----:EIA-232] Access level of
user admin has been set to 15

<189> JAN 10 18:59:19 10.27.21.22-2 CMDLOGGER[209809328]:
cmd_logger_api.c(83) 370 %% CLI:EIA-232:----:exit

<189> JAN 10 18:59:22 10.27.21.22-2 CMDLOGGER[209809328]:
cmd_logger_api.c(83) 371 %% CLI:EIA-232:----:telnet 10.27.21.22

<189> JAN 10 18:59:27 10.27.21.22-2 TRAPMGR[209809328]:
traputil.c(614) 372 %% Multiple Users: Unit: 0 Slot: 5 Port: 1

<189> JAN 10 18:59:27 10.27.21.22-2 CMDLOGGER[209809328]:
cmd_logger_api.c(83) 373 %% CLI:10.27.21.22:admin:User admin logged
in

<190> JAN 10 18:59:27 10.27.21.22-2 CLI_WEB[209809328]:
cmd_logger_api.c(260) 374 %% [CLI:admin:10.27.21.22] User has
successfully logged in

<190> JAN 10 18:59:28 10.27.21.22-2 CLI_WEB[209809328]:
cmd_logger_api.c(260) 375 %% [CLI:admin:10.27.21.22] User admin
logged in to enable mode.
```

logging

Use the **logging** command in Global Configuration mode to log messages to a syslog server. To delete the syslog server with the specified address from the list of syslogs, use the **no** form of this command.

Syntax

logging {*ip-address* | *hostname*}

no logging {*ip-address* | *hostname*}

- *ip-address* — IP address of the host to be used as a syslog server.
- *hostname* — Hostname of the host to be used as a syslog server. (Range: 1-63 characters) The command allows spaces in the host name when specified in double quotes. For example, #snmp-server v3-host “host name”.

Default Configuration

No syslog servers defined.

Command Mode

Global Configuration mode

User Guidelines

Up to eight syslog servers can be used.

The Dell PowerConnect always uses the local7(23) facility in the syslog message. Syslog messages will not exceed 96 bytes in length. Syslog messages use the following format:

```
<130> JAN 01 00:00:06 0.0.0.0-1 UNKN[0x800023]: bootos.c(386) 4 %% Event(0xaaaaaaaa)
 |     |      |   ||   |      |  | |   |
 |     |      |   ||   |      |  | |   Message
 |     |      |   ||   |      |  | |
 |     |      |   ||   |      |  | Sequence Number
 |     |      |   ||   |      |  |
 |     |      |   ||   |      |  Line Number
 |     |      |   ||   |      |
 |     |      |   ||   |      File Name
 |     |      |   ||   |
 |     |      |   ||   Thread ID
 |     |      |   ||
 |     |      |   |Component Name
 |     |      |   |
 |     |      |   Stack ID
 |     |      |
 |     |     Host IP Address
 |     Timestamp
 PRI
```

PRI	This consists of the facility code (see RFC 3164) multiplied by 8 and added to the severity. See below for more information on severity.
Timestamp	The system up time. For systems that use SNTP, this is UTC. When time zones are enabled, local time will be used.
Host IP Address	The IP address of the local system.
Stack ID	The assigned stack ID. 1 is used for systems without stacking capability. The top of stack is used to collect messages for the entire stack.

Component Name	Component name for the logging component. Components must use the new APIs in order to enable identification of the logging component. Component **UNKN** is substituted for components that do not use the new logging APIs.
Thread ID	The thread ID of the logging component.
File Name	The name of the file containing the invoking macro.
Line Number	The line number which contains the invoking macro.
Sequence Number	The message sequence number for this stack component. Sequence numbers may be skipped because of filtering but are always monotonically increasing on a per stack member basis.
Message	An informative message regarding the event.

Example

The following example places the designated server in logging configuration mode.

```
console(config)#logging 192.168.15.1
```

logging audit

Use the **logging audit** command to enable switch auditing. Use the **no** form of the command to disable switch auditing.

Syntax

logging audit

no logging audit

Default Configuration

The command default is enabled.

Command Mode

Global Configuration

Example

```
console(config)#logging audit
```

logging buffered

Use the **logging buffered** command in Global Configuration mode to limit syslog messages displayed from an internal buffer based on severity. To cancel the buffer use, use the **no** form of this command.

Syntax

logging buffered [*severity–level*]

no logging buffered

Parameter Description

Parameter	Description
severity–level	(Optional) The number or name of the desired severity level. Range: [0 | emergencies] [1 | alerts] [2 | critical] [3 | errors] [4 | warnings] [5 | notifications] [6 | informational] [7 | debugging]

Default Configuration

The default value for *level* is **info**.

Command Mode

Global Configuration mode

User Guidelines

All the syslog messages are logged to the internal buffer. This command limits the commands displayed to the user.

Example

The following example limits syslog messages displayed from an internal buffer based on the severity level "error."

```
console(config)#logging buffered error
```

logging console

Use the **logging console** command in Global Configuration mode to limit messages logged to the console based on severity. To disable logging to the console terminal, use the **no** form of this command.

Syntax

logging console [*severity–level*]

no logging console

Parameter Description

Parameter	Description
severity–level	(Optional) The number or name of the desired severity level. Range: [0 | emergencies] [1 | alerts] [2 | critical] [3 | errors] [4 | warnings] [5 | notifications] [6 | informational] [7 | debugging]

Default Configuration

The default value for *level* is **warnings**.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example limits messages logged to the console based on severity level "alert".

```
console(config)#logging console alert
```

logging file

Use the **logging file** command in Global Configuration mode to limit syslog messages sent to the logging file based on severity. To cancel the buffer, use the **no** form of this command.

Syntax

logging file [*severity–level-number* | *type*]

no logging file

Parameter Description

Parameter	Description
severity–level–number	(Optional) The number or name of the desired severity level. Range: [0 | emergencies] [1 | alerts] [2 | critical] [3 | errors] [4 | warnings] [5 | notifications] [6 | informational] [7 | debugging]

Default Configuration

The default severity level is **error**.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example limits syslog messages sent to the logging file based on the severity level "warning."

```
console(config)#logging file warning
```

logging on

Use the **logging on** command in Global Configuration mode to control error messages logging. This command globally enables the sending of logging messages to the currently configured locations. To disable the sending of log messages, use the **no** form of this command.

Syntax

logging on

no logging on

Default Configuration

Logging is enabled.

Command Mode

Global Configuration mode

User Guidelines

The logging process controls the distribution of logging messages to the various destinations, such as the logging buffer, logging file, or syslog server. Logging on and off for these destinations can be individually configured using the **logging buffered**, **logging file**, and **logging** *server* global configuration

commands. However, if the **logging on** command is disabled, no messages are sent to these destinations. In this case, only the console will continue to receive logging messages.

Example

The following example shows how logging is enabled.

```
console(config)#logging on
```

logging snmp

Use the **logging snmp command** in Global Configuration mode to enable SNMP Set command logging. To disable, use the no form of this command.

Syntax

logging snmp

no logging snmp

Default Configuration

Disabled.

Command Mode

Global Configuration mode

User Guidelines

To see SNMP Set command logs use the show logging command.

Example

```
console(config)#logging snmp
```

logging web-session

Use the **logging web-session** command in Global Configuration mode to enable web session logging. To disable, use the no form of this command.

Syntax

logging web-session

no logging web-session

Default Configuration

Disabled.

Command Mode

Global Configuration mode

User Guidelines

To see web session logs use the show logging command.

Example

```
console(config)#logging web-session

<133> MAR 24 07:46:07 10.131.7.165-2 UNKN[83102768]:
cmd_logger_api.c(140) 764 %%
WEB:10.131.7.67:<<UNKNOWN>>:EwaSessionLookup :
session[0] created

<133> MAR 24 07:46:07 10.131.7.165-2 UNKN[83102768]:
cmd_logger_api.c(140) 765 %%
WEB:10.131.7.67:admin:User admin logged in
```

port

Use the **port** command in Logging mode to specify the port number of syslog messages. To reset to the default value, use the **no** form of the command.

Syntax

port *port*

no port

Parameter Description

Parameter	Description
port	The port number for syslog messages. (Range: 1-65535)

Default Configuration

The default port number is 514.

Command Mode

Logging mode

User Guidelines

After entering the view corresponding to a specific syslog server, the command can be executed to set the port number for the server.

Example

The following example sets the syslog message port to 300.

```
console(config-logging)#port 300
```

show logging

Use the **show logging** command in Privileged EXEC mode to display all logging information, including auditing status.

Syntax

show logging

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the state of logging and the syslog messages stored in the internal buffer.

```
console#show logging

Logging is enabled.

Console Logging: level warnings. Console Messages: 1778
Dropped.

Buffer Logging: level informational. Buffer Messages: 983
Logged,

File Logging: level notActive. File Messages: 1783 Dropped.

CLI Command Logging : disabled

Switch Auditing : disabled

Web Session Logging : disabled

SNMP Set Command Logging : disabled

1141 Messages dropped due to lack of resources.

Buffer Log:

<190> JAN 10 16:26:53 0.0.0.0-1 NIM[177745344]:
nim_intf_map_api.c(381) 985 %% nimCheckIfNumber: incorrect
phase for operation

<190> JAN 10 16:26:53 0.0.0.0-1 NIM[177745344]:
nim_intf_map_api.c(381) 986 %% nimCheckIfNumber: incorrect
phase for operation
```

show logging file

Use the **show logging file** command in Privileged EXEC mode to display the state of logging and the syslog messages stored in the logging file.

Syntax

show logging file

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the state of logging and syslog messages sorted in the logging file.

```
console#show logging file

Persistent Logging : enabled

Persistent Log Count : 1

<186> JAN 01 00:00:05 0.0.0.0-1 UNKN[268434928]:
bootos.c(382) 3 %% Event(0xaaaaaaaa)
```

show syslog-servers

Use the **show syslog-servers** command in Privileged EXEC mode to display the syslog servers settings.

Syntax

show syslog-servers

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays the syslog server settings.

```
console#show syslog-servers

IP
address      Port  Severity     Facility      Description
------------------------------------------------------------
192.180.2.275   14    Info         local7        7
192.180.2.285   14    Warning      local7        7
```

81

System Management Commands

This chapter explains the following commands:

asset-tag	login-banner	show interfaces advanced firmware	show system
banner exec	media-type	show interfaces media-type	show system id
banner login	member	–	show system temperature
banner motd	motd-banner	show memory cpu	show tech-support
banner motd acknowledge	ping	–	show users
clear checkpoint statistics	reload	show power-usage-history	show version
cut-through mode–	set description	show process cpu	stack
exec-banner	slot	show sessions	–
hostname	show banner	show slot	–
–	show boot-version	show supported cardtype	–
–	show checkpoint statistics	show supported switchtype	telnet
–	show cut-through mode	show switch	traceroute
	–	–	–

asset-tag

Use the **asset-tag** command in Global Configuration mode to specify the switch asset tag. To remove the existing asset tag, use the **no** form of the command.

Syntax

asset-tag [*unit*] *tag*

no asset-tag [*unit*]

- *unit* — Switch number. (Range: 1–12)
- *tag* — The switch asset tag.

Default Configuration

No asset tag is defined by default.

Command Mode

Global Configuration mode

User Guidelines

The asset-tag command accepts any printable characters for a tag name except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may accept entries up to the first illegal character or reject the entry entirely.

Example

The following example specifies the switch asset tag as 1qwepot. Because the unit parameter is not specified, the command defaults to the master switch number.

```
console(config)# asset-tag 1qwepot
```

banner exec

Use the **banner exec** command to set the message that is displayed after a successful login. Use the **no** form of the command to remove the set message.

Syntax

banner exec *MESSAGE*

no banner exec

- *MESSAGE* — Quoted text

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

The exec message may consist of multiple lines. Enter a quote to complete the message and return to configuration mode. Up to 2000 characters may be entered into a banner. Each line entered will consume an extra two characters to account for the carriage return and line feed.

Example

```
console(config)# banner exec "banner text"
```

banner login

Use the **banner login** command to set the message that is displayed just before the login prompt. Use **no banner login** command to remove the message.

Syntax

banner login *MESSAGE*

no banner login

- *MESSAGE* — Quoted text

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

The login banner can consist of multiple lines. Enter a quote to end the banner text and return to the configuration prompt. Up to 2000 characters may be entered into a banner. Each line entered will consume an extra two characters to account for the carriage return and line feed.

Example

```
console(config)# banner login "banner text"
```

banner motd

Use the **banner motd** command to set the message that is displayed on logging into the switch. Use **no banner motd** command to remove the message.

Syntax

banner motd *MESSAGE*

no banner motd

- *MESSAGE* — Quoted text

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

The motd banner can consist of multiple lines. Enter a quote to end the banner text and return to the configuration prompt. Up to 2000 characters may be entered into a banner. Each line entered will consume an extra two characters to account for the carriage return and line feed.

Example

```
console(config)# banner motd “IMPORTANT: There is a
power shutdown at 23:00hrs today, duration 1 hr 30
minutes.”
```

When the MOTD banner is executed, the following displays:

IMPORTANT: There is a power shutdown at 23:00hrs today, duration 1 hr 30 minutes.

banner motd acknowledge

The banner displayed on the console must be acknowledged if **banner motd acknowledge** is executed. Enter "y" or "n" to continue to the login prompt. If "n" is entered, the session is terminated and no further communication is allowed on that session. However, serial connection will not get terminated if ‘y’ is not entered. Use the **no banner motd acknowledge** command to disable banner acknowledge.

Syntax

banner motd acknowledge

no banner motd acknowledge

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

```
console(config)# banner motd “There is a power
shutdown at 23:00hrs today, duration 1 hr 30 minutes.”
console(config)# banner motd acknowledge
```

When the MOTD banner is executed, the following displays:

```
IMPORTANT: There is a power shutdown at 23:00hrs
today, duration 1 hr 30 minutes.

Press ‘y’ to continue
```

If ‘y’ is entered, the following displays:

```
console >
```

If ‘n’ is entered, the session will get disconnected, unless it is a serial connection.

clear checkpoint statistics

Use the **clear checkpoint statistics** command to clear the statistics for the checkpointing process.

Syntax

clear checkpoint statistics

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

When nonstop forwarding is enabled on a stack, the stack's management unit checkpoints operational data to the backup unit. If the backup unit takes over as the management unit, the control plane on the new management unit uses the checkpoint data when initializing its state. Checkpoint statistics track the amount of data checkpointed from the management unit to the backup unit.

Example

```
console#clear checkpoint statistics
```

cut-through mode

Use the **cut-through mode** command to enable the cut-through mode on the switch. The mode takes effect on all ports on next reload of the switch. To disable the cut-through mode on the switch, use the no form of this command.

Syntax

cut-through mode

no cut-through mode

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

No specific guidelines.

Example

```
console(config)#cut-through mode

The mode (enable) is effective from the next reload of
Switch/Stack.
```

exec-banner

Use the **exec-banner** command to enable exec banner on the console, telnet or SSH connection. To disable, use the **no** form of the command.

Syntax

exec-banner

no exec-banner

- *MESSAGE* — Quoted text

Default Configuration

This command has no default configuration.

Command Mode

Line Configuration

User Guidelines

The exec banner can consist of multiple lines. Enter a quote to complete the message and return to configuration mode.

Example

```
console(config-telnet)# no exec-banner
```

hostname

Use the **hostname** command in Global Configuration mode to specify or modify the switch host name. To restore the default host name, use the **no** form of the command.

Syntax

hostname *name*

no hostname

- *name* — The name of the host. (Range: 1–255 characters) The command allows spaces in the host name when specified in double quotes. For example, #snmp-server v3-host “host name”.

Default Configuration

Host name not configured.

Command Mode

Global Configuration mode

User Guidelines

The hostname may include any printable characters except a double quote or question mark. Enclose the string in double quotes to include spaces within the name. The surrounding quotes are not used as part of the name. The CLI does not filter illegal characters and may truncate entries at the first illegal character or reject the entry entirely.

Example

The following example specifies the switch host name.

