Release Notes for the DELL PowerEdge FN I/O Aggregator

Dell Networking OS Version 9.6(0.0) October 2014
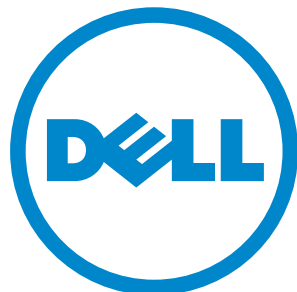
Table of Contents

For more information on hardware and software features, commands, and capabilities, refer to the Dell Networking website at www.dell.com/networking.

How To Use This Document

This document contains information on open and resolved caveats and operational information specific to the Dell Networking OS on the Dell PowerEdge FN I/O Aggregator.

Caveats are unexpected or incorrect behavior, and are listed in order of Problem Report (PR) number within the appropriate sections.

> Note: Customers can subscribe to caveat update reports or use the BugTrack search tool to read current information about open and closed software caveats. To subscribe or use BugTrack, visit Dell Networking Support at: https://www.force10networks.com/CSPortal20/BugTrack/SearchIssues.aspx. BugTrack currently tracks software caveats opened in Dell Networking OS version 6.2.1.1 and later.

> All Release Notes are available on the Software Center tab of Dell Networking Support. The link to the relevant Release Notes for each software version is next to the link for that version:

> https://www.force10networks.com/CSPortal20/Software/Downloads.aspx

Prerequisites

*   The Dell Chassis Management Controller (CMC) version 1.05 or later is required in a Dell PowerEdge FX2 Server Enclosure to use an FN I/O Aggregator module running Dell Networking OS version 9.4(0.0) or later.

    You can use the CMC out-of-band management interface to access and manage an Aggregator using the Dell Networking OS command-line interface. For more information, refer to the *Dell Chassis Management Controller Firmware User's Guide* on the Dell Support website at http://support.dell.com.

Supported Hardware

Hardware
FN 410S I/O Aggregator: 4x10G SFP+
FN 410T I/O Aggregator: 4x10G Base-T
FN 2210S I/O Aggregator: 4x10G Combo ports with Ethernet and Fibre Channel

> Note: The Aggregator does not support using the cable Cisco SFP-H10GB-ACU10M revision 37-1150-01.

New Dell Networking OS Version 9.6(0.0) Features

The following features have been added to the Dell PowerEdge FN I/O Aggregator with Dell Networking OS Version 9.6(0.0).

Feature	Feature Description
Auto LAG	Auto LAG is supported on the Aggregator in Standalone, Stacking, and VLT modes. By default, auto LAG is enabled. You can enable or disable auto LAG on the server-facing interfaces.
Fibre Channel Interface	The FN 2210S Aggregator functions as a converged enhanced Ethernet (CEE) switch that supports both LAN and storage area network (SAN) traffic using the Fibre Channel protocol. With the default port configurations, to access a SAN fabric, use the first two uplink ports (9 and 10) and to access the LAN network, use the last two uplink ports (11 and 12). However, you can change the Fibre channel ports (9 and 10) to LAN ports using the **port mode** command.
Stacking	Stacking is supported on the FN410S and FN410T Aggregators with ports 9 and 10 as the stack ports. The Aggregator supports both ring and daisy-chain topology and stacking of the same Aggregator type. FN 410S and FN 410T Aggregators support two-unit in-chassis stacking and up to six units stacking across the chassis. An Aggregator auto-configures to operate in Standalone mode. To use an Aggregator in a stack, you must manually configure it using the CLI to operate in Stacking mode.
NPIV Proxy Gateway	The N-port identifier virtualization (NPIV) Proxy Gateway (NPG) feature provides FCoE-FC bridging capability on the FN 2210S Aggregator, allowing server CNAs to communicate with SAN fabrics over the FN 2210S Aggregator.

