

Dell EMC PowerProtect DP series appliance

2.6

Networking Guide for DP5900, DP8400, and DP8900

Rev. 01

December 2020

Each of the Dell EMC PowerProtect DP5900, DP8400, and DP8900 appliance models is a pre-integrated, converged appliance solution that is simple to deploy and scale, provides comprehensive protection for a diverse application ecosystem, and comes with native cloud tiering for long-term retention.

To take full advantage of the Dell EMC PowerProtect (PowerProtect) appliance solution, it is important to configure the network settings properly. Each PowerProtect appliance model includes a pre-configured Dell EMC PowerSwitch S4148-ON, which requires an onsite configuration of an uplink connection to the network switch in a customer environment.

This guide contains the following topics:

- [Preface](#)..... 2
- [Dell EMC PowerSwitch S4148-ON](#)..... 2
- [Port channels or LAG](#)..... 3
- [PowerSwitch ports reserved for the uplink](#)..... 3
- [Pre-configured uplink configuration on the PowerSwitch](#)..... 4
- [Switch configuration at customer site](#)..... 4
- [Changing the standard VLAN used for external communications on the PowerSwitch](#)..... 11
- [Removing the uplink ports on a PowerSwitch from port channels](#)..... 11
- [Configuring the PowerSwitch for access port configuration](#)..... 12
- [Spanning tree configurations](#)..... 12
- [Reference guide](#)..... 14

Preface

As part of an effort to improve product lines, periodic revisions of software and hardware are released. Therefore, all versions of the software or hardware currently in use might not support some functions that are described in this document. The product release notes provide the most up-to-date information on product features.

If a product does not function correctly or does not function as described in this document, contact a technical support professional.

NOTE: This document was accurate at publication time. To ensure that you are using the latest version of this document, go to the Support website <https://www.dell.com/support>.

Purpose

This document provides detailed information about how to configure the uplink to the customer network environment.

Audience

The intended audience of this document is the network administrator of the customer environment or the Professional Services (PS) person who is responsible for the PowerProtect deployment.

Revision history

The following table presents the revision history of this document.

Table 1. Revision history

Revision number	Date	Description
01	December 2020	First release of this document for the Dell EMC PowerProtect DP5900, DP8400, and DP8900 appliance models.

Dell EMC PowerSwitch S4148-ON

The Dell EMC PowerSwitch S4148-ON (PowerSwitch) is a 1U high-density 1/10/25/40/50/100 GbE, ToR switch with 48 dual-speed 1/10 GbE (SFP+) ports and four ports of 100 GbE (QSFP28).

The following figure shows the front of the PowerSwitch.

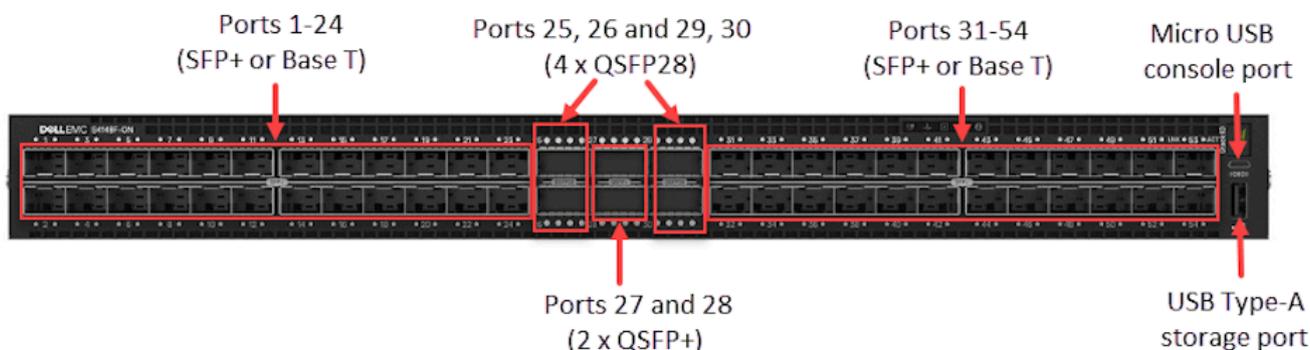


Figure 1. PowerSwitch - front view

The following figure shows the back of the PowerSwitch.