```
console(config)# hostname Dell
```

locate

Use the **locate** command to locate a switch by LED blinking.

Syntax

locate [**switch** *unit*] [**time** *time*]

Parameter Description

Parameter	Description
switch *unit*	If multiple devices are stacked, you can choose which switch to identify.
time *time*	LED blinking duration in seconds. Range 1-3600 seconds.

Default Configuration

Default value is 20 seconds.

Command Mode

Privileged EXEC

User Guidelines

The LED will blink green until it times out. The user may select a new time value while the LED is blinking. The last value selected takes effect immediately. The **locate** command does not persist across reboots.

Example

```
console# locate switch 1 time 555
```

login-banner

Use the **login-banner** command to enable login banner on the console, telnet or SSH connection. To disable, use the **no** form of the command.

Syntax

login-banner

no login-banner

- *MESSAGE* — Quoted text

Default Configuration

This command has no default configuration.

Command Mode

Line Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config-telnet)# no login-banner
```

media-type

Select the **media-type** command for the interface. This command is only valid on combo ports.

Syntax

media-type { auto-select [rj45 | sfp] | rj45 | sfp }

Parameter Description

Parameter	Description
auto-select rj45	Utilize RJ45 media when both media types are active.
auto-select sfp	Utilize the SFP media when both media types are active.
auto-select	Return the selection to the default (auto-select sfp)
rj45	Force connection on the RJ45 port. Power off SFP media port.
sfp	Force connection on the SFP port. Power off RJ45 media port.

Default Configuration

The default is **media-type auto-select sfp**.

Command Mode

Interface Config

User Guidelines

When both media types are connected, the preference as determined by the auto-select keyword parameter selects the active media. When the auto-select keyword is not specified, the selected media type is powered on and the alternate media type is powered off. Note that when the auto-select keyword is used with any media type, the SFP port will remain powered and the laser, if any, will remain on in order to allow connections over the SFP port.

Example

```
! Select the RJ45 port and power off the SFP port
console(config-if-Te1/0/24)#media-type rj45
! Prefer the RJ45 port and leave the SFP port powered on
console(config-if-Te1/0/24)#media-type auto-select rj45
```

member

Use the **member** command in Stack Global Configuration mode to pre-configure a switch stack member. Execute this command on the Management Switch. To remove a stack-member configuration from the stack, use the **no** form of the command.

NOTE: The "no" form of the command may not be used if the member is present in the stack.

Syntax

member *unit switchindex*

no member ***unit***

- *unit* — The switch identifier of the switch to be added or removed from the stack. (Range: 1–12)
- *switchindex* — The index into the database of the supported switch types, indicating the type of the switch being preconfigured. The switch index is a 32-bit integer obtained from the **show supported switchtype** command.

Default configuration

This command has no defaults.

Command Mode

Stack Global Configuration

User Guidelines

The switch index (SID) can be obtained by executing the **show supported switchtype** command in User Exec mode. When removing a unit from a stack, use the **no member** command to remove the stack member configuration after physically removing the unit.

Example

The following example displays how to add to stack switch number 2 with index 1.

```
console(config)# stack
console(config-stack)# member 2 1
```

motd-banner

Use the **motd-banner** command to enable motd on the console, telnet or SSH connection. To disable, use the **no** form of the command.

Syntax

motd-banner

no motd-banner

- *MESSAGE* — Quoted text

Default Configuration

This command has no default configuration.

Command Mode

Line Configuration

User Guidelines

This command has no user guidelines.

Example

```
console(config-telnet)# motd-banner
```

ping

Use the **ping** command in User EXEC mode to check the accessibility of the desired node on the network.

Syntax

ping [**ip** | **ipv6**] *ipaddress* | *hostname* [**repeat** *count*] [**timeout** *interval*] [**size** *size*]

- *ipaddress* — IP address to ping (contact).
- *hostname* — Hostname to ping (contact). (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes, even though host names may only consist of letters, numbers and the hyphen character.

- *count* — Number of packets to send (Range: 1–15 packets).
- *interval* — The time between Echo Requests, in seconds (Range: 1–60 seconds).
- *size* — Number of data bytes in a packet (Range: 0–65507 bytes).

Default Configuration

The default count is 4.

The default interval is 3 seconds.

The default size is 0 data bytes.

Command Mode

User EXEC mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays a ping to IP address 10.27.65.60

```
console#ping 10.27.65.60
 Pinging 10.27.65.60 with 0 bytes of data:

Reply From 10.27.65.60: icmp_seq = 0. time <10 msec.
Reply From 10.27.65.60: icmp_seq = 1. time <10 msec.
Reply From 10.27.65.60: icmp_seq = 2. time <10 msec.
Reply From 10.27.65.60: icmp_seq = 3. time <10 msec.

----10.27.65.60 PING statistics----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (msec) min/avg/max = <10/<10/<10
```

console#

The following example displays a ping to yahoo.com.

```
console#ping yahoo.com

Pinging yahoo.com [66,217,71,198] with 64 bytes of
data;

64 bytes from 10.1.1.1: icmp_seq=0. time=11 ms

64 bytes from 10.1.1.1: icmp_seq=1. time=8 ms

64 bytes from 10.1.1.1: icmp_seq=2. time=8 ms

64 bytes from 10.1.1.1: icmp_seq=3. time=7 ms

----10.1.1.1 PING Statistics----

4 packets transmitted, 4 packets received, 0% packet
loss

round-trip (ms) min/avg/max = 7/8/11
```

reload

Use the **reload** command in Privileged EXEC mode to reload stack members.

Syntax

reload [*stack–member–number*]

Parameter Description

Parameter	Description
stack–member–number	The stack member to be reloaded.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

If no unit is specified, all units are reloaded.

Example

The following example displays how to reload the stack.

```
console#reload 1
Management switch has unsaved changes.
Would you like to save them now? (y/n)n
Configuration Not Saved!
Are you sure you want to reload the switch? (y/n) y
Reloading management switch 1.
```

set description

Use the **set description** command in Stack Global Configuration mode to associate a text description with a switch in the stack.

Syntax

set description *unit description*

- *unit* — The switch identifier. (Range: 1–12)
- *description* — The text description. (Range: 1–80 alphanumeric characters)

Default Configuration

This command has no default configuration.

Command Mode

Stack Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example displays

```
console(config)#stack
console(config-stack)#set description 1 “unit 1"
```

slot

Use the **slot** command to configure a slot in the system. The unit/slot is the slot identifier of the slot located in the specified unit. The *cardindex* is the index to the database of the supported card types (see the command show supported cardtype) indicating the type of card being preconfigured in the specified slot. The card index is a 32-bit integer. If a card is currently present in the slot that is unconfigured, the configured information will be deleted and the slot will be reconfigured with default information for the card. The supported card types are:

- PowerConnect 7024
- PowerConnect 7024P
- PowerConnect 7024F
- PowerConnect 7048
- PowerConnect 7048P
- PowerConnect 7048R
- PowerConnect 7048R-RA
- CX4 Expansion Card
- 10GBaseT Expansion Card
- SFP+ Expansion Card

Use the **no** form of the command to return the unit/slot configuration to the default value.

Syntax

slot *unit/slot cardindex*

no slot *unit/slot*

- *unit/slot* — The slot identifier of the slot.

- *cardindex* — The index into the database of the supported card types (see **show supported cardtype**) indicating the type of card being preconfigured in the specified slot. The card index is a 32-bit integer.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

The card index (CID) can be obtained by executing the show supported cardtype command in User EXEC mode.

show banner

Use the **show banner** command to display banner information.

Syntax

show banner

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show banner


Banner:Exec
```

```
Line Console..................... Enable
Line SSH......................... Disable
Line Telnet...................... Enable
===exec=====

Banner:Login
Line Console..................... Enable
Line SSH......................... Enable
Line Telnet...................... Disable
===login=====

Banner:MOTD
Line Console..................... Enable
Line SSH......................... Enable
Line Telnet...................... Enable
===motd=====
```

show boot-version

Use the **show boot-version** command to display the boot image version details. The details available to the user include the build date and time.

Syntax

show boot-version [**unit**]

- *unit* — The switch identifier. (Range: 1–12)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC or Privileged EXEC

User Guidelines

No specific guidelines.

Example

```
console#show boot-version
unit          Boot Image Version
1             Thu Aug 30 12:01:04 2007
```

show checkpoint statistics

Use the **show checkpoint statistics** command to display the statistics for the checkpointing process.

Syntax

show checkpoint statistics

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

When nonstop forwarding is enabled on a stack, the stack's management unit checkpoints operational data to the backup unit. If the backup unit takes over as the management unit, the control plane on the new management unit uses the checkpointed data when initializing its state. Checkpoint statistics track the amount of data checkpointed from the management unit to the backup unit.

Example

```
console#show checkpoint statistics


Messages Checkpointed.....................6708
Bytes Checkpointed........................894305
Time Since Counters Cleared...............3d 01:05:09
Checkpoint Message Rate...................0.025 msg/sec
Last 10-second Message Rate...............0 msg/sec
Highest 10-second Message Rate............8 msg/sec
```

show cut-through mode

Use the **show cut-through mode** command to show the cut-through mode on the switch.

Syntax

show cut-through mode

Command Mode

Privileged EXEC

Default Configuration

This command has no default configuration.

User Guidelines

No specific guidelines.

Example

```
Console#show cut-through mode
Current mode    : Enable
Configured mode : Disable (This mode is effective on
next reload)
```

show interfaces advanced firmware

Use the **show interfaces advanced firmware** command to display the firmware revision of the PHY for a port.

Syntax

show interfaces advanced firmware *interface*

Parameter Description

Parameter	Description
interface	A 10G non-stacking physical interface.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command is only applicable to 10G non-stacking interfaces.

Example

```
console#show interfaces advanced firmware
Port Revision Part number
-------- ----------- -----------
Te1/0/1 0x411 BCM8727
Te1/0/2 0x411 BCM8727
Te1/0/3 0x411 BCM8727
Te1/0/4 0x411 BCM8727
Te1/0/5 0x411 BCM8727
```

show interfaces media-type

Use the **show interfaces media-type** command in Privileged EXEC mode to display the configured and active media type for the combo ports.

Syntax

show interfaces media-type

Parameter Description

Parameter	Description
auto-select rj45	Utilize RJ45 media when both media types are active.
auto-select sfp	Utilize the SFP media when both media types are active.
rj45	Force connection on the RJ45 port. Power off SFP media port.
sfp	Force connection on the SFP port. Power off RJ45 media port.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

```
console#show interfaces media-type

Port       Configured Media-Type(s)     Active
---------  --------------------------   ------
Te1/0/21   auto-select, SFP preferred   SFP
Te1/0/22   auto-select, SFP preferred   SFP
```

```
Te1/0/23   auto-select, SFP preferred   Down
Te1/0/24   auto-select, SFP preferred   Down
```

show memory cpu

Use the **show memory cpu** command to check the total and available RAM space on the switch.

Syntax

show memory cpu

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

No specific guidelines.

Example

```
console#show memory cpu


Total Memory.......................... 262144 KBytes
Available Memory Space................ 121181 KBytes
```

show power-usage-history

Use the **show power-usage-history** command in Privileged EXEC mode to display the history of unit power consumption for the unit specified in the command and total stack power consumption. Historical samples are not saved across switch reboots/reloads.

Syntax

show power-usage-history *unit-id*

Parameter Description

Parameter	Description
unit-id	Stack unit for which to display the power history. Range 1-12.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

There are no user guidelines for this command.

Example

```
console#show power-usage-history unit 1


Sampling Interval (sec)..................... 30
Total No. of Samples to Keep................ 168
Current Power Consumption (mWatts)........... 56172

Sample      Time Since          Power        Power
 No.        The Sample       Consumption   Consumption
           Was Recorded      On This Unit   Per Stack
                              (mWatts)      (mWatts)
------ -------------------  -----------   -----------
3       0d:00:00:13           56172         56172
```

```
2        0d:00:00:43            56172          56172
1        0d:00:01:12            54360          54360
```

show process cpu

Use the **show process cpu** command to check the CPU utilization for each process currently running on the switch.

Syntax

show process cpu

Command Mode

Privileged EXEC

Default Configuration

This command has no default configuration.

User Guidelines

No specific guidelines.

Example

```
console#show process cpu


Memory Utilization Report


status      bytes
------ ----------
   free   64022608
  alloc  151568112


CPU Utilization:


  PID     Name                      5 Sec    1 Min    5 Min
```

```
-------------------------------------------------------------
  328bb20 tTffsPTask                0.00%    0.00%    0.02%
  3291820 tNetTask                  0.00%    0.00%    0.01%
  3295410 tXbdService               0.00%    0.00%    0.03%
  347dcd0 ipnetd                    0.00%    0.00%    0.01%
  348a440 osapiTimer                1.20%    1.43%    1.21%
  358ee70 bcmL2X.0                  0.40%    0.30%    0.12%
  359d2e0 bcmCNTR.0                 0.80%    0.42%    0.50%
  3b5b750 bcmRX                     0.00%    0.13%    0.12%
  3d3f6d0 MAC Send Task             0.00%    0.07%    0.10%
--More-- or (q)uit
  3d48bd0 MAC Age Task              0.00%    0.00%    0.03%
  40fdbf0 bcmLINK.0                 0.00%    0.14%    0.46%
  4884e70 tL7Timer0                 0.00%    0.06%    0.02%
  48a1250 osapiMonTask              0.00%    0.32%    0.17%
  4969790 BootP                     0.00%    0.00%    0.01%
  4d71610 dtlTask                   0.00%    0.06%    0.05%
  4ed00e0 hapiRxTask                0.00%    0.06%    0.03%
  562e810 DHCP snoop                0.00%    0.00%    0.06%
  58e9bc0 Dynamic ARP Inspection    0.00%    0.06%    0.03%
  62038a0 dot1s_timer_task          0.00%    0.00%    0.03%
  687f360 dot1xTimerTask            0.00%    0.06%    0.07%
  6e23370 radius_task               0.00%    0.00%    0.01%
  6e2c870 radius_rx_task            0.00%    0.06%    0.03%
  7bc9030 spmTask                   0.00%    0.09%    0.01%
  7c58730 ipMapForwardingTask       0.00%    0.06%    0.03%
  7f6eee0 tRtrDiscProcessingTask    0.00%    0.00%    0.01%
  b1516d0 dnsRxTask                 0.00%    0.00%    0.01%
  b194d60 tCptvPrtl                 0.00%    0.06%    0.03%
```

```
  b585770 isdpTask                  0.00%    0.00%    0.02%
  bda6210 RMONTask                  0.00%    0.11%    0.11%
  bdb24b0 boxs Req                  0.00%    0.13%    0.10%
  c2d6db0 sshd                      0.00%    0.00%    0.01%
-------------------------------------------------------------
--More-- or (q)uit
  Total CPU Utilization             2.40%    3.62%    3.45%
```

show sessions

Use the **show sessions** command in Privileged EXEC mode to display a list of the open telnet sessions to remote hosts.

Syntax

show sessions

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a list of open telnet sessions to remote hosts.