Important Points to Remember

When an Aggregator is installed in a Dell PowerEdge FX2 server chassis:

- Starting 9.4(0.0) release, only ESC key can be used to break into the BLI/X-loader of the FN I/O Aggregator during boot/reload procedure. For this feature to be effective, the boot selector upgrade needs to be performed as explained in section Upgrading the Dell Networking OS Image.
- FCoE traffic drops/outage will be observed when the DCBx parameters are changed when the Aggregator is operational. Outage will be more with Broadcom CNAs (40 seconds) compared to Intel CNAs (10 seconds). It is recommended to configure all CNAs and the required DCBx parameters before on boarding and making the Aggregator operational.
- Avoid connecting both the switch management interfaces (in band and out of band interfaces) to the same subnet.

Restrictions and Known Issues with Other Devices

- When configuring **CAM ACL** using the **cam-acl l2acl 2 ipv4acl 2 ipv6acl 0 ipv4qos 1 l2qos 2 l2pt 0 ipmacacl 0 vman-qos 0 ecfmacl 2 fcoeacl 4 iscsioptacl 0** command and reloading, the system fails due to a limitation in the BCM SDK 6.3.4.
- Connections between an Aggregator and the following devices are not supported:
  — Cisco fabric extenders (FEXes): Storage deployments are not supported; LAN deployments are supported.
- When an Aggregator interoperates with a Brocade B8000 switch, rebooting the Aggregator results in the B8000 switch generating more PFC frames, which may result in the failure to establish the iSCSI sessions.
- In connections with a server using a Q-LOGIC CNA for converged traffic, a FIP snooping session may flap when non-standard LAN traffic is transmitted with SAN traffic.
- In connections with a server using a Q-LOGIC CNA, FCoE sessions will be cleared when the **keepalive** parameter in fcoe-map is toggled (disabled and enabled).
- In connections with a server using an Intel X520 CNA, the server may fail to boot from the SAN network if a Brocade CNA is also installed in the server.
- If an Intel X520 CNA adapter is used for any DCB connection, follow these steps to establish sessions to send and receive traffic on an Aggregator:

> Note: The interface connected to the Intel X520 CNA adapter must be manually shut/no shut for the full functionality after making the below changes.

Step	Task	Command	Mode
1.	On each server-facing port, enter the following commands in interface configuration mode. The **dcbx version cee** command configures a port to use the CEE (Intel 1.01) version of DCBX. Configure server-facing ports with the **shutdown** and **no shutdown** commands, as needed. For example:		
2.	Display information on FIP-snooped sessions and check the entries in ENode Interface fields to see if you have established the FCoE session on a server-facing port.	**show fip-snooping sessions**	EXEC Privilege

```
Dell# interface tenGigabitEthernet 0/1
Dell(conf-if-te-0/1)# protocol lldp
Dell(conf-lldp)# dcbx version cee
Dell(conf-lldp)# exit
Dell(conf-if-te-0/1)# no shutdown
Dell(conf-if-te-0/1)# exit
Dell#
```

- To ensure interoperability, the recommended LLDP and LACP timeout values that should be configured in devices to which the Aggregator connects (such as ToR switch and servers) are:
  — LLDP timeout: 30 seconds
  — LACP long timeout
- When 68-byte frames are sent at line rate to a server, the server-facing LACP connection may flap. This behavior is due to the server's inability to send LACP control packets when handling incoming line-rate traffic.

- If a Brocade VDX6730 switch is used for any DCB connection, enter the following commands for each port connected from the Aggregator to the Brocade switch:

```
Dell# interface tenGigabitEthernet 0/12
Dell(conf-if-te-0/12)# protocol lldp
Dell(conf-lldp)# dcbx version cee
Dell(conf-lldp)# exit
```

✍ Note: The interfaces or port channel connected to the Brocade switch must be manually shut/no shut after making the above changes. The **dcbx version cee** command configures a port to use the CEE (Intel 1.01) version of DCBX.

Upgrading the Dell Networking OS Image

This section describes the procedure to upgrade Boot Flash and Boot Sector Images in Dell PowerEdge FN I/O Aggregator.

The Aggregator is pre-loaded with default Dell Networking OS. Each Aggregator must be upgraded individually to a new Dell Networking OS release.

✍ Note: The upgrade can also be performed through the Chassis Management Controller (CMC) user interface. Refer to the Dell Chassis Management Controller (CMC) User's Guide on the Dell Support website at http://support.dell.com.