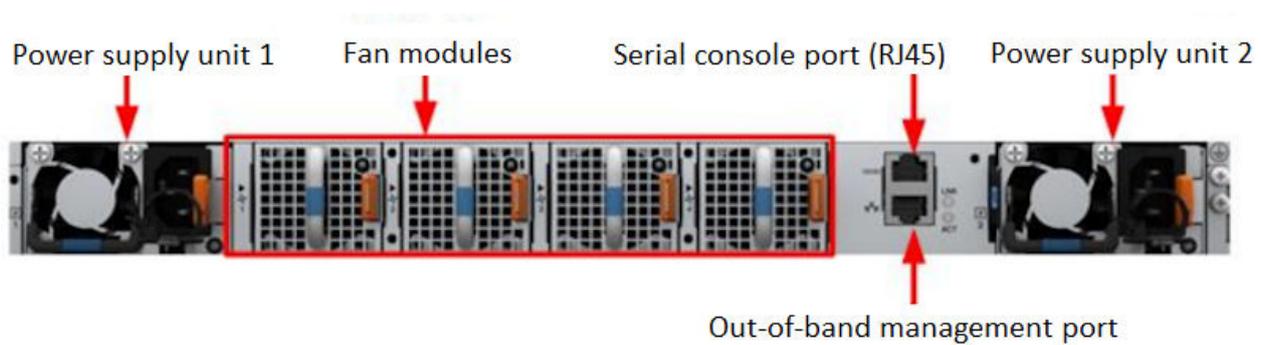


Figure 2. PowerSwitch - back view

Port channels or LAG

Port channels or link aggregation (LAG) enables you to create a single logical interface with redundancy by aggregating multiple physical interfaces.

All links are active and the traffic flows are hashed across all active members of the port channel. When a single physical link is lost, in-flight traffic is lost and on retransmission, the traffic will be hashed across the remaining active members.

It is recommended that you configure uplinks in a port channel, and that you use Link Aggregation Control Protocol (LACP) enabled LAG instead of static link aggregation (Static LAG).

LACP (defined under IEEE 802.1ad) is a control protocol that sends control packets to the other side of a connection to ensure that the connection is configured to operate as LACP-enabled LAG. If LACP is not enabled on both sides, the port channel will not become operational. The use of mode active ensures that objects on both sides of a connection proactively attempt to check that the object on other side operates as LACP-enabled LAG.

Port channel configuration requires that both participating switches have similar configuration related to port channels.

PowerSwitch ports reserved for the uplink

By default, two of the four QSFP28 ports and two 10 GbE SFP+ ports on the Dell EMC PowerSwitch are pre-configured for use in the topology where the switch connects to a customer upstream switch.

The following figure shows the two pre-configured QSFP28 ports on the PowerSwitch. Port numbers 1/1/29 and 1/1/30 are pre-configured for 100 GbE uplink connections. If upstream switches do not have 100 GbE ports then these ports can be split into either 25*4 or 4*10 depending on upstream switch port availability.

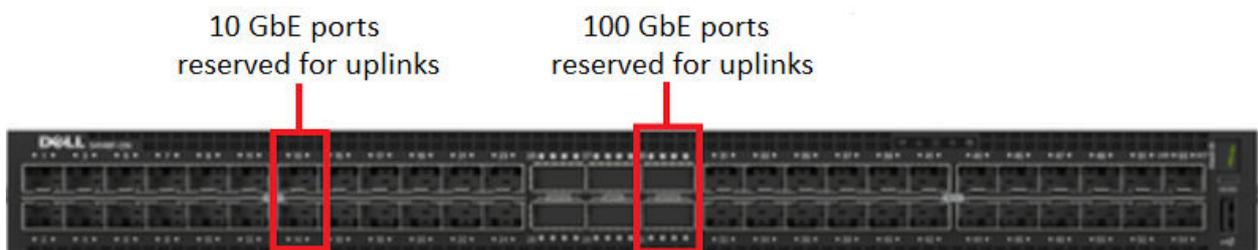


Figure 3. Ports that reserved for the uplink on the PowerSwitch

The default configuration of the two QSFP28 and two SFP+ uplink ports are as follows.