```
console#show sessions
User Name Connection from  Idle      Session    Session
                           Time      Time       Type
--------- --------------- -------- --------- -----------
----      EIA-232          00:00:00  00:07:37   Serial
admin     192.168.1.248    00:00:17  00:00:26   Telnet
```

```
admin     192.168.1.248    00:00:16  00:00:32   HTTP

console#
```

The following table describes the significant fields shown in the display.

Field	Description
Connection	Connection number
Host	Remote host to which the switch is connected through a Telnet session
Address	IP address of the remote host
Port	Telnet TCP port number

show slot

Use the **show slot** command in User EXEC mode to display information about all the slots in the system or for a specific slot.

Syntax

show slot [*slot/port*]

The following table explains the output parameters.

Parameter	Description
Slot	The slot identifier in a slot/port format.
Slot Status	The slot is empty, full, or has encountered an error.
Admin State	The slot administrative mode is enabled or disabled.
Power State	The slot power mode is enabled or disabled.
Configured Card Model Identifier	The model identifier of the card preconfigured in the slot. Model identifier is a 32-character field used to identify a card.

Parameter	Description
Pluggable	Cards are pluggable or non-pluggable in the slot.

If you supply a value for slot/port, the following additional information appears as shown in the table below.

Parameter	Description
Inserted Card Model Identifier	The model identifier of the card inserted in the slot. Model identifier is a 32-character field used to identify a card. This field is displayed only if the slot is full.
Inserted Card Description	The card description. This field is displayed only if the slot is full.
Configured Card Description	The description of the card preconfigured in the slot.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC

User Guidelines

The command has no user guidelines.

show supported cardtype

Use the **show supported cardtype** command in User EXEC mode to display information about all card types supported in the system. If a card index is entered, then the command displays information about specific card types supported in the system. Card index values are specific to each family of products. Use the generic form (without specifying an index) to display all the card types for a product family.

Syntax

show supported cardtype [*cardindex*]

- *cardindex* — Displays the index into the database of the supported card types. This index is used when preconfiguring a slot.

The following table explains the output parameters.

Parameter	Description
Card Index (CID)	The index into the database of the supported card types. This index is used when preconfiguring a slot.
Card Model Identifier	The model identifier for the supported card type.

If you supply a value for *cardindex*, the following additional information appears as shown in the table below.

Parameter	Description
Card Type	The 32-bit numeric card type for the supported card.
Model Identifier	The model identifier for the supported card type.
Card Description	The description for the supported card type.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC

User Guidelines

The CID information is used when pre-configuring cards using the **slot** command.

show supported switchtype

Use the **show supported switchtype** command in User EXEC mode to display information about all supported switch types.

Syntax

show supported switchtype [*switchindex*]

- *switchindex* — Specifies the index into the database of the supported switch types, indicating the type of the switch being preconfigured. The switch index is a 32-bit integer. (Range: 0–65535)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

The switch SID is used when pre-configuring switches in a stack using the **member** command in config-stack mode.

Example

The following example displays the information for supported switch types.

```
console>show supported switchtype

                                        Mgmt      Code
SID         Switch Model ID             Pref      Type
------------------------------------------------------------
1                                                 0x100b000
```

The following table describes the fields in the example.

Field	Description
Switch Index (SID)	This field displays the index into the database of supported switch types. This index is used when preconfiguring a member to be added to the stack.
Model Identifier	This field displays the model identifier for the supported switch type.
Management Preference	This field indicates the management preference value of the switch type.
Code Version	This field displays the code load target identifier of the switch type.

The following example displays the format of the **show supported switchtype** [*switchindex*] command.

```
console#show supported switchtype 1

Switch Type..................... 0xd8200001

Model Identifier................ PC8024

Switch Description.............. PowerConnect 8024

Expected Code Type.............. 0x100b000

Supported Cards:

    Slot..................... 0

    Card Index (CID)........... 2

   Model Identifier............ PowerConnect 8024

console#
```

The following table describes the fields in the example.

Field	Description
Switch Type	This field displays the 32-bit numeric switch type for the supported switch.

Field	Description
Model Identifier	This field displays the model identifier for the supported switch type.
Switch Description	This field displays the description for the supported switch type.

show switch

NOTE: The **show switch stack-ports** and **show switch stack-standby** commands in Privileged EXEC mode are not supported by the PC8024/PC8024F switch.

Use the **show switch** command in User EXEC mode to display information about units in the stack.

The **show switch** command shows the configuration and status of the stacking units, including the active and standby stack management units, the pre-configured model identifier, the plugged in model identifier, the switch status and the current code version. If there is a stack firmware synchronization (SFS) operation in progress, the switch status will show as **Updating Code**. Both the pre-configured switch type (as set by the **member** command in stack mode) and the actual connected switch type are shown.

The **show switch** *unitid* command shows details of the switch configuration including the SFS last attempt status for the specified unit.

The **show switch** command may show an SDM Mismatch value in the Switch Status field. This value indicates that the unit joined the stack, but is running a different SDM template than the management unit. This status should be temporary; the stack unit should automatically reload using the template running on the stack manager.

Use the **show supported switchtype** command to display switch SIDs.

Use the **show stack-ports** command to display details regarding stacking links.

Use the **show slot** command to display details regarding slot configuration.

Use the **show sdm prefer** command to display the SDM template configuration.

Syntax

show switch [chassis-mgmt | stack–member–number | stack–ports[counters | diag] | stack–standby]

Parameter Description

Parameter	Description
unitid	The unit number.
chassis-mgmt	Display chassis management.
stack–member–number	The stack member number.
stack–ports	Display summary stack-port information for all interfaces.
counters	Display summary data counter information for all interfaces.
diag	Display front panel stacking diagnostics for each port.
stack–standby	Display the configured or automatically selected standby unit number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Examples

Example – Stack Status for the Switch

The following example displays stack status information for the switch.

```
console#show switch 1
```

Switch..... 1
Management Status..... Management Switch
Switch Type..... 0xd8200002
Preconfigured Model Identifier.... PC8024F
Plugged-in Model Identifier..... PC8024F
Switch Status..... OK
Switch Description..... Powerconnect 8024F
Expected Code Type..... 0x100b000
Detected Code Version..... 4.1.0.6
Detected Code in Flash..... 4.1.0.6
SFS Last Attempt Status..... None
CPLD Version..... 3
Serial Number.....
Up Time..... 0 days 0 hrs 11 mins 34 secs

console#The following table describes the fields in the example.

Unit	Description
Switch	This field displays the unit identifier assigned to the switch.
Management Status	This field indicates whether the switch is the Management Switch, a stack member, or the status is unassigned.
Admin Management Preference	This field indicates the administrative management preference value assigned to the switch. This preference value indicates how likely the switch is to be chosen as the Management Switch.
Switch Type	This field displays the 32-bit numeric switch type.

Unit	Description
Model Identifier	This field displays the model identifier for this switch. Model Identifier is a 32-character field assigned by the switch manufacturer to identify the switch.
Switch Status	This field displays the switch status. Possible values are OK, Unsupported, Code Mismatch, Config Mismatch, or Not Present.
Switch Description	This field displays the switch description.
Expected Code Version	This field indicates the expected code version.
Detected Code Version	This field displays the version of code running on this switch. If the switch is not present and the data is from preconfiguration, the code version is "None."
Detected Code in Flash	This field displays the version of code that is currently stored in FLASH memory on the switch. This code will execute after the switch is reset. If the switch is not present and the data is from pre-configuration, then the code version is "None."
Boot Code Version	This field displays the version of the boot strapping code.
Up Time	This field displays the system up time.

Example – All Units in the Stack

This example displays information about all units in the stack.

```
console>show switch

Switch   Management   Preconfig   Plugged-in   Switch   Code
         Status       Model ID    Model ID     Status   Version
---------------------------------------------------------------

1        Mgmt Switch  PCM8024   PCM8024              1.0.0.0
```

Different fields in the display are explained as follows:

Unit	Description
Switch	This field displays the unit identifier assigned to the switch.
Management Status	This field indicates whether the switch is the Management Switch, a stack member, or the status is unassigned.
Preconfigured Model Identifier	This field displays the model identifier of a preconfigured switch ready to join the stack. The Model Identifier is a 32-character field assigned by the switch manufacturer to identify the switch.
Plugged-In Model Identifier	This field displays the model identifier of the switch in the stack. Model Identifier is a 32-character field assigned by the switch manufacturer to identify the switch.
Switch Status	This field indicates the switch status. Possible values for this state are: OK, Unsupported, CodeMismatch, ConfigMismatch, or NotPresent
Code Version	This field indicates the detected version of code on this switch.

Example – Status Parameters for NSF

The **show switch** command is used to display which unit is the management unit and which is the backup unit. Global Status Parameters for NSF are explained as follows:

Parameter	Description	Range	Default
NSF Administrative Status	Whether nonstop forwarding is administratively enabled or disabled	Enabled Disabled	Enabled
NSF Operational Status	Indicates whether NSF is enabled on the stack.	Enabled Disabled	None

Parameter	Description	Range	Default
Last Startup Reason	The type of activation that caused the software to start the last time. There are four options. “Power-On” means that the switch rebooted. This could have been caused by a power cycle or an administrative “Reload” command. “Administrative Move” means that the administrator issued a command for the stand-by manager to take over. “Warm-Auto-Restart” means that the primary management card restarted due to a failure, and the system executed a nonstop forwarding failover. “Cold-Auto-Restart” means that the system switched from the active manager to the backup manager and was unable to maintain user data traffic. This is usually caused by multiple failures occurring close together.	Power-On Administrative-Move Warm-Auto-Restart Cold-Auto-Restart	None
Time Since Last Restart	Time since the current management card became the active management card. For the backup manager, the value is set to 0d 00:00:00	Time Stamp	0d 00:00:00
Restart in progress	Whether a restart is in progress. A restart is not considered complete until all hardware tables have been fully reconciled.	Yes or No	
Warm Restart Ready	Whether the initial full checkpoint has finished	Yes or No	
Status	Whether the running configuration on the backup unit includes all changes made on the management unit.	Current or Stale	

Parameter	Description	Range	Default
Time Since Last Copy	When the running configuration was last copied from the management unit to the backup unit.	Time Stamp	
Time Until Next Copy	The number of seconds until the running configuration will be copied to the backup unit. This line only appears when the running configuration on the backup unit is Stale.	0 - L7_UNITMGR_CONFIG_COPY_HOLDDOWN	

```
(nsf-stack) #show nsf


Administrative Status.......................
Enable

Operational Status..........................
Enable

Last Startup Reason.......................... Warm
Auto-Restart

Time Since Last Restart...................... 0
days 16 hrs 52 mins 55 secs

Restart In Progress.......................... No

Warm Restart Ready........................... Yes


Copy of Running Configuration to Backup Unit:

   Status..................................... Stale

  Time Since Last Copy...................... 0 days
4 hrs 53 mins 22 secs

   Time Until Next Copy....................... 28
seconds
```

```
    Unit    NSF Support
    ----    -----------
       1        Yes
       2        Yes
       3        Yes
```

Per Unit Status Parameters are explained as follows:

Parameter	Description	Range	Default
NSF Support	Whether a unit supports NSF	Yes or No	—

Example – Switch Firmware Stack Status

The following example displays the Switch Firmware stack status information for the switch.

```
console#show switch

    Management  Standby    Preconfig     Plugged-in     Switch       Code
SW    Switch    Status     Model ID      Model ID       Status       Version
--- ---------- --------- ------------- ------------- ------------ ---------
1   Mgmt Sw              ANFirebolt-48 ANFirebolt-48 OK           4.12.17.37
2   Stack Mbr             ANFirebolt-24 ANFirebolt-24 Updating Code 13.4.8.42


console#show switch 1

Switch........................... 1
Management Status................ Management Switch
Hardware Management Preference.... Unassigned
Admin Management Preference....... Unassigned
Switch Type...................... 0xb6340001
Preconfigured Model Identifier.... PCT7048
Plugged-in Model Identifier....... PCT7048
Switch Status.................... OK
Switch Description............... PowerConnect 7048
Expected Code Type............... 0x100b000
Detected Code Version............ 5.31.1.46
```

```
Detected Code in Flash..... 5.31.1.46
CPLD Version..... 5
SFS Last Attempt Status..... None
Serial Number..... none
Up Time..... 0 days 2 hrs 14 mins 54 secs

console#
```

Example – SDM Templates

This example shows the SDM Mismatch value in the Switch Status field.

```
console#show switch

   Management   Standby Preconfig       Plugged-in      Switch       Code
SW Switch       Status   Model ID       Model ID        Status      Version
-- ---------- ------ ------------- ------------- -----------
1  Mgmt Sw             ANFirebolt-48   ANFirebolt-48   OK        2.24.17.48
2                      ANFirebolt-48   ANFirebolt-48   SDM Mismatch
2.24.17.48
```

show system

Use the **show system** command in User EXEC mode command to display system information.

Syntax

show system [*unit*]

- *unit* — The unit number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays system information.

show system id

Use the **show system id** command in User EXEC mode to display the system identity information.

Syntax

show system id [*unit*]

- *unit* — The unit number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

The tag information is on a switch by switch basis.

Example

The following example displays the system service tag information.