To upgrade the Dell Networking OS, Boot Flash and Boot Selector Images, follow the below steps:

Step	Task	Command	Mode
1.	Dell recommends that you back up your startup configuration and any important files or directories to an external media prior to upgrading the system.		
2.	Upgrade the Dell Networking OS in flash partition A: or B:	**upgrade system [flash: | ftp: | scp: | tftp: | usbflash:] [A:| B:]**	EXEC Privilege

	`Dell# upgrade system ftp: A:`
	`Address or name of remote host []: 10.16.127.35`
	`Source file name []: FTOS-XL-9.6.0.0.bin`
	`User name to login remote host: ftpuser`
	`Password to login remote host:`
	`!!!!!!!!!!!!!!!!!!!!!!!!!!!!!`
	`Erasing IOM Primary Image, please wait`
	`...................................................................................................`
	`...................................................................................................`
	`...................................................................................................`
	`...................................................................................................`
	`...................................................................................................`
	`...................................................................................................`
	`............!`
	`44875621 bytes successfully copied`
	`System image upgrade completed successfully.`
	`Dell#`		

3.	Upgrade the Dell Networking OS for the stacked units.	**upgrade system stack-unit [0-5 | all] [A: | B:]**	EXEC Privilege

If A: is specified in the command, the Dell Networking OS version present in Management unit's A: partition will be pushed.

```
Dell# upgrade system stack-unit 0 A:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Image upgraded to all
Dell#
```

4.	Verify the Dell Networking OS has been upgraded correctly in the upgraded flash partition.	**show boot system stack unit [0-5 | all]**	EXEC Privilege

The Dell Networking OS versions present in A: and B: can be viewed for individual units by specifying the **stack unit id [0-5]** in the command.

```
Dell# show boot system stack-unit 0
Current system image information in the system:
===============================================
Type          Boot Type         A           B
---------------------------------------------------------------
Stack-unit 0  FLASH BOOT      9.6(0.0) 9.3(0.0)[boot]
Dell#
```

5.	Upgrade the FN I/O Aggregator Boot Flash and Boot Selector image.	**upgrade boot [all | bootflash-image | bootselector-image] stack-unit [0-5 | all] [booted | flash: | ftp: | scp: | tftp: | usbflash:] [A: | B:]**	EXEC Privilege

Dell Networking OS version 9.6(0.0) requires FN I/O Aggregator Boot Flash image version 4.0.1.3 and Boot Selector image version 4.0.0.2. If any higher versions of Boot Flash or Boot Selector versions are present in the unit, do not upgrade the Boot Flash and Boot Selector images respectively.

The Boot Flash and Boot Selector images can be upgraded at the same time by specifying **all** in the command. These can be upgraded separately by selecting bootflash-image or bootselector-image respectively.

The Boot Flash and Boot Selector images can be upgraded for individual stack units by specifying the particular stack unit ID from the range [0-5] in the command. These can be upgraded to all the stack units together by selecting all option instead of the stack unit ID.

The Boot Flash and Boot Selector images can be saved in two partitions A: and B: and the user can select the partition to be upgraded by specifying A: or B: in the command.

```
Dell# upgrade boot all stack-unit all ftp: A:
Address or name of remote host []: 10.16.127.35
Destination file name []: FTOS-XL-9.6.0.0.bin
User name to login remote host: ftpuser
Password to login remote host:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Current Boot information in the system:
=============================================
Card       BootFlash      Current Version      New Version
-------------------------------------------------------------------------------------------
Unit0   Boot Flash      4.0.1.1                4.0.1.3
Unit1   Boot Flash      4.0.1.1                4.0.1.3
*****************************************************************************
*  Warning - Upgrading boot flash is inherently risky and should only*
*  be attempted when necessary.  A failure at this upgrade may cause*
*  a board RMA.  Proceed with caution !*
*****************************************************************************
Proceed Boot Flash image for all units [yes/no]: yes
!!!!!!!!!!!!!!!!!
Erasing IOM Primary Bootflash Image, please wait
.!.!.!.!.!.!.!.!..!.......................
Bootflash image upgrade for all completed successfully.
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Current Boot information in the system:
=============================================

Card           BootSelector          Current Version          New Version
---------------------------------------------------------------------------
Unit0          Boot Selector          4.0.0.1                  4.0.0.2
Unit1          Boot Selector          4.0.0.1                  4.0.0.2

*****************************************************************************
*  Warning - Upgrading boot selectors is inherently risky and should *
*  only be attempted when necessary.  A failure at this upgrade may*
*  cause a board RMA.  Proceed with caution ! *
*****************************************************************************

Proceed Boot Selector image for all units [yes/no]: yes
!!!
Erasing IOM Boot Selector Image, please wait
.!!.!...!.!...!.!.......
Bootselector image upgrade for all completed successfully.
Dell#
```