- Port numbers 1/1/29 and 1/1/30 can be used for 100 GbE uplink and are configured as a part of port channel 1 (po1) on the PowerSwitch.
- Port numbers 1/1/29 and 1/1/30 can be logically split into 25 GbE or 10 GbE ports and configured as a part of the port channel on the PowerSwitch. You will require breakout cables to connect to the 25 GbE ports on the customer switch. Order the required cables according to uplink preferences.
- Port numbers 1/1/13 and 1/1/14 can be used for 10 GbE uplink and are configured as a part of port channel 3 (po3) on the PowerSwitch. You can use additional free 10 GbE SFP+ ports on the PowerSwitch for the uplink, as required.

The PowerProtect appliance configures the 123 VLAN as the standard pre-configured VLAN for external communication and for transmitting backup, replication, and management traffic. Ensure that the port channel or trunk allows traffic from this VLAN. If the customer wants to use an already existing backup VLAN from their network instead of the 123 VLAN, then you must create that VLAN number on the PowerSwitch.

Pre-configured uplink configuration on the PowerSwitch

The following `interface` commands show a subset of the pre-configured attributes for each QSFP28 and SFP+ port that is reserved for the uplink, port channels 1, 2, 3 and the 123 VLAN on the PowerSwitch.

```
interface ethernet1/1/13
  description "port channel member po3 used for uplink"
  no shutdown
  channel-group 3 mode active
  flowcontrol receive on
!
interface ethernet1/1/14
  description "port channel member po3 used for uplink"
  no shutdown
  channel-group 3 mode active
  flowcontrol receive on
!
interface ethernet1/1/29
  description "port channel member po1 used for uplink"
  no shutdown
  channel-group 1 mode active
  flowcontrol receive on
!
interface ethernet1/1/30
  description "port channel member po1 used for uplink"
  no shutdown
  channel-group 1 mode active
  flowcontrol receive on
!

interface port-channel1
  description "100g port channel used for uplink"
  shutdown
  switchport mode trunk
  switchport trunk allowed vlan 123
!
interface port-channel3
  description "10g port channel used for uplink"
  shutdown
  switchport mode trunk
  switchport trunk allowed vlan 123
!
```

Switch configuration at customer site

After the Dell EMC PowerProtect appliance reaches the customer site, the customer or Customer Service (CS) engineer assigns a management IP address to the switch management port on the pre-configured Dell EMC PowerSwitch S4148-ON, and then configures the uplink to the customer network.

Uplink configurations

To establish a connection between the PowerProtect appliance and the customer network, connect the uplinks from the PowerSwitch in the PowerProtect appliance to the customer switches. After you configure the uplink, the PowerProtect appliance can communicate with the customer network.

There are three main topologies in which to configure the uplinks:

- A PowerSwitch that connects to a single customer upstream switch—In this topology, you connect the 100 GbE, 25 GbE, or 10 GbE uplinks that are part of the port channel to a single upstream customer switch. The following figure shows the uplink connected to a single upstream switch.