```
console>show system id

Service Tag: 89788978

Serial number: 8936589782

Asset tag: 7843678957

Unit    Service tag     Serial number     Asset tag

-----   ------------    --------------    -----------

1       89788978        8936589782        7843678957
```

```
2          4254675          3216523877          5621987728
```

show system power

Use the **show system power** command in User EXEC or Privileged EXEC mode to display information about the system level power consumption.

Syntax

show system power

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command has no user guidelines.

Examples

```
console#show system power

console>show system power
Power Supplies:

Unit  Description    Status     Source  Average     Current        Since
                                        Power       Power       Date/Time
                                       (Watts)     (Watts)
----  -----------  -----------  ------  ----------  ------- -----------------
1     System       OK           AC      206710688  81540
1     Main         OK           AC      44896      81540 01/10/2031 15:58:46
1     Secondary    Not present  DC
```

show system temperature

Use the **show system temperature** command in User EXEC or Privileged EXEC mode to display information about the system temperature and fan status.

Syntax

show system temperature

Parameter Description

This command does not require a parameter description.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

Temperature status is indicated as per the following table:

Status	Degrees Celsius
Good	0-50
Medium	51-74
High	75-200

Examples

```
console>show system temperature
Temperature Sensors:

Unit     Description   Temperature    Status
```

```
                          (Celsius)
----      -----------   -----------    ------
1         MAC           33             Good
1         PHY           24             Good

Fans:

Unit      Description    Status
----      -----------    ------
 1        Fan 1          OK
 1        Fan 2          OK
 1        Fan 3          OK
```

show tech-support

Use the **show tech-support** command to display system and configuration information for use in debugging or contacting technical support. The output of the show tech-support command combines the output of the following commands:

- show version
- show sysinfo
- show port all
- show isdp neighbors
- show logging
- show event log
- show logging buffered
- show running config
- show debugging

Syntax

show tech-support

Parameter Ranges

Not applicable

Command Mode

Privileged EXEC mode.

Usage Guidelines

Not applicable

Default Value

Not applicable

Example

```
console#show tech-support

 ***************** Show Version ******************

Switch: 2

System Description.............................. PowerConnect 6248P,
1.23.0.33
                                                  VxWorks 6.5
Machine Type.................................... PowerConnect 6248P
Machine Model................................... PCT6248P
Serial Number...................................
CN0PK4632829881C0067
FRU Number...................................... 1
Part Number..................................... BCM56314
Maintenance Level............................... A
Manufacturer.................................... 0xbc00
Burned In MAC Address........................... 00:1E:4F:04:5D:F4
```

```
Software Version.............................. 1.23.0.33
Operating System.............................. VxWorks 6.5
Network Processing Device..................... BCM56314_A0
Additional Packages............................
QOS
Multicast
Stacking
Routing


 ***************** Show SysInfo ******************


System Location...............................
System Contact................................
System Object ID..............................
1.3.6.1.4.1.674.10895.3013
System Up Time................................ 0 days 0 hrs 11
mins 47 secs
10/100 Ethernet/802.3 interface(s)............. 4
Gig Ethernet/802.3 interface(s)................ 1
10Gig Ethernet/802.3 interface(s).............. 0
Virtual Ethernet/802.3 interface(s)............ 0


MIBs Supported:


--More-- or (q)uit
```

Selecting More (m) continues the display of output for the show tech-support command.

show users

Use the **show users** command in Privileged EXEC mode to display information about the active users.

Syntax

show users [**long**]

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a list of active users and the information about them.

```
console#show users
Username     Protocol       Location
--------     --------       ------------
Bob          Serial
John         SSH            172.16.0.1
Robert       HTTP           172.16.0.8
Betty        Telnet         172.16.1.7
```

show version

Use the **show version** command in User EXEC mode to displays the system version information.

Syntax

show version [*unit*]

- *unit* — The unit number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode

User Guidelines

This command has no user guidelines.

Example

The following example displays a system version (this version number is only for demonstration purposes).

```
console>show version
Image Descriptions
image1 : default image
image2 :
Images currently available on Flash
--------------------------------------------------------------------
unit   image1    image2    current-active   next-active
--------------------------------------------------------------------
1      K.3.9.1   0.0.0.0   image1           image1
2      K.3.9.1   0.0.0.0   image1           image1
```

stack

Use the **stack** command in Global Configuration mode to set the mode to Stack Global Config.

Syntax

stack

Default Configuration

This command has no default mode.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example sets the mode to Stack Global Config.

```
console(config)#stack
console(config-stack)#
```

telnet

Use the **telnet** command in Privileged EXEC mode to log into a host that supports Telnet.

Syntax

telnet {*ip-address* | *hostname*} [*port*] [*keyword1.....*]

Parameter Description

Parameter	Description
ip-address	Valid IP address of the destination host.
hostname	Hostname of the destination host. (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes. For example, `console(config)#snmp-server host "host name"`
port	A decimal TCP port number, or one of the keywords from the port table in the usage guidelines (see Port Table below).
keyword	One or more keywords from the keywords table in the user guidelines (see Keywords Table below).

Keywords Table

Options	Description
/debug	Enable telnet debugging mode.
/line	Enable telnet linemode.
/localecho	Enable telnet localecho.
<cr>	Press ENTER to execute the command.
port	Enter the port number. Refer to the following table.

Port Table

Keyword	Description	Port Number
bgp	Border Gateway Protocol	179
chargen	Character generator	19
cmd	Remote commands	514
daytime	Daytime	13
discard	Discard	9
domain	Domain Name Service	53
echo	Echo	7
exec	Exec	512
finger	Finger	79
ftp	File Transfer Protocol	21
ftp-data	FTP data connections	20
gopher	Gopher	70
hostname	NIC hostname server	101
ident	Ident Protocol	113
irc	Internet Relay Chat	194
klogin	Kerberos login	543
kshell	Kerberos shell	544
login	Login	513

Keyword	Description	Port Number
lpd	Printer service	515
nntp	Network News Transport Protocol	119
pim-auto-rp	PIM Auto-RP	496
pop2	Post Office Protocol v2	109
pop3	Post Office Protocol v3	110
smtp	Simple Mail Transport Protocol	25
sunrpc	Sun Remote Procedure Call	111
syslog	Syslog	514
tacacs	TAC Access Control System	49
talk	Talk	517
telnet	Telnet	23
time	Time	37
uucp	Unix-to-Unix Copy Program	540
whois	Nickname	43
www	World Wide Web	80

Default Configuration

port — Telnet port (decimal 23) on the host.

Command Mode

User EXEC, Privileged EXEC mode

User Guidelines

This command has no user guidelines.

Example

Following is an example of using the **telnet** command to connect to 176.213.10.50.

```
console#telnet 176.213.10.50

Esc U sends telnet EL
```

traceroute

Use the **traceroute** command in Privileged EXEC mode to discover the IP routes that packets actually take when traveling to their destinations.

You can use **traceroute** command in either of two formats:

- You can specify the IP address and hostname in the command. The **traceroute** {ipaddress | hostname} command sets the parameters to their default values.
- You can enter **traceroute** to without specifying the IP address and hostname, and specify values for the traceroute parameters.

Syntax

traceroute [**ip** | **ipv6**] *ipaddress* | *hostname* [**initTtl** *initTtl*] [**maxTtl** *maxTtl*] [**maxFail** *maxFail*] [**interval** *interval*] [**count** *count*] [**port** *port*] [**size** *size*]

- *ipaddress* — Valid IP address of the destination host.
- *hostname* — Hostname of the destination host. (Range: 1–158 characters). The command allows spaces in the host name when specified in double quotes. For example, `console(config)#snmp-server host "host name"`
- *initTtl* — The initial time-to-live (TTL); the maximum number of router hops between the local and remote system (Range: 0–255).
- *maxTtl* — The largest TTL value that can be used (Range:1–255).
- *maxFail* — Terminate the traceroute after failing to receive a response for this number of consecutive probes (Range: 0–255).
- *interval* — The timeout period. If a response is not received within this period of time, then traceroute considers that probe a failure (printing *) and sends the next probe. If traceroute does receive a response to a probe, then it sends the next probe immediately. (Range: 1–60 seconds).
- *count* — The number of probes to be sent at each TTL level (Range:1–10).
- *port* — The destination UDP port of the probe. This should be an unused port on the remote destination system (Range: 1–65535).

- *size* — The size, in bytes, of the payload of the Echo Requests sent (Range: 0–65507 bytes).

Default Configuration

The default count is 3 probes.

The default interval is 3 seconds.

The default size is 0 data bytes.

The default port is 33434.

The default initTtl is 1 hop.

The default maxTtl is 30 hops.

The default maxFail is 5 probes.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example discovers the routes that packets will actually take when traveling to the destination specified in the command.

```
console#traceroute 192.168.77.171

Tracing route over a maximum of 20 hops

 1  192.168.21.1       30 ms      10 ms       10 ms
 2                      *          *           *
 3                      *          *           *
 4                      *          *           *
 5                      *          *           *
```

The following example uses the iterative process to obtain command parameters, and displays the routes that packets actually take when traveling to their destination.

```
console#traceroute

traceroute# Enter the ip-address | hostname :
192.168.77.171

traceroute# Packet size (default: 40 bytes): 30

traceroute# Max ttl value (default: 20):  10

traceroute# Number of probes to send at each level
(default 3):

traceroute# Timeout (default: 3 seconds): 6

traceroute# Source ip-address (default to select best
interface address):

traceroute# Type of Service byte (default):

Tracing route over a maximum of 20 hops

1 192.168.21.1   30 ms   10 ms    10 ms

2                 *       *        *

3                 *       *        *

4                 *       *        *

5                 *       *        *
```

82

Telnet Server Commands

The Telnet protocol (outlined in RFC 854) allows users (clients) to connect to multiuser computers (servers) on the network. Telnet is often employed when a user communicates with a remote login service.

Telnet is the terminal emulation protocol in the TCP/IP suite. Telnet uses TCP as the transport protocol to initiate a connection between server and client. After connecting, the telnet server and client enter a period of option negotiation that determines the options each side is capable of supporting for the connection. The connected systems can negotiate new options or renegotiate old options at any time. In general, each end of the Telnet connection attempts to implement all options that maximize performance for the systems involved.

When a Telnet connection is initiated, each side of the connection is assumed to originate and terminate at a Network Virtual Terminal, or NVT. Therefore, the server and user hosts do not maintain information about the characteristics of each other's terminals and terminal-handling conventions.

Commands in this Chapter

This chapter explains the following commands:

ip telnet server disable	show ip telnet
ip telnet port	

ip telnet server disable

The ip telnet server disable command is used to enable/disable the Telnet service on the switch.

Syntax

ip telnet server disable

no ip telnet server disable

Parameter Ranges

Not applicable

Command Mode

Global Configuration

Usage Guidelines

No specific guidelines.

Default Value

This feature is enabled by default.

Example

```
console#configure
console(config)#ip telnet server disable
console(config)# no ip telnet server disable
```

ip telnet port

The **ip telnet port** command is used to configure the Telnet service port number on the switch.

Syntax

ip telnet port *port number*

- *port number* — Telnet service port number (Range: 1–65535)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

Usage Guidelines

No specific guidelines.

Example

```
console(config)#ip telnet port 45
console(config)#no ip telnet port
```

show ip telnet

The **show ip telnet** command displays the status of the Telnet server and the Telnet service port number.

Syntax

show ip telnet

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

Example

```
(console)#show ip telnet
Telnet Server is Enabled. Port:23
```

83

Terminal Length Commands

This chapter provides information about terminal length commands.

terminal length

Use the **terminal length** command to set the terminal length. Use the **no** form of the command to reset the terminal length to the default.

Syntax

terminal length *value*

no terminal length

- *value* — The length in number of lines. Range: 0–512

Default Configuration

This default value is 24.

Command Mode

Privileged EXEC mode

User Guidelines

Setting the terminal length to 0 disables paging altogether. It is recommended that the terminal length either be set to 0 or a value larger than 4 as terminal lengths in the range of 1 to 4 may give odd output due to prompting. The terminal length command is specific to the current session. Logging out, rebooting or otherwise ending the current session will require that the command be re-entered. Likewise, because the terminal length setting is specific to a session, it is never saved in the config.

Example

```
console#terminal length 50
```

84

Time Ranges Commands

Time ranges are used with time-based ACLs to restrict their application due to specific time slots.

This chapter explains the following commands:

time-range	periodic
absolute	show time-range

time-range

Use the **time-range** command in Global Configuration mode to create a time range identified by *name*, consisting of one absolute time entry and/or one or more periodic time entries.

If a time range by this name already exists, this command enters Time-Range Configuration mode to allow updating the time range entries.

Use the **no** form of this command to delete a time-range identified by *name*.

Syntax

time-range *name*

no time-range *name*

Parameter Description

Parameter	Description
name	A case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the time range. An alpha-numeric string is defined as consisting of only alphabetic, numeric, dash, underscore, or space characters.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration

User Guidelines

The CLI mode changes to Time-Range Configuration mode when you successfully execute this command.

Example

```
console(config)#time-range timeRange_1
```

absolute

Use the absolute command in Time Range Configuration mode to add an absolute time entry to a time range.

Use the **no** form of this command to delete the absolute time entry in the time range.

Syntax

absolute {[**start** *time date*] [**end** *time date*]}

no absolute

Parameter Description

Parameter	Description
Start time date	Time and date at which the configuration that referenced the time range is in effect. The time is expressed in a 24-hour clock, in the form of hours:minutes. For example, 8:00 is 8:00 am and 20:00 is 8:00 pm. The date is expressed in the format day month year. If no start time and date are specified, the configuration statement is in effect immediately.
End time date	Time and date at which the configuration that referenced the time range is no longer in effect. Same time and date format as described for the start. The end time and date must be after the start time and date. If no end time and date are specified, the configuration statement is in effect indefinitely.

Default Configuration

This command has no default configuration.

Command Mode

Time Range Configuration

User Guidelines

Only one absolute time entry is allowed per time-range. The *time* parameter is referenced to the currently configured time zone.

Example

```
console#time-range timeRange_1

console(Config-time-range)#absolute end 12:00 16 Dec
2010
```

periodic

Use the periodic command to add a periodic time entry to a time range. The *time* parameter is based off of the currently configured time zone. Use the **no** form of this command to delete a periodic time entry from a time-range.

Syntax

periodic {**days-of-the-week** *time*} **to** {[**days-of-the-week**] *time*}

no periodic

Parameter Description

Parameter	Description
days-of-the-week	The first occurrence of this argument is the starting day or days from which the configuration that referenced the time range starts going into effect. The second occurrence is the ending day or days from which the configuration that referenced the time range is no longer in effect. If the end days-of-the-week are the same as the start, they can be omitted. This argument can be any single day or combinations of days: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Other possible values are: • daily -- Monday through Sunday • weekdays -- Monday through Friday • weekend -- Saturday and Sunday If the ending days of the week are the same as the starting days of the week, they can be omitted.
time	The first occurrence of this argument is the starting hours:minutes which the configuration that referenced the time range starts going into effect. The second occurrence is the ending hours:minutes at which the configuration that referenced the time range is no longer in effect. The hours:minutes are expressed in a 24-hour clock. For example, 8:00 is 8:00 am and 20:00 is 8:00 pm.

Default Configuration

This command has no default configuration.

Command Mode

Time Range Configuration

User Guidelines

Multiple periodic entries can exist in a time range, but periodic time entries cannot overlap each other. Periodic time entries can also coexist with an absolute time entry in a time range.

When both periodic and absolute time entries are specified within a time range, the periodic time entries limit the time range to only those times specified within the periodic time range and bounded by the absolute time range. In this case, the absolute time entry specifies the absolute start and end dates/times and the periodic entries specify the start/stop times within the limits of the absolute time entry dates and times.

If a periodic time entry is added to an active time-range with an existing absolute time entry, the absolute time entry immediately becomes inactive. For example, an administrator applies a absolute time-range configured for a week's work hours (08/09-08/13 9am to 6pm) and later adds multiple periodic entries for same days configured individually (Monday, Tuesday, Wednesday, Thursday, Friday) but with after-work hours (9pm to 11pm) . The administrator wants to permit/deny HTTP traffic for this time-range, but the entire time-range is invalid due to conflicting entries. The absolute entry is forced to inactive because the periodic entry time is not yet in effect.

Examples