6.	Change the Primary Boot Parameter of the FN I/O Aggregator to the upgraded partition A: or B:	**boot system stack-unit [0-5	all] primary [system A:	system B:	tftp://<URL>]**	CONFIGURATION
7.	Save the configuration so that the configuration will be retained after a reload using **write memory** command.	**write [memory]** In case of a stack setup, the configuration will be saved in the Management as well as the standby units.	EXEC Privilege

```
Dell# write memory
!
Synchronizing data to peer Stack-unit
!!!!!!!!
Dell#
```

8.	Reload the unit.	**reload**	EXEC Privilege

```
Dell# reload

Proceed with reload [confirm yes/no]: yes
Mar 29 21:32:27: %STKUNIT0-M:CP %CHMGR-5-RELOAD: User request to reload the
chassis
syncing disks... done
```

9.	Verify the FN I/O Aggregator has been upgraded to the Dell Networking OS version 9.6(0.0).	**show version**	EXEC Privilege

```
Dell# show version
Dell Real Time Operating System Software
Dell Operating System Version:  2.0
Dell Application Software Version:  9-6(0-180)
Copyright (c) 1999-2014 by Dell Inc. All Rights Reserved.
Build Time: Sun Mar 30 20:15:19 PDT 2014
Build Path: /sites/eqx/work/build/toolSpaces/tools05/E9-4-0/SW/SRC
Dell Networking OS uptime is 1 day(s), 3 hour(s), 57 minute(s)

System image file is "dv-ci-stomp-tc-1-a1"

System Type: PE-FN-410S-IOA
Control Processor: MIPS RMI XLP with 2147483648 bytes of memory, core(s) 1.

128M bytes of boot flash memory.

1 12-port GE/TE (FN)
12 GigabitEthernet/IEEE 802.3 interface(s)

Dell#
```

| 10. | Verify the FN I/O Aggregator has been upgraded to the latest Boot Flash and Boot Selector versions. | **show system stack-unit [0-5]** | EXEC Privilege |

```
Dell# show system stack-unit 0

--  Unit 0 --
Unit Type                 : Management Unit
Status                    : online
Next Boot                 : online
Required Type             : PE-FN-410S-IOA - 12-port GE/TE (FN)
Current Type              : PE-FN-410S-IOA - 12-port GE/TE (FN)
Master priority           : 0
Hardware Rev              : X01
Num Ports                 : 12
Up Time                   : 2 day, 16 hr, 26 min
Dell Networking OS Version : 1-0(0-1864)
Jumbo Capable             : yes
POE Capable               : no
FIPS Mode                 : disabled
Boot Flash                : A: 4.1.1.2b    B: 4.1.1.2c [booted]
Boot Selector             : 4.1.0.1b
Memory Size               : 2147483648 bytes
Temperature               : 59C
Voltage                   : ok
Switch Power              : GOOD
Product Name              : Dell PowerEdge FN 410S IOA
Mfg By                    : DELL
Mfg Date                  : 2013-12-24
Serial Number             : TW000000000014
Part Number               : 07NVPVX01
Piece Part ID             : TW-07NVPV-00000-000-0014
PPID Revision             : X01
Service Tag               : N/A
Expr Svc Code             : N/A
Chassis Svce Tag          : testing
Fabric Id                 : A2
Asset tag                 :
PSOC FW Rev               : 0xd
ICT Test Date             : 0-0-0
ICT Test Info             : 0x0
Max Power Req             : 15360
Fabric Type               : 0x3
Fabric Maj Ver            : 0x1
Fabric Min Ver            : 0x2
SW Manageability          : 0x4
HW Manageability          : 0xd
Max Boot Time             : 3 minutes
Link Tuning               : unsupported
Auto Reboot               : disabled
Burned In MAC             : 00:1e:c9:de:03:7b
No Of MACs                : 3

Dell#
```