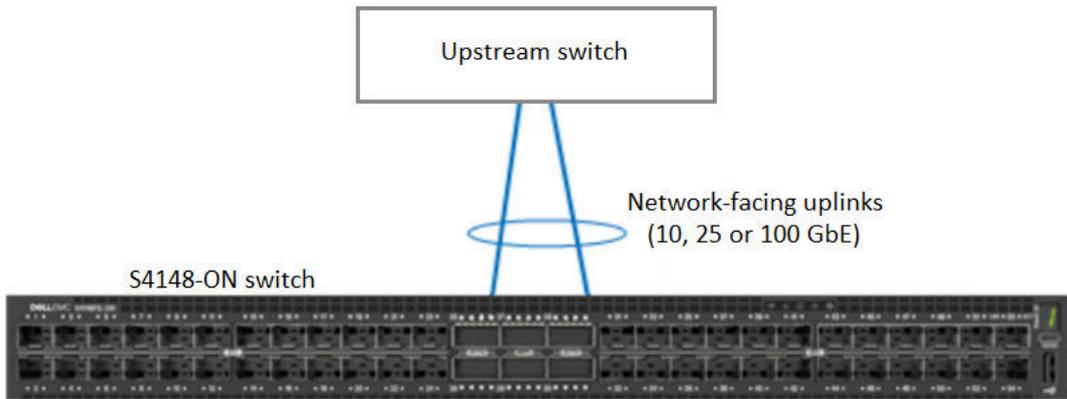


Figure 4. Uplink to a single upstream switch

- A PowerSwitch that connects to two different customer upstream switches with MLAG configured—In this topology, you connect the 100 GbE, 25 GbE, or 10 GbE uplinks that are part of the port channel to two different upstream customer switches by using Multichassis Link Aggregation (MLAG). The following figure shows the uplink connected to two upstream switches with MLAG configured.

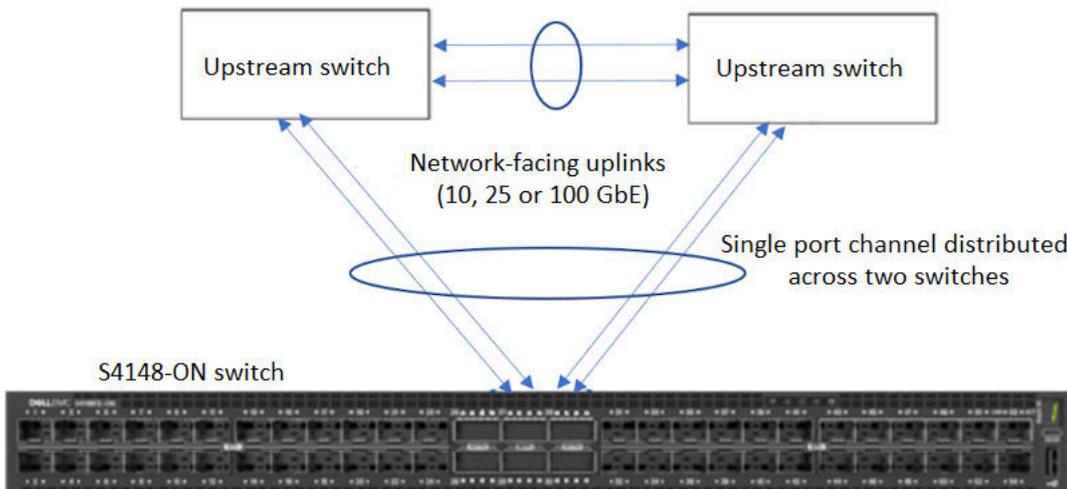


Figure 5. Uplink to two upstream switches with MLAG configured

- A PowerSwitch that connects to two different customer upstream switches without MLAG—In this topology, you connect the 100 GbE, 25 GbE, or 10 GbE uplinks that are part of the port channel to two different upstream customer switches by using two different port channels. The customer spanning tree implementation may require you to configure Spanning Tree Protocol (STP) to suppress one of the two uplinks in order to prevent a layer 2 loop from forming. The following figure shows the redundant link blocked by the spanning tree.