```
console#time-range timeRange_2

console(Config-time-range)#periodic monday 00:00 to
tuesday 12:30

console(Config-time-range)#periodic tuesday 13:00 to
wednesday 12:00

console(Config-time-range)#periodic wednesday 12:30
to thursday 20:00

console(Config-time-range)#periodic weekend 18:00 to
20:00
```

show time-range

Use the show time-range command in Privileged EXEC mode to display a time range and all the absolute/periodic time entries that are defined for the time range. The [**name**] parameter is used to identify a specific time range to display. When the [**name**] parameter is not specified, all the time ranges defined in the system are displayed.

Syntax

show time-range [**name**]

Parameter Description

Parameter	Description
Number of Time Ranges	Number of time ranges configured in the system.
Time Range Name	Name of the time range.
Time Range Status	Status of the time range(active/inactive).
Absolute start	Start time and day for absolute time entry.
Absolute end	End time and day for absolute time entry.
Periodic Entries	Number of periodic entries in a time-range.
Periodic start	Start time and day for periodic entry.
Periodic end	End time and day for periodic entry.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC

User Guidelines

This command has no user guidelines.

Examples

```
console#show time-range timeRange_1

Time Range Name.............................. timeRange_1
Time Range Status............................ Inactive

Entry Number: 1
```

```
Absolute End Time.............................. 12:00 16
Dec 2010


Periodic Entries: 4


Entry Number: 2
Periodic Start Time............................ MON 00:00
Periodic End Time.............................. TUE 12:30


Entry Number: 3
Periodic Start Time............................ TUE 13:00
Periodic End Time.............................. WED 12:00


Entry Number: 4
Periodic Start Time............................ WED 12:30
Periodic End Time.............................. THU 20:00


Entry Number: 5
Periodic Start Time............................ SUN SAT
18:00
--More-- or (q)uit
Periodic End Time.............................. SUN SAT
20:00


console#show time-range


Current number of all Time Ranges: 5  Maximum number of all
Time Ranges: 100
```

```
                                        Periodic
Time Range Name Status   Entry count Absolute Entry
------------------------------  -------- ----------- ------
timeRange_1                 Inactive    4      Exists
timeRange_2                 Inactive    4      Exists
timeRange_3                 Inactive    4      Exists
timeRange_4                 Inactive    4      Exists
timeRange_5                 Inactive    4      Exists
```

85

User Interface Commands

This chapter explains the following commands:

enable	–
end	–
exit	quit

enable

Use the **enable** command in User EXEC mode to enter the Privileged EXEC mode.

Syntax

enable

Default Configuration

The default privilege level is 15.

Command Mode

User EXEC mode

User Guidelines

If there is no authentication method defined for enable, then a level 1 user is not allowed to execute this command.

Example

The following example shows how to enter privileged mode.

```
console>enable
console#
```

end

Use the **end** command to get the CLI user control back to the privileged execution mode or user execution mode.

Syntax

end

Default Configuration

This command has no default configuration.

Command Mode

All command modes

User Guidelines

No specific guidelines.

Example

```
console(config)#end
console#end
console>
```

exit

Use the **exit** command to go to the next lower command prompt or, in User EXEC mode, to close an active terminal session by logging off the switch.

Syntax

exit

Default Configuration

This command has no default configuration.

Command Mode

All command modes. In User EXEC mode, this command behaves identically with the **quit** command.

User Guidelines

There are no user guidelines for this command.

Example

The following example changes the configuration mode from Interface Configuration mode to User EXEC mode to the login prompt.

```
console(config-if-Gi1/0/1)# exit

console(config)# exit

console#exit

console>exit


User:
```

quit

Use the **quit** command in User EXEC mode to close an active terminal session by logging off the switch.

Syntax

quit

Default Configuration

This command has no default configuration.

Command Mode

User EXEC command mode

User Guidelines

There are no user guidelines for this command.

Example

The following example closes an active terminal session.

```
console>quit
```

86

Web Server Commands

If enabled, the PowerConnect is manageable via industry standard web browsers. User privilege levels are the same as for the CLI. Over 95% of the management functions are available via the web interface, including configuration and firmware upgrades.

Web Sessions

The HTTP protocol does not provide support for persistent connections. Connections are constantly made and broken so there is no way to know who is accessing the web interface or for how long they are doing so. Additionally, with the use of basic authentication the user authorization is handled by the client browser. This means that once entered, the user name and password are cached in the browser and given to the server on request. Effectively, once a user logs in to the switch, they have access until the browser closes, even across reboots of the switch. This poses a security threat.

The Web Sessions feature makes use of cookies to control web connections, sessions. Cookies must be enabled on the browser. The Set-Cookie directive is sent only once at initiation of the session. With the introduction of Web Sessions the client connections can be monitored and controlled. Web Sessions put the authentication control in the PowerConnect instead of the client browser resulting in a more efficient implementation that allows web access while using Radius or TACACS+ for authentication.

The web login is implemented in the login page itself instead of a client browser popup. Additionally, there is a logout button, always present on the web interface. There are various commands that have been modified or added to support Web Sessions. Similarly there are modifications to some of the web pages. Support of SNMP configuration for Web Sessions is also available.

When the authentication method set for web login authentication is set to TACACS+, the exec shell configuration on the TACACS+ server is used to determine user permissions (read-only or read/ write). If the configured value on the server is 15, the user is given read-write permissions. Any other value is read-only. If exec shell feature is not enabled on the server, the user is given read-only permissions.

Commands in this Chapter

This chapter explains the following commands:

common-name	ip http secure-port
country	ip http secure-server
crypto certificate generate	key-generate
crypto certificate import	location
crypto certificate request	organization-unit
duration	show crypto certificate mycertificate
ip http port	show ip http server status
ip http server	show ip http server secure status
ip http secure-certificate	state

common-name

Use the **common-name** command in Crypto Certificate Generation or Crypto Certificate Request mode to specify the common-name for the switch.

Syntax

common-name *common-name*

Parameter Description

Parameter	Description
common-name	Specifies the fully qualified URL or IP address of the switch. If left unspecified, this parameter defaults to the lowest IP address of the switch (when the certificate is generated). (Range: 1–64)

Default Configuration

This command has no default configuration.

Command Mode

Crypto Certification mode

User Guidelines

This command mode is entered using the **crypto certificate request** or **crypto certificate generate** command.

Example

The following example displays how to specify the name of "router.gm.com."

```
console(config-crypto-cert)#common-name router.gm.com
```

country

Use the **country** command in Crypto Certificate Generation or Crypto Certificate Request mode to specify the country.

Syntax

country *country*

- *country* — Specifies the country name. (Range: 2 characters)

Default Configuration

This command has no default configuration.

Command Mode

Crypto Certificate Generation or Crypto Certificate Request mode

User Guidelines

This command mode is entered using the **crypto certificate request** or **crypto certificate generate** command.

Example

The following example displays how to specify the country as "us."

```
console(config-crypto-cert)#country us
```

crypto certificate generate

Use the **crypto certificate generate** command in Global Configuration mode to generate a self-signed HTTPS certificate.

Syntax

crypto certificate *number* **generate**

- *number* — Specifies the certificate number. (Range: 1–2)
- **generate** — Regenerates the SSL RSA key.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

This command is not saved in the router switch configuration; however, the certificate and keys generated by this command are saved in the private configuration. This saved information is never displayed to the user or backed up to another switch. If the RSA keys do not exist, the **generate** parameter must be used. To save the generated certificate and keys on the local switch and distribute the certificate across a stack, save the configuration. Otherwise, the certificate and keys will not be available after the next reboot.

Example

The following example generates a self-signed HTTPS certificate.

```
console(config-crypto-cert)#common-name DELL
console(config-crypto-cert)#country USA
console(config-crypto-cert)#Duration 3650
```

```
console(config-crypto-cert)#email no-reply@dell.com
console(config-crypto-cert)#location Round Rock
console(config)#crypto certificate 1 generate
console(config-crypto-cert)#organization-unit
"PowerConnect Networking"
console(config-crypto-cert)#organization-name "Dell,
Inc."
console(config-crypto-cert)#state TX
console(config-crypto-cert)#key-generate
console(config-crypto-cert)#ex
console(config)#ex
```

crypto certificate import

Use the **crypto certificate import** command in Global Configuration mode to import a certificate signed by the Certification Authority for HTTPS.

Syntax

crypto certificate *number* **import**

- *number* — Specifies the certificate number. (Range: 1–2)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode

User Guidelines

Use this command to enter an external certificate (signed by the Certification Authority) to the switch. To end the session, add a period (.) on a separate line after the input, and press ENTER.

The imported certificate must be based on a certificate request created by the **crypto certificate request** Privileged EXEC command.

If the public key found in the certificate does not match the switch's SSL RSA key, the command fails.

This command is not saved in the router configuration; however, the certificate imported by this command is saved in the private configuration (which is never displayed to the user or backed up to another switch).

Example

The following example imports a certificate sighed by the Certification Authority for HTTPS.

```
console(config)#crypto certificate 1 import

-----BEGIN CERTIFICATE-----

dHmUgUm9vdCBDZXJ0aWZpZXIwXDANBgkqhkiG9w0BAQEFAANLADBI
AkEAp4HS

nnH/xQSGA2ffkRBwU2XIxb7n8VPsTm1xyJ1t11a1GaqchfMqqe0km
fhcoHSWr

yf1FpD0MWOTgDAwIDAQABo4IBojCCAZ4wEwYJKwYBBAGCNxQCBAYe
BABDAEEw

CwR0PBAQDAgFGMA8GA1UdEwEB/wQFMAMBAf8wHQYDVR0OBBYEFAf4
MT9BRD47

ZvKBAEL9Ggp+6MIIBNgYDVR0fBIIBLTCCASkwgdKggc+ggcyGgcls
ZGFwOi8v

L0VByb3h5JTIwU29mdHdhcmUlMjBSb290JTIwQ2VydGlmaWVyLENO
PXNlcnZl

-----END CERTIFICATE-----

Certificate imported successfully.

Issued to: router.gm.com

Issued by: www.verisign.com

Valid from: 8/9/2005  to 8/9/2005

Subject: CN= router.gm.com, 0= General Motors, C= US
```

```
Finger print: DC789788 DC88A988 127897BC BB789788
```

crypto certificate request

Use the **crypto certificate request** command in Privileged EXEC mode to generate and display a certificate request for HTTPS. This command takes you to Crypto Certificate Request mode.

Syntax

crypto certificate *number* **request**

- *number* — Specifies the certificate number. (Range: 1–2)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

User Guidelines

Use this command to export a certificate request to a Certification Authority. The certificate request is generated in Base64-encoded X.509 format.

Before generating a certificate request, you must first generate a self-signed certificate using the **crypto certificate generate** command in Global Configuration mode in order to generate the keys. Make sure to re-enter values in the certificate fields.

After receiving the certificate from the Certification Authority, use the **crypto certificate import** command in Global Configuration mode to import the certificate into the switch. This certificate replaces the self-signed certificate.

Example

The following example generates and displays a certificate request for HTTPS.

```
console#crypto certificate 1 request

console(config-crypto-cert)#
```

duration

Use the **duration** command in Crypto Certificate Generation mode to specify the duration.

Syntax

duration *days*

- *days* — Specifies the number of days a certification would be valid. If left unspecified, the parameter defaults to 365 days. (Range: 30–3650 days)

Default Configuration

This command defaults to 365 days.

Command Mode

Crypto Certificate Generation mode

User Guidelines

This command mode is entered using the **crypto certificate generate** command.

Example

The following example displays how specify a duration of 50 days that a certification is valid.

```
console(config-crypto-cert)#duration 50
```

ip http port

Use the **ip http port** command in Global Configuration mode to specify the TCP port for use by a web browser to configure the switch. To use the default TCP port, use the **no** form of this command.

Syntax

ip http port *port-number*

no ip http port

- *port-number* — Port number for use by the HTTP server. (Range: 1–65535)

Default Configuration

This default port number is 80.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines. However, specifying 0 as the port number effectively disables HTTP access to the switch.

Example

The following example shows how the http port number is configured to 100.

```
console(config)#ip http port 100
```

ip http server

Use the **ip http server** command in Global Configuration mode to enable the switch to be configured, monitored, or modified from a browser. To disable this function use the **no** form of this command.

Syntax

ip http server

no ip http server

Default Configuration

The default mode is enabled.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example enables the switch to be configured from a browser.

```
console(config)#ip http server
```

ip http secure-certificate

Use the **ip http secure-certificate** command in Global Configuration mode to configure the active certificate for HTTPS. To return to the default setting, use the **no** form of this command.

Syntax

ip http secure-certificate *number*

no ip http secure-certificate

Parameter Description

Parameter	Description
number	Specifies the certificate number. (Range: 1–2)

Default Configuration

The default value of the certificate number is 1.

Command Mode

Global Configuration mode

User Guidelines

The HTTPS certificate is generated using the **crypto certificate generate** command in Global Configuration mode.

Example

The following example configures the active certificate for HTTPS.

```
console(config)#ip http secure-certificate 1
```

ip http secure-port

Use the **ip http secure-port** command in Global Configuration mode to configure a TCP port for use by a secure web browser to configure the switch. To use the default port, use the **no** form of this command.

Syntax

ip http secure-port *port-number*

no ip http secure-port

Parameter Description

Parameter	Description
port-number	Port number for use by the secure HTTP server. (Range: 1–65535)

Default Configuration

This default port number is 443.

Command Mode

Global Configuration mode

User Guidelines

This command has no user guidelines.

Example

The following example configures the https port number to 100.

```
console(config)#ip http secure-port 2
```

ip http secure-server

Use the **ip http secure-server** command in Global Configuration mode to enable the switch to be configured, monitored, or modified securely from a browser. To disable this function, use the **no** form of this command.

Syntax

ip http secure-server

no ip http secure-server

Default Configuration

The default for the switch is disabled.

Command Mode

Global Configuration mode

User Guidelines

You must import a certificate using the **crypto certificate import** command, followed by the **crypto certificate generate** command.

Example

The following example enables the switch to be configured from a browser.