Upgrading the CPLD

An Aggregator with Dell Networking OS version 9.6(0.0) or later requires CPLD image **7**.

Verify that a CPLD Upgrade is Required

Figure 1-1. **Verifying the CPLD version**

```
Dell# show revision

--  Stack unit 0 --
IOM SYSTEM CPLD       : 7

--  Stack unit 1 --
IOM SYSTEM CPLD       : 7

--  Stack unit 2 --
IOM SYSTEM CPLD       : 7
```

Figure 1-2. **Display the CPLD Version Included with the Dell Networking OS Image**

```
Dell# show os-version

RELEASE IMAGE INFORMATION :
---------------------------------------------------------------------
       Platform           Version         Size           ReleaseTime
 F-Series:  FN 9.6.0.0     31968831    Jun 23 2012 23:28:46

TARGET IMAGE INFORMATION :
---------------------------------------------------------------------
         Type           Version                    Target     checksum
      runtime        9.6.0.0          Control Processor     passed

BOOT IMAGE INFORMATION :
---------------------------------------------------------------------
         Type          Version                   Target     checksum
   boot flash          4.0.1.3 Control Processor      passed

BOOTSEL IMAGE INFORMATION :
---------------------------------------------------------------------
         Type          Version                   Target     checksum
 boot selector          4.0.0.2 Control Processor      passed

CPLD IMAGE INFORMATION :
---------------------------------------------------------------------
       Card                    CPLD Name     Version
 Stack-unit 0              IOM SYSTEM CPLD        6
 Stack-unit 1              IOM SYSTEM CPLD        6
 Stack-unit 2              IOM SYSTEM CPLD        6
```

Upgrade the CPLD Image

> Note: The **upgrade fpga-image stack-unit 0 booted** command is hidden when using the ? feature in the CLI. However, it is a supported command and will be accepted when entered as documented.

To upgrade the CPLD image on an Aggregator:

Step	Task	Command	Command Mode
1.	Shut down all of the interfaces on the system. Shutting down the ports ensures that the stack-unit power supplies are not disrupted during the upgrade.	**shutdown**	INTERFACE
	Shutting down the ports prior to upgrading ensures that the line card power is not disrupted while the upgrade is taking place. The ports will come back up following the power cycle.		
2.	Upgrade the CPLD image.	**upgrade fpga-image stack-unit {0-5} booted**	EXEC Privilege

```
Dell#upgrade fpga-image stack-unit 0 booted

Current FPGA information in the system:
======================================

  Card                      FPGA Name    Current Version    New Version
-----------------------------------------------------------------------
  Unit0               IOM SYSTEM CPLD                 6              6

    **********************************************************************
    *  Warning - Upgrading FPGA is inherently risky and should          *
    *  only be attempted when necessary.  A failure at this upgrade may  *
    *  cause a board RMA.  Proceed with caution !                        *
    **********************************************************************

Upgrade fpga image for stack-unit 0 [yes/no]: yes


FPGA upgrade in progress!!! Please do NOT power off the unit!!!
!!!!!!!!!!!!!!!

Upgrade result :
================
Unit 0 FPGA upgrade successful. power cycle the stack-unit to complete the
upgrade.

Dell#
```

3.	Power cycle the switch (IO module) using the CMC interface or remove and re-insert the switch (OIR) from the chassis so that the CPLD upgrade takes effect.

Note: The **powercycle stack-unit 0** command does not load the latest CPLD version.