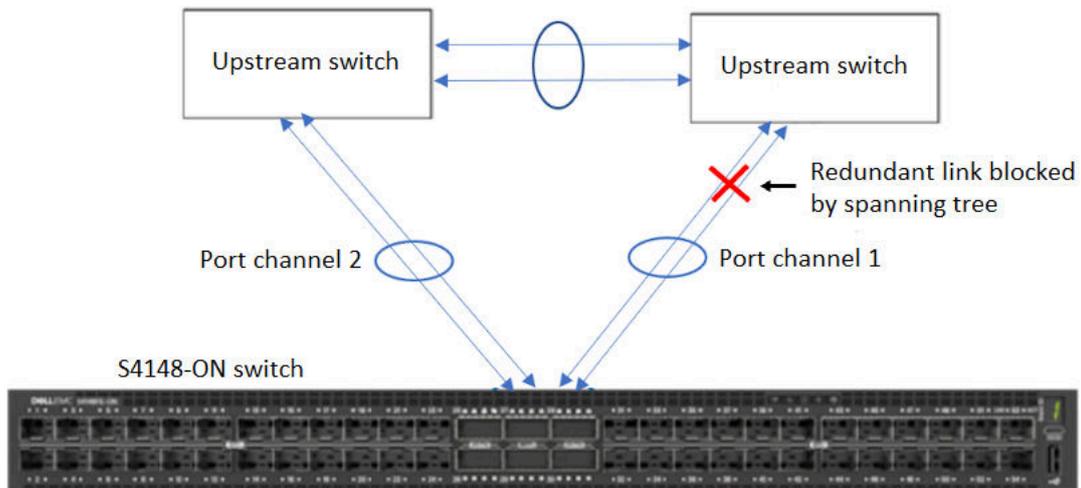


Figure 6. Uplink to two upstream switches without MLAG

Example uplink configurations on the switch for a single upstream topology

The Dell EMC PowerSwitch S4148-ON is pre-configured to support a single customer upstream switch.

Different upstream switch vendors require different configuration settings to support the uplink. The following sections provide an overview of the configuration settings that are required for a Dell OS 10, Cisco, Arista, and Brocade upstream switch. The specified interfaces are examples only. Replace the specified interface in each sample command with the actual interface that is used to configure the uplink in the customer environment.

Dell OS 10 switch

Type the following commands on a Dell OS 10 switch:

```
S4148 (conf) #interface range ethernet1/1/29-1/1/30
S4148 (conf-range-eth1/1/29-1/1/30) #no shutdown
S4148 (conf-range-eth1/1/29-1/1/30) #channel-group 1 mode active
#interface port-channel 1
S4148 (conf-if-po-1) #no shutdown
S4148 (conf-if-po-1) #switchport mode trunk
S4148 (conf-if-po-1) #switchport trunk allowed vlan 123
```

Cisco switch

Type the following commands on a Cisco switch:

```
Nx5548 (config) #interface Ethernet 1/1-2
Nx5548 (config-if-range) #switchport mode trunk
Nx5548 (config-if-range) #channel-group 10 mode active
Nx5548 (config-if-range) #switchport trunk allowed 123
Nx5548 (config-if-range) #no shutdown
Nx5548 (config) #interface port-channel 10
Nx5548 (config-if) #switchport mode trunk
Nx5548 (config-if-range) #switchport trunk allowed vlan 1,123
Nx5548 (config-if) #no shutdown
```

Arista

Type the following commands on an Arista switch:

```
Arista(config)#interface Ethernet 21-22
Arista(config-if-Et21-24)#switchport mode trunk
Arista(config-if-Et21-24)#channel-group 10 mode active
Arista(config-if-Et21-24)#no shutdown
Arista(config)#interface port-Channel 10
Arista(config-if-Po10)#switchport mode trunk
Arista(config-if-Po10)#no shutdown
```

Brocade

Type the following commands on a Brocade switch:

```
VDX(config)#interface TenGigabitEthernet 10/0/1-2
VDX(conf-if-te-10/0/1-4)#channel-group 10 mode active type standard
VDX(conf-if-te-10/0/1-4)#no shutdown
VDX(config)# interface Port-channel 10
VDX(config-Port-channel-10)#switchport
VDX(config-Port-channel-10)#switchport mode trunk
VDX(config-Port-channel-10)#no shutdown
```

Example uplink configurations on the switch for a dual upstream topology