```
console(config)#ip http secure-server
```

key-generate

Use the **key-generate** command in Crypto Certificate Generation mode to specify the key-generate.

Syntax

key-generate [*length*]

- *length* — Specifies the length of the SSL RSA key. If left unspecified, this parameter defaults to 1024. (Range: 512–2048)

Default Configuration

This command has no default configuration.

Command Mode

Crypto Certificate Generation mode

User Guidelines

This command mode is entered using the **crypto certificate request** command.

Example

The following example displays how to specify that you want to regenerate the SSL RSA key 1024 byes in length.

```
console(config-crypto-cert)#key-generate 1024
```

location

Use the **location** command in Crypto Certificate Generation or Crypto Certificate Request mode to specify the location or city name.

Syntax

location *location*

- *location* — Specifies the location or city name. (Range: 1–64 characters)

Default Configuration

This command has no default configuration.

Command Mode

Crypto Certificate Generation or Crypto Certificate Request mode

User Guidelines

This command mode is entered using the **crypto certificate request** or **crypto certificate generate** command.

Example

The following example displays how to specify the city location of "austin."

```
console(config-crypto-cert)#location austin
```

organization-unit

Use the **organization-unit** command in Crypto Certificate Generation or Crypto Certificate Request mode to specify the organization unit.

Syntax

organization-unit *organization-unit*

- *organization-unit* — Specifies the organization-unit or department name. (Range: 1–64 characters)

Default Configuration

This command has no default configuration.

Command Mode

Crypto Certificate Generation or Crypto Certificate Request mode

User Guidelines

This command mode is entered using the **crypto certificate request** or **crypto certificate generate** command.

Example

The following example displays how to specify the "generalmotors" organization-unit.

```
console(config-crypto-cert)#organization-unit
generalmotors
```

show crypto certificate mycertificate

Use the **show crypto certificate mycertificate** command in Privileged EXEC mode to view the SSL certificates of your switch.

Syntax

show crypto certificate mycertificate [*number*]

- **number —** Specifies the certificate number. (Range: 1–2 digits)

Default configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

Example

The following example displays the SSL certificate of a sample switch.

```
console#show crypto certificate mycertificate 1

-----BEGIN CERTIFICATE-----

dHmUgUm9vdCBDZXJ0aWZpZXIwXDANBgkqhkiG9w0BAQEFAANLADBI
AkEAp4HS

NnH/xQSGA2ffkRBwU2XIxb7n8VPsTm1xyJ1t11a1GaqchfMqqe0km
fhcoHSWr

yf1FpD0MWOTgDAwIDAQABo4IBojCCAZ4wEwYJKwYBBAGCNxQCBAYe
BABDAEEw

CwR0PBAQDAgFGMA8GA1UdEwEB/wQFMAMBAf8wHQYDVR0OBBYEFAf4
MT9BRD47

ZvKBAEL9Ggp+6MIIBNgYDVR0fBIIBLTCCASkwgdKggc+ggcyGgcls
ZGFwOi8v

L0VByb3h5JTIwU29mdHdhcmUlMjBSb290JTIwQ2VydGlmaWVyLENO
PXNlcnZl

-----END CERTIFICATE-----

Issued by: www.verisign.com

Valid from: 8/9/2003 to 8/9/2004

Subject: CN= router.gm.com, 0= General Motors, C= US

Finger print: DC789788 DC88A988 127897BC BB789788
```

show ip http server status

Use the **show ip http** server command in User EXEC or Privileged EXEC mode to display the HTTP server status information.

Syntax

show ip http server status

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC

User Guidelines

This command has no user guidelines.

Example

The following example displays the HTTP server configuration.

```
console#show ip http server status
HTTP server enabled. Port: 80
```

show ip http server secure status

Use the **show ip http server secure status** command in User EXEC or Privileged EXEC mode to display the HTTP secure server status information.

Syntax

show ip http server secure status

Syntax Description

This command has no arguments or keywords.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC, Privileged EXEC modes

User Guidelines

This command has no user guidelines.

Example

The following example displays an HTTPS server configuration with DH Key exchange enabled.

```
console#show ip https
HTTPS server enabled. Port: 443
DH Key exchange enabled.
Certificate 1 is active
Issued by: www.verisign.com
Valid from: 8/9/2003 to 8/9/2004
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: DC789788 DC88A988 127897BC BB789788
Certificate 2 is inactive
Issued by: self-signed
Valid from: 8/9/2003 to 8/9/2004
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: 1873B936 88DC3411 BC8932EF 782134BA
```

The following example displays the HTTPS server configuration with DH Key exchange disabled.

```
console#show ip https
HTTPS server enabled. Port: 443
```

```
DH Key exchange disabled, parameters are being
generated.
Certificate 1 is active
Issued by: www.verisign.com
Valid from: 8/9/2003 to 8/9/2004
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: DC789788 DC88A988 127897BC BB789788
Certificate 2 is inactive
Issued by: self-signed
Valid from: 8/9/2003 to 8/9/2004
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: 1873B936 88DC3411 BC8932EF 782134BA
```

state

Use the **state** command in Crypto Certificate Generation or Crypto Certificate Request mode to specify the state or province name.

Syntax

state *state*

- *state* — Specifies the state or province name. (Range: 1–64 characters)

Default Configuration

This command has no default configuration.

Command Mode

Crypto Certificate Generation or Crypto Certificate Request mode

User Guidelines

This command mode is entered using the **crypto certificate request** or **crypto certificate generate** command.

Example

The following example shows how to specify the state of "texas."