Documentation Errata

The following information has to be captured as a new section in the *Dell PowerEdge FN I/O Aggregator Configuration Guide*:

Isolated Networks

Isolated Networks feature is supported only on the Aggregator in Standalone mode. This feature allows specifying a global list of VLANs to be designated as Isolated networks. Once specified, the servers that belong to these set of VLANs will not be able to communicate to each other directly within the IOA. All traffic from these servers that belong to Isolated network VLANs will be forwarded to the uplink LAG automatically. The only way the servers can communicate to each other is by being routed at the uplink ToR or beyond.

Traffic from the uplink LAG that belong to Isolated network VLANs will be handled the same way as other VLANs, except for unknown unicast and unknown multicast, which will be dropped.

This chapter describes the isolated networks configurations in the Dell Networking OS. To configure isolated-network functionality, use the following commands:

1.   Enable the isolated-network functionality for a particular VLAN or a set of VLANs.

CONFIGURATION mode

io-aggregator isolated-network vlan vlan-range

Dell(conf)#io-aggregator isolated-network vlan 5-10

To disable the isolated-network functionality, use the **no io-aggregator isolated-network vlan vlan-range** command.

2.   View the VLANs that are configured to be part of an isolated network on an Aggregator.

EXEC mode

show io-aggregator isolated-networks

Dell#show io-aggregator isolated-networks

Isolated Network Enabled VLANs : 5-10

Caveats

The following sections describe problem report (PR) types, and list open, closed, and rejected PRs:

- Caveat Definitions
- Resolved H/W Caveats for the FN I/O Aggregator
- Resolved S/W Caveats for the FN I/O Aggregator in Dell Networking OS 9.6(0.0)
- Open S/W Caveats for the FN I/O Aggregator in Dell Networking OS 9.6(0.0)

> ✍ Note: Customers can subscribe to caveat update reports or use the BugTrack search tool to read current information about open and closed software caveats. Visit the BugTrack tool on Dell Networking Support. BugTrack currently tracks software caveats opened in Dell Networking OS version 6.2.1.1 and later.
>
> All Release Notes are available on the Software Center tab of Dell Networking Support. The link to the relevant Release Notes for each software version is next to the link for that version.

Caveat Definitions

Category	Description
PR#	Problem Report number that identifies the caveat.
Severity	S1—Crash: A software crash occurs in the kernel or a running process that requires a restart of the router or process. S2—Critical: A caveat that renders the system or a major feature unusable, which can have a pervasive impact on the system or network, and for which there is no workaround acceptable to the customer. S3—Major: A caveat that effects the functionality of a major feature or negatively effects the network for which there exists a workaround that is acceptable to the customer. S4—Minor: A cosmetic caveat or a caveat in a minor feature with little or no network impact for which there might be a workaround.
Synopsis	Synopsis is the title or short description of the caveat.
Release Notes	Release Notes description contains more detailed information about the caveat.
Workaround	Workaround describes a mechanism for circumventing, avoiding, or recovering from the caveat. It might not be a permanent solution. Caveats listed in the "Closed Caveats" section should not be present, and the workaround is unnecessary, as the version of code for which this release note is documented has resolved the caveat.

Resolved H/W Caveats for the FN I/O Aggregator

None

Resolved S/W Caveats for the FN I/O Aggregator in Dell Networking OS 9.6(0.0)

None

Open S/W Caveats for the FN I/O Aggregator in Dell Networking OS 9.6(0.0)

CLI (Open)

PR# 142236

Severity: S2
Synopsis: In SMUX stack, member unit ports could come up as "no shut" after reload even if startup-config has "shutdown" for the ports
Release Notes: Ports will come up as "no shutdown" after reload even start up config having "shutdown" for the ports
Workaround: none

Technical Support

Dell Networking Technical Support provides a range of documents and tools to assist you with effectively using Dell Networking equipment and mitigating the impact of network outages.

Accessing Dell Networking Technical Support

The URL for Dell Networking Support is www.dell.com/support.

- On the Dell Networking Support page, enter your service tag if you have it. You can also access general support information from this page.
- http://www.dell.com/support/contents/us/en/04/category/Contact-Information/Technical-Support