```
console(config-crypto-cert)#state texas
```

Appendix A: List of Commands

{deny | permit} (IPv6 ACL). 506
802.1x Advanced Features. 789
802.1x Advanced Features. 813
802.1x Commands 785
802.1x Monitor Mode 787
802.1x Option 81 789
aaa accounting network default start-stop group radius. 675
aaa authentication dot1x default 236
aaa authentication enable 238
aaa authentication login 239
aaa authorization network default radius 241
AAA Commands 235
aaa ias-user username 242
aaa new-model 243
absolute 1668
Access Control Lists 615
access-list 266
acct-port 675
ACL Commands 263
ACL Logging 263
action 553
add gigabitethernet. 555
add port-channel. 556
add tengigabitethernet 555
Address Table Commands 281
Appendix A: List of Commands 1699
area default-cost (Router OSPF) 1143
area default-cost (Router OSPFv3) 1216
area nssa (Router OSPF) 1144
area nssa (Router OSPFv3) 1217
area nssa default-info-originate 1146

area nssa default-info-originate 1218
area nssa no-redistribute 1147
area nssa no-redistribute 1219
area nssa no-summary. 1147
area nssa no-summary. 1220
area nssa translator-role 1148
area nssa translator-role 1221
area nssa translator-stab-intv 1149
area nssa translator-stab-intv 1222
area range (Router OSPF). 1150
area range (Router OSPFv3). 1223
area stub no-summary. 1152
area stub no-summary. 1225
area stub 1151
area stub 1224
area virtual-link authentication. 1155
area virtual-link dead-interval. 1156
area virtual-link dead-interval. 1228
area virtual-link hello-interval 1157
area virtual-link hello-interval 1228
area virtual-link retransmit-interval 1158
area virtual-link retransmit-interval 1229
area virtual-link transmit-delay. 1159
area virtual-link transmit-delay. 1230
area virtual-link. 1153
area virtual-link. 1226
arp access-list 365
ARP Aging 882
arp cachesize. 883
ARP Commands 881
arp dynamicrenew. 884
arp purge 885
arp resptime 886

arp retries 887
arp timeout 887
arp 882
asset-tag 1605
assign-queue 619
authentication timeout 1347
auth-port 676
auto-cost 1160
Auto-Install Commands 1335
auto-summary 1285
Auto-VoIP Commands 307
bandwidth 1161
banner exec 1606
banner login 1607
banner motd acknowledge 1609
banner motd 1608
block 1352
boot auto-copy-sw allow-downgrade 1337
boot auto-copy-sw 1336
boot host autoreboot 1338
boot host autosave 1339
boot host dhcp 1339
boot host retrycount 1340
boot system 1414
bootfile 897
bootpdhcprelay maxhopcount 975
bootpdhcprelay minwaittime 976
capability opaque 1162
Captive Portal Client Connection Commands 1360
Captive Portal Commands 1345
Captive Portal Configuration Commands 1352
Captive Portal Interface Commands 1364
Captive Portal Local User Commands 1365

Captive Portal Status Commands 1371
Captive Portal User Group Commands 1375
captive-portal client deauthenticate 1360
captive-portal 1347
CDP Interoperability Commands 313
channel-group 598
Class of Service (CoS) 616
class. 619
class-map rename 621
class-map 620
classofservice dot1p-mapping 622
classofservice ip-dscp-mapping 623
classofservice trust 623
clear (IAS) 243
clear arp-cache management. 889
clear arp-cache 888
clear captive-portal users 1365
clear checkpoint statistics 1610
clear config 1415
clear counters 396
clear dhcp l2relay statistics interface 338
clear dot1x authentication–history 812
clear fip-snooping statistics 869
clear gvrp statistics 451
clear host. 484
clear ip address-conflict-detect. 484
clear ip arp inspection statistics 366
clear ip dhcp binding 898
clear ip dhcp conflict 899
clear ip dhcp snooping binding. 350
clear ip dhcp snooping statistics 351
clear ip helper statistics. 977
clear ip ospf. 1162

clear ipv6 dhcp 925
clear ipv6 neighbors 1037
clear ipv6 statistics 1037
clear isdp counters 313
clear isdp table 314
clear lldp remote-data 562
clear lldp statistics 563
clear logging email statistics 388
clear logging file 1587
clear logging 1587
clear mac address-table 282
clear priority-flow-control statistics 875
clear spanning-tree detected-protocols 701
CLI Command Modes 174
CLI Logged to Local File and Syslog Server 1585
CLI Macro Commands 1379
client-identifier 899
client-name 900
Clock Commands 1389
clock summer-time date 1402
clock summer-time recurring 1401
clock timezone hours-offset 1400
Command Groups 75
Command Groups 76
Command Line Configuration Scripting Commands 1407
Command Line Interface Scripting 1413
common-name 1680
compatible rfc1583 1163
Configurable Minimum Password Length 1463
Configuration and Image File Commands 1413
configuration 1353
configure terminal 1461
conform-color 624

copy 1415
cos-queue min-bandwidth 625
cos-queue random-detect 626
cos-queue strict 627
country 1681
crypto certificate generate 1682
crypto certificate import 1683
crypto certificate request 1685
crypto key generate dsa 1573
crypto key generate rsa 1574
crypto key pubkey-chain ssh 1575
cut-through mode 1611
Data Center Bridging Commands 821
Data Center Bridging Exchange Protocol 821
Data Center Technology Commands 115
Data Center Technology Commands 819
datacenter-bridging 826
deadtime 677
debug arp 1512
debug auto-voip 1513
debug cfm 447
debug clear 1513
debug console 1514
debug dhcp packet 344
debug dot1x 1514
debug igmpsnooping 1515
debug ip acl 1516
debug ip dvmrp 1516
debug ip igmp 1517
debug ip mcache 1518
debug ip pimdm packet 1519
debug ip pimsm packet 1520
debug ip vrrp 1520

debug ipv6 dhcp 1521
debug ipv6 mcache 1522
debug ipv6 mld 1522
debug ipv6 pimdm 1523
debug ipv6 pimsm 1524
debug isdp 1525
debug lacp 1526
debug mldsnooping 1526
debug ospf 1527
debug ospfv3 1528
debug ping 1528
debug rip 1529
debug sflow 1530
debug spanning-tree 1530
debug vrrp 1531
Default Routes 992
default-information originate 1164
default-information originate 1231
default-information originate 1286
default-metric 1165
default-metric 1232
default-metric 1287
default-router 901
delete backup-config 1422
delete backup-image 1422
delete startup-config. 1423
delete 1421
Denial of Service Commands 1435
deny (management) 1454
deny | permit (IP ACL) 268
deny | permit (Mac-Access-List-Configuration) 270
depends-on 557
description 1588

description. 397
dhcp l2relay (Global Configuration) 325
dhcp l2relay (Interface Configuration) 326
dhcp l2relay circuit-id. 327
dhcp l2relay remote-id 328
dhcp l2relay trust 328
dhcp l2relay vlan. 329
DHCP Layer 2 Relay Commands. 325
DHCP Management Interface Commands 341
DHCP Server and Relay Agent Commands 893
DHCP Snooping Commands 349
DHCPv6 Commands 925
diffserv 628
dir 1424
distance ospf 1166
distance ospf 1233
distance rip 1287
distribute-list out. 1167
distribute-list out. 1288
dns-server (IP DHCP Pool Config) 902
dns-server (IPv6 DHCP Pool Config) 926
do 1461
domain-name (IP DHCP Pool Config). 903
domain-name (IPv6 DHCP Pool Config). 926
dos-control firstfrag 1437
dos-control icmp 1437
dos-control l4port 1438
dos-control sipdip 1439
dos-control tcpflag 1440
dos-control tcpfrag 1440
dot1x dynamic-vlan enable. 789
dot1x guest-vlan 813
dot1x initialize 790

dot1x mac-auth-bypass 790
dot1x max-req 791
dot1x max-users 792
dot1x port-control 793
dot1x re-authenticate 794
dot1x reauthentication 795
dot1x system-auth-control monitor 795
dot1x timeout guest-vlan-period 796
dot1x timeout quiet-period 797
dot1x timeout re-authperiod 798
dot1x timeout server-timeout 799
dot1x timeout supp-timeout 800
dot1x timeout tx-period 801
dot1x unauth-vlan 814
Double VLAN Mode 731
drop 629
duplex 398
duration 1686
dvlan-tunnel ethertype 734
DVMRP Commands 943
Dynamic ARP Inspection Commands 365
Email Alerting Commands 379
enable authentication 244
enable password encrypted 1477
enable password 245
enable 1168
enable 1234
enable 1289
enable 1348
enable 1353
enable 1675
encapsulation 993
end 1676

Enhanced LAG Hashing 596
Entering and Editing CLI Commands 165
erase 1425
ethernet cfm cc level 434
Ethernet CFM Commands 431
ethernet cfm domain 432
ethernet cfm mep active 437
ethernet cfm mep archive-hold-time 438
ethernet cfm mep enable 436
ethernet cfm mep level 435
ethernet cfm mip level 438
Ethernet Configuration Commands 395
exec-banner 1611
exec-timeout 1447
exit (mst) 701
exit 1676
exit-overflow-interval 1169
exit-overflow-interval 1235
external-lsdb-limit 1170
external-lsdb-limit 1235
feature fip-snooping 841
File System Commands 1413
filedescr 1425
FIP Snooping Commands 839
fip-snooping enable 842
fip-snooping fc-map 843
fip-snooping port-mode 844
Flexible Assignment of Ports to LAGs 597
flowcontrol 399
Forwarding of OSPF Opaque LSAs Enabled by Default . . . 1141
garp timer 452
Graceful Restart 1142
group 1354

Guest VLAN 787
GVRP Commands 451
gvrp enable (global) 453
gvrp enable (interface) 454
gvrp registration-forbid 455
gvrp vlan-creation-forbid 456
hardware-address 904
hashing-mode 600
history size 1449
history 1448
host 905
hostname 1612
hostroutesaccept 1290
http port 1349
https port 1349
IGMP Commands 951
IGMP Proxy Commands 965
IGMP Snooping Commands 461
IGMP Snooping Querier Commands 475
Independent VLAN Learning 732
instance (mst) 702
interface loopback 1089
interface port-channel 599
interface range port-channel 599
interface range vlan 736
interface range 400
Interface Tracking 1309
interface tunnel 1302
interface vlan 735
interface 1355
interface 399
Interoperability with IEEE DCBX 822
Introduction 165

Introduction. 75
ip access-group 272
ip address (Out-of-Band) 485
ip address dhcp (Interface Config) 487
ip address 993
ip address-conflict-detect run 486
IP Addressing Commands 483
ip arp inspection filter. 367
ip arp inspection limit 367
ip arp inspection trust 368
ip arp inspection validate 369
ip arp inspection vlan 370
ip default-gateway 488
ip dhcp bootp automatic 906
ip dhcp conflict logging 906
ip dhcp excluded-address 907
ip dhcp ping packets 908
ip dhcp pool 894
ip dhcp relay information check 977
ip dhcp relay information check-reply 978
ip dhcp relay information option 979
ip dhcp relay information option-insert 980
ip dhcp snooping binding 352
ip dhcp snooping database write-delay. 354
ip dhcp snooping database 353
ip dhcp snooping limit 355
ip dhcp snooping log-invalid 356
ip dhcp snooping trust. 356
ip dhcp snooping verify mac-address 357
ip dhcp snooping. 351
ip domain-lookup 490
ip domain-name 490
ip dvmrp metric. 944

ip dvmrp 943
ip helper enable 985
IP Helper/DHCP Relay Commands 973
ip helper-address (global configuration) 981
ip helper-address (interface configuration) 983
ip host 491
ip http authentication 246
ip http port 1686
ip http secure-certificate 1688
ip http secure-port 1689
ip http secure-server 1689
ip http server 1687
ip https authentication 247
ip icmp echo-reply 1441
ip icmp error-interval 1442
ip igmp last-member-query-count 953
ip igmp last-member-query-interval 954
ip igmp query-interval 955
ip igmp query-max-response-time 956
ip igmp robustness 956
ip igmp snooping (global) 462
ip igmp snooping (interface) 463
ip igmp snooping (VLAN) 469
ip igmp snooping fast-leave 470
ip igmp snooping groupmembership-interval 471
ip igmp snooping host-time-out 464
ip igmp snooping leave-time-out 464
ip igmp snooping maxresponse 472
ip igmp snooping mcrtrexpiretime 473
ip igmp snooping mrouter-time-out 465
ip igmp snooping querier election participate 477
ip igmp snooping querier query-interval 478
ip igmp snooping querier timer expiry 479

ip igmp snooping querier version 479
ip igmp snooping querier 475
ip igmp startup-query-count 957
ip igmp startup-query-interval 958
ip igmp version 959
ip igmp 952
ip igmp-proxy reset-status 966
ip igmp-proxy unsolicited-report-interval 967
ip igmp-proxy 965
ip irdp address. 1277
ip irdp holdtime. 1278
ip irdp maxadvertinterval 1279
ip irdp minadvertinterval 1280
ip irdp multicast 1281
ip irdp preference 1282
ip irdp 1275
ip local-proxy-arp 890
ip mcast boundary. 1095
ip mroute. 1095
ip mtu 995
ip multicast ttl-threshold. 1097
ip multicast 1096
ip name-server 492
ip netdirbcast. 996
ip ospf area 1171
ip ospf authentication 1172
ip ospf cost 1173
ip ospf dead-interval 1173
ip ospf hello-interval. 1174
ip ospf mtu-ignore. 1175
ip ospf network 1176
ip ospf priority 1177
ip ospf retransmit-interval. 1177

ip ospf transmit-delay 1178
ip pim bsr-border 1099
ip pim bsr-candidate. 1099
ip pim dense 1101
ip pim dr-priority 1101
ip pim hello-interval. 1102
ip pim join-prune-interval 1103
ip pim register-rate-limit 1104
ip pim rp-address 1104
ip pim rp-candidate 1105
ip pim sparse 1106
ip pim spt-threshold 1108
ip pim ssm 1107
ip pim 1098
ip proxy-arp 890
ip redirects 1443
ip rip authentication 1291
ip rip receive version 1292
ip rip send version 1293
ip rip 1290
ip route default 998
ip route distance 999
ip route 997
IP Routing Commands 991
ip routing 1000
IP Source Guard Commands 535
ip ssh port 1576
ip ssh pubkey-auth 1577
ip ssh server 1577
IP Subnet Based VLANs 733
ip telnet port 1662
ip telnet server disable 1661
ip unreachables. 1443

ip verify binding 537
ip verify source port-security 536
ip verify source 535
ip vrrp accept-mode 1329
ip vrrp 1310
IPv6 Access List Commands 505
ipv6 access-list rename 509
ipv6 access-list 508
ipv6 address (Interface Config) 493
ipv6 address (OOB Port) 494
ipv6 address dhcp 496
ipv6 address 1038
ipv6 dhcp pool 927
ipv6 dhcp relay 928
ipv6 dhcp server 929
ipv6 enable (Interface Config) 497
ipv6 enable (OOB Config) 497
ipv6 enable 1039
ipv6 gateway (OOB Config). 498
ipv6 hop-limit 1040
ipv6 host 1041
ipv6 icmp error-interval 1444
IPv6 Limitations & Restrictions 1035
ipv6 mld last-member-query-count 1041
ipv6 mld last-member-query-interval 1042
ipv6 mld query-interval 1045
ipv6 mld query-max-response-time 1046
ipv6 mld router 1046
ipv6 mld snooping (Global) 519
ipv6 mld snooping (Interface) 520
ipv6 mld snooping (VLAN) 521
IPv6 MLD Snooping Commands 515
ipv6 mld snooping groupmembership-interval. 517

ipv6 mld snooping immediate-leave 516
ipv6 mld snooping maxresponse 517
ipv6 mld snooping mcrtexpiretime 518
ipv6 mld snooping querier (VLAN mode). 528
ipv6 mld snooping querier address 529
IPv6 MLD Snooping Querier Commands 527
ipv6 mld snooping querier election participate 530
ipv6 mld snooping querier query-interval 530
ipv6 mld snooping querier timer expiry. 531
ipv6 mld snooping querier 528
ipv6 mld-proxy reset-status 1043
ipv6 mld-proxy unsolicit-rprt-interval 1044
ipv6 mld-proxy. 1043
ipv6 mtu 1047
IPv6 Multicast Commands. 1123
ipv6 nd dad attempts 1048
ipv6 nd managed-config-flag. 1049
ipv6 nd ns-interval 1050
ipv6 nd other-config-flag 1051
ipv6 nd prefix. 1051
ipv6 nd ra-interval 1053
ipv6 nd ra-lifetime 1054
ipv6 nd reachable-time. 1054
ipv6 nd suppress-ra 1055
ipv6 ospf area. 1237
ipv6 ospf cost 1238
ipv6 ospf dead-interval 1239
ipv6 ospf hello-interval 1239
ipv6 ospf mtu-ignore 1240
ipv6 ospf network 1241
ipv6 ospf priority 1242
ipv6 ospf retransmit-interval 1243
ipv6 ospf transmit-delay 1244

ipv6 ospf 1236
ipv6 pim bsr-border 1017
ipv6 pim bsr-candidate 1018
IPv6 PIM Commands 1015
ipv6 pim dense 1016
ipv6 pim dr-priority 1019
ipv6 pim hello-interval 1020
ipv6 pim join-prune-interval 1020
ipv6 pim register-rate-limit 1021
ipv6 pim rp-address 1022
ipv6 pim rp-candidate 1023
ipv6 pim sparse (Global config) 1016
ipv6 pim spt-threshold 1024
ipv6 pim ssm 1025
ipv6 pim 1015
ipv6 pimsm (Global config) 1123
ipv6 pimsm (VLAN Interface config) 1124
ipv6 pimsm bsr-border 1124
ipv6 pimsm bsr-candidate 1125
ipv6 pimsm dr-priority 1126
ipv6 pimsm hello-interval 1127
ipv6 pimsm join-prune-interval 1127
ipv6 pimsm register-threshold 1128
ipv6 pimsm rp-address 1129
ipv6 pimsm rp-candidate 1130
ipv6 pimsm spt-threshold 1130
ipv6 pimsm ssm 1131
ipv6 route distance 1057
ipv6 route 1056
ipv6 router ospf 1244
IPv6 Routing Commands 1035
ipv6 traffic-filter 510
ipv6 unicast-routing 1058

ipv6 unreachables. 1445
iscsi aging time 542
iscsi cos 543
iscsi enable 545
iSCSI Optimization Commands. 541
iscsi target port 546
isdp advertise-v2 314
isdp enable 315
isdp holdtime 316
isdp timer 317
key 678
key 772
key-generate 1690
key-string 1578
lacp port-priority 601
lacp system-priority 602
lacp timeout 603
LAG Hashing 595
LAG Thresholds. 594
Layer 2 ACLs. 616
Layer 2 Commands 81
Layer 2 Switching Commands. 233
Layer 3 Commands 117
Layer 3 Commands 879
Layer 3/4 IPv4 ACLs 616
lease 909
level 1589
Line Commands 1447
line 1449
Link Dependency Commands 553
link-dependency group. 554
LLDP Commands 561
lldp dcbx port-role 829

lldp dcbx version. 826
lldp notification. 564
lldp notification-interval 564
lldp receive 565
lldp timers 566
lldp tlv-select dcbxp 828
lldp transmit 567
lldp transmit-mgmt 568
lldp transmit-tlv 568
Local 802.1X Authentication Server 785
locale. 1355
locate. 1613
location 1691
logging audit 1593
logging buffered 1594
logging cli-command 1589
logging console. 1595
logging email from-addr 385
logging email logtime. 386
logging email message-type subject 385
logging email message-type to-addr. 384
logging email test message-type. 387
logging email urgent. 382
logging email 380
logging file 1596
logging on. 1597
logging snmp 1598
logging traps 383
logging web-session 1598
logging 1591
login authentication 248
login-banner 1614
Loopback Interface Commands 1089

mac access-group 273
mac access-list extended rename 275
mac access-list extended 274
mac address-table aging-time 283
mac address-table multicast filtering 284
mac address-table multicast forbidden address 285
mac address-table multicast forbidden forward-unregistered 286
mac address-table multicast forward-all 287
mac address-table multicast forward-unregistered 288
mac address-table multicast static 289
mac address-table static 291
MAC Authentication Bypass 786
MAC-Based VLANs 733
macro apply 1384
macro description 1386
macro global apply 1381
macro global description 1383
macro global trace 1382
macro name 1380
macro trace 1385
mail-server ip-address | hostname 390
management access-class 1455
management access-list 1456
Management ACL Commands 1453
Manual Aggregation of LAGs 597
Manual Aggregation of LAGs 597
mark cos 630
mark ip-dscp 630
mark ip-precedence 631
match class-map 632
match cos 633
match destination-address mac 634
match dstip 635

match dstip6 636
match dstl4port 636
match ethertype 637
match ip dscp 639
match ip precedence 640
match ip tos 640
match ip6flowlbl 638
match protocol 641
match source-address mac 642
match srcip 643
match srcip6 644
match srcl4port 644
match vlan 645
maximum-paths 1179
maximum-paths 1245
media-type 1614
member 1616
mirror 646
Mode Commands 1461
mode dvlan-tunnel 737
Mode Types 79
monitor session 612
motd-banner 1617
msgauth 678
mtu 402
Multicast Commands 1093
Multicast VLAN Registration Commands 577
mvr group 579
mvr immediate 582
mvr mode 580
mvr querytime 580
mvr type 583
mvr vlan group 585

mvr vlan 582
mvr 578
name (Captive Portal) 1356
name (mst) 704
name (RADIUS server) 679
name (VLAN Configuration). 738
netbios-name-server. 910
netbios-node-type. 911
network area. 1180
network 912
next-server 913
no clock summer-time 1403
no clock timezone 1400
no user 1365
Notes 2
nsf helper strict-lsa-checking 1182
nsf helper strict-lsa-checking 1248
nsf helper 1181
nsf helper 1247
nsf restart-interval 1183
nsf restart-interval 1248
nsf. 1246
option 914
organization-unit 1692
OSPF Commands. 1139
OSPF Equal Cost Multipath (ECMP) 1140
OSPFv3 Commands. 1215
Passive Interfaces. 1141
passive-interface default 1184
passive-interface default 1250
passive-interface 1184
passive-interface 1249
password (aaa IAS User Configuration) 249

password (Line Configuration) 250
password (Mail Server Configuration Mode) 392
password (User EXEC) 251
Password Aging 1463
Password History 1463
Password Management Commands 1463
Password Strength 1464
passwords aging 1466
passwords history 1466
passwords lock-out 1467
passwords min-length 1468
passwords strength exclude-keyword 1476
passwords strength max-limit consecutive-characters 1473
passwords strength max-limit repeated-characters 1474
passwords strength minimum character-classes 1475
passwords strength minimum lowercase-letters 1471
passwords strength minimum numeric-characters 1472
passwords strength minimum special-characters 1473
passwords strength minimum uppercase-letters 1470
passwords strength-check 1469
periodic 1669
permit (management) 1457
permit ip host mac host 371
PHY Diagnostics Commands 1481
ping ethernet cfm 439
ping ipv6 interface 1060
ping ipv6 1059
ping 1617
Pingable VRRP Commands 1329
Pingable VRRP Interface 1307
police-simple 647
policy-map 648
port (Mail Server Configuration Mode) 391

Port Channel Commands 593
Port Channels 594
Port Monitor Commands 611
Port Roles 822
port security max 293
port security 292
port 1599
port 773
port-channel min-links 603
prefix-delegation 930
primary 680
Priority Flow Control Commands 871
priority 681
priority 773
priority-flow-control mode 872
priority-flow-control priority 873
Protocol Based VLANs 732
protocol group 739
protocol vlan group all 741
protocol vlan group 740
protocol 1357
QoS Commands 615
Queue Mapping 617
quit 1677
RADIUS Commands 671
RADIUS-based Dynamic VLAN Assignment 788
radius-server attribute 4 816
radius-server deadtime 682
radius-server host 683
radius-server key 684
radius-server retransmit 685
radius-server source-ip 685
radius-server timeout 686

Real-time Clock 1389
redirect 1357
redirect 649
redirect-url 1358
redistribute 1185
redistribute 1251
redistribute 1294
release dhcp 342
reload 1619
rename. 1426
renew dhcp 343
retransmit 687
revision (mst) 705
rmon alarm 1485
rmon collection history 1488
RMON Commands 1485
rmon event 1489
Route Preferences 1140
Route Tracking 1309
Router Discovery Protocol Commands 1275
router ospf 1187
router rip 1295
router-id 1186
router-id 1251
Routing Information Protocol Commands 1285
routing 1001
script apply 1407
script delete 1408
script list 1409
script show 1409
script validate 1410
sdm prefer 1505
SDM Templates Commands 1505

security 389
service dhcp 918
service dhcpv6 932
service 433
Serviceability Tracing Packet Commands 1511
service-acl input 276
service-policy 650
session-timeout 1358
set description 1620
Setting Up FIP Snooping 839
Sflow Commands 1533
sflow destination 1533
sflow polling (Interface Mode) 1536
sflow polling 1535
sflow sampling (Interface Mode) 1538
sflow sampling 1537
show aaa ias-users 252
show aaa servers 688
show arp access-list 372
show arp 891
show authentication methods 253
show auto-copy-sw 1341
show backup-config 1427
show banner 1622
show boot 1342
show bootvar 1428
show boot-version 1623
show bridge multicast address-table count 1109
show captive-portal client status 1360
show captive-portal configuration client status 1361
show captive-portal configuration interface 1372
show captive-portal configuration locales 1373
show captive-portal configuration status 1374

show captive-portal configuration 1371
show captive-portal interface client status 1362
show captive-portal interface configuration status 1364
show captive-portal status. 1351
show captive-portal user 1366
show captive-portal. 1350
show checkpoint statistics. 1624
show class-map 651
show classofservice dot1p-mapping 653
show classofservice ip-dscp-mapping 654
show classofservice trust 657
show clock 1404
show copper-ports tdr 1481
show crypto certificate mycertificate 1692
show crypto key mypubkey 1580
show crypto key pubkey-chain ssh 1581
show cut-through mode 1625
show debugging 1531
show dhcp l2relay agent-option vlan 334
show dhcp l2relay all 330
show dhcp l2relay circuit-id vlan 336
show dhcp l2relay interface 331
show dhcp l2relay remote-id vlan. 337
show dhcp l2relay stats interface 332
show dhcp l2relay subscription interface 333
show dhcp l2relay vlan 335
show dhcp lease 345
show diffserv service brief 661
show diffserv service interface port-channel 660
show diffserv service interface 659
show diffserv 658
show dos-control. 1445
show dot1x advanced 815

show dot1x authentication-history 803
show dot1x clients 805
show dot1x interface 807
show dot1x statistics 809
show dot1x users 811
show dot1x 802
show dvlan-tunnel interface 743
show dvlan-tunnel 742
show ethernet cfm domain 442
show ethernet cfm errors 442
show ethernet cfm maintenance-points local 443
show ethernet cfm maintenance-points remote 444
show ethernet cfm statistics 446
show fiber-ports optical-transceiver 1482
show fip-snooping enode 847
show fip-snooping fcf 849
show fip-snooping sessions 852
show fip-snooping statistics 860
show fip-snooping vlan 867
show fip-snooping 845
show gvrp configuration 456
show gvrp error-statistics 458
show gvrp statistics 459
show hosts 499
show interfaces advanced firmware 1626
show interfaces advertise 403
show interfaces configuration 404
show interfaces cos-queue 662
show interfaces counters 406
show interfaces description 409
show interfaces detail 410
show interfaces loopback 1090
show interfaces media-type 1627

show interfaces port-channel 604
show interfaces priority-flow-control 875
show interfaces random-detect 664
show interfaces status 413
show interfaces switchport 744
show interfaces tunnel 1302
show ip access-lists 278
show ip address-conflict 500
show ip arp inspection vlan 375
show ip arp inspection 372
show ip brief 1001
show ip dhcp binding 919
show ip dhcp conflict 920
show ip dhcp global configuration 921
show ip dhcp pool 922
show ip dhcp relay 987
show ip dhcp server statistics 922
show ip dhcp snooping binding 359
show ip dhcp snooping database 360
show ip dhcp snooping interfaces 361
show ip dhcp snooping statistics 362
show ip dhcp snooping 358
show ip dvmrp interface 946
show ip dvmrp neighbor 946
show ip dvmrp nexthop 947
show ip dvmrp prune 948
show ip dvmrp route 949
show ip dvmrp 945
show ip helper statistics 988
show ip helper-address 501
show ip helper-address 986
show ip http server secure status 1694
show ip http server status 1694

show ip igmp groups 960
show ip igmp interface stats 963
show ip igmp interface 961
show ip igmp membership 963
show ip igmp snooping groups 467
show ip igmp snooping interface 468
show ip igmp snooping mrouter 469
show ip igmp snooping querier 480
show ip igmp snooping 466
show ip igmp 959
show ip igmp-proxy groups detail 970
show ip igmp-proxy groups 970
show ip igmp-proxy interface 969
show ip igmp-proxy 968
show ip interface 1002
show ip irdp 1282
show ip mcast boundary 1111
show ip mcast mroute group 1113
show ip mcast mroute source 1114
show ip mcast mroute static 1115
show ip mcast mroute 1113
show ip multicast interface 1112
show ip multicast 1110
show ip ospf abr 1193
show ip ospf area 1194
show ip ospf asbr 1196
show ip ospf database database-summary 1200
show ip ospf database 1197
show ip ospf interface brief 1204
show ip ospf interface stats 1204
show ip ospf interface 1202
show ip ospf neighbor 1205
show ip ospf range 1208

show ip ospf statistics 1209
show ip ospf stub table 1210
show ip ospf virtual-link 1211
show ip ospf virtual-links brief 1212
show ip ospf 1188
show ip pim bsr-router 1116
show ip pim interface 1117
show ip pim neighbor 1119
show ip pim rp hash 1120
show ip pim rp mapping 1121
show ip protocols 1005
show ip rip interface brief 1298
show ip rip interface 1297
show ip rip 1296
show ip route configured 1008
show ip route preferences 1009
show ip route summary 1010
show ip route 1006
show ip source binding 538
show ip ssh 1582
show ip telnet 1663
show ip traffic 1011
show ip verify interface 537
show ip verify source interface 538
show ip vlan 1013
show ip vrrp interface 1330
show ipv6 access-lists 511
show ipv6 brief 1061
show ipv6 dhcp binding 933
show ipv6 dhcp interface (Privileged EXEC) 936
show ipv6 dhcp interface (User EXEC) 934
show ipv6 dhcp interface out-of-band statistics 502
show ipv6 dhcp pool 939

show ipv6 dhcp statistics 940
show ipv6 dhcp 933
show ipv6 interface management statistics 1064
show ipv6 interface out-of-band 503
show ipv6 interface 1062
show ipv6 mld groups 1066
show ipv6 mld interface. 1069
show ipv6 mld snooping groups 523
show ipv6 mld snooping querier 532
show ipv6 mld snooping 522
show ipv6 mld traffic 1077
show ipv6 mld-proxy groups detail 1074
show ipv6 mld-proxy groups 1073
show ipv6 mld-proxy interface 1076
show ipv6 mld-proxy 1071
show ipv6 neighbors 1079
show ipv6 ospf abr 1256
show ipv6 ospf area 1257
show ipv6 ospf asbr 1258
show ipv6 ospf border-routers 1259
show ipv6 ospf database database-summary 1262
show ipv6 ospf database 1259
show ipv6 ospf interface brief 1265
show ipv6 ospf interface stats 1266
show ipv6 ospf interface vlan 1267
show ipv6 ospf interface 1263
show ipv6 ospf neighbor 1269
show ipv6 ospf range 1270
show ipv6 ospf stub table. 1271
show ipv6 ospf virtual-link brief 1273
show ipv6 ospf virtual-links. 1272
show ipv6 ospf 1252
show ipv6 pim bsr-router 1027

show ipv6 pim interface 1028
show ipv6 pim neighbor 1030
show ipv6 pim rp hash 1032
show ipv6 pim rp mapping 1033
show ipv6 pimsm bsr 1133
show ipv6 pimsm interface 1134
show ipv6 pimsm neighbor 1135
show ipv6 pimsm rp mapping 1137
show ipv6 pimsm rphash 1136
show ipv6 pimsm 1026
show ipv6 pimsm 1132
show ipv6 route preferences 1081
show ipv6 route summary 1082
show ipv6 route 1080
show ipv6 traffic 1083
show ipv6 vlan 1086
show iscsi sessions 549
show iscsi 548
show isdp entry 318
show isdp interface 320
show isdp neighbors 321
show isdp traffic 323
show isdp 317
show lacp 605
show line 1450
show link-dependency 558
show lldp dcbx 832
show lldp interface 570
show lldp local-device 571
show lldp remote-device 573
show lldp statistics 574
show lldp tlv-select 830
show lldp 569

show logging email statistics 388
show logging file 1601
show logging 1600
show mac access-list 279
show mac address-table address 297
show mac address-table count 298
show mac address-table dynamic. 299
show mac address-table filtering 295
show mac address-table interface 301
show mac address-table multicast 293
show mac address-table static 302
show mac address-table vlan 303
show mac address-table 296
show mail-server 393
show management access-class 1459
show management access-list 1460
show memory cpu 1628
show monitor session. 613
show mvr interface. 589
show mvr members 588
show mvr traffic. 591
show mvr 586
show parser macro 1386
show passwords configuration. 1477
show passwords result 1479
show policy-map interface. 666
show policy-map 665
show port protocol 748
show ports security addresses 305
show ports security 304
show power-usage-history 1628
show process cpu 1630
show radius statistics 691

show rmon alarm 1490
show rmon alarms 1492
show rmon collection history 1493
show rmon events 1494
show rmon history 1495
show rmon log 1499
show rmon statistics 1500
show running-config 1429
show sdm prefer 1507
show service-acl interface 277
show service-policy 667
show sessions 1632
show sflow agent 1539
show sflow destination 1540
show sflow polling 1541
show sflow sampling 1542
show slot 1633
show snmp engineID 1547
show snmp filters 1548
show snmp group 1549
show snmp user 1550
show snmp views 1552
show snmp 1545
show sntp configuration 1390
show sntp server 1391
show sntp status 1393
show spanning-tree summary 709
show spanning-tree 705
show startup-config 1430
show statistics port-channel 607
show statistics switchport 419
show statistics 414
show storm-control 421

show supported cardtype 1634
show supported switchtype 1636
show switch 1638
show switchport protected 428
show switchport voice 308
show syslog-servers 1602
show system id 1647
show system power 1648
show system temperature 1649
show system 1646
show tacacs 774
show tech-support 1650
show time-range 1671
show trapflags 1553
show users accounts 254
show users login-history 256
show users 1652
show version 1653
show vlan association mac 750
show vlan association subnet 751
show vlan 749
show voice vlan 782
show vrrp interface brief 1327
show vrrp interface stats 1328
show vrrp interface 1325
show vrrp 1322
shutdown 422
Simple Network Time Protocol 1389
slot 1621
SNMP Commands 1545
snmp-server community 1555
snmp-server community-group 1557
snmp-server contact 1558

snmp-server enable traps 1558
snmp-server engineID local 1561
snmp-server filter 1562
snmp-server group 1564
snmp-server host. 1565
snmp-server location. 1567
snmp-server user. 1568
snmp-server v3-host 1571
snmp-server view 1569
sntp authenticate 1394
sntp authentication-key. 1395
sntp broadcast client enable 1396
sntp client poll timer. 1396
sntp server. 1397
sntp trusted-key. 1398
sntp unicast client enable 1399
sntp 918
source-ip 695
Spanning Tree Commands 699
spanning-tree auto-portfast. 712
spanning-tree bpdu flooding. 712
spanning-tree bpdu-protection 713
spanning-tree cost. 714
spanning-tree disable 715
spanning-tree forward-time 716
spanning-tree guard 717
spanning-tree loopguard 717
spanning-tree max-age 718
spanning-tree max-hops 719
spanning-tree mode. 720
spanning-tree mst configuration 720
spanning-tree mst cost 721
spanning-tree mst port-priority. 722

spanning-tree mst priority 723
spanning-tree portfast bpdufilter default 725
spanning-tree portfast default 726
spanning-tree portfast. 724
spanning-tree port-priority 727
spanning-tree priority. 728
spanning-tree tcnguard. 728
spanning-tree transmit hold-count 729
spanning-tree 711
speed 1452
speed 423
split-horizon 1299
SSH Commands. 1573
stack 1654
Starting the CLI 187
state 1696
Static LAGS 593
Static Reject Routes 992
Static Routes/ECMP Static Routes 991
storm-control broadcast 424
storm-control multicast 425
storm-control unicast 426
switchport access vlan 752
switchport forbidden vlan 753
switchport general acceptable-frame-type tagged-only 754
switchport general allowed vlan 754
switchport general ingress-filtering disable 755
switchport general pvid 756
switchport mode. 757
switchport protected name 428
switchport protected. 427
switchport trunk 758
switchport voice detect auto. 310

Syslog Commands 1585
System Management Commands 1605
TACACS+ Commands 771
tacacs-server host 775
tacacs-server key 776
tacacs-server timeout 777
Telnet Server Commands 1661
telnet 1655
Terminal Length Commands 1665
terminal length 1665
test copper-port tdr 1483
Time Ranges Commands 1667
timeout 696
timeout 777
time-range 1667
timers spf 1213
traceroute ethernet cfm 440
traceroute ipv6 1086
traceroute 1658
traffic-shape 668
tunnel destination 1303
Tunnel Interface Commands 1301
tunnel mode ipv6ip 1304
tunnel source 1305
update bootcode 1432
usage 697
user group moveusers 1376
user group name 1376
user group 1367
user group 1375
User Interface Commands 1675
User Lockout 1463
user name 1369

user password 1369
user session-timeout 1370
user-key 1583
user-logout 1368
username (Mail Server Configuration Mode) 391
username password encrypted 258
username unlock 260
username 257
Using CLI Functions and Tools 195
Using the CLI 165
Utility Commands 1333
Utility Commands 143
verification 1359
Virtual Router Redundancy Protocol Commands 1307
Virtual Router Redundancy Protocol Commands 1310
vlan (Global Config) 761
vlan association mac 762
vlan association subnet 762
VLAN Commands 731
vlan database 763
vlan makestatic 764
vlan protocol group add protocol 766
vlan protocol group name 767
vlan protocol group remove 767
vlan protocol group 765
vlan routing 768
vlan 760
VLANs and LAGs 594
voice vlan (Interface) 780
Voice VLAN Commands 779
voice vlan data priority 782
voice vlan 780
vrrp accept-mode 1310

vrrp authentication 1311
vrrp description 1312
vrrp ip 1313
vrrp mode 1314
vrrp preempt 1315
vrrp priority 1316
VRRP Route/Interface Tracking 1308
vrrp timers advertise 1317
vrrp timers learn 1318
vrrp track interface 1319
vrrp track ip route 1320
Web Server Commands 1679
Web Sessions 1679
write 1433

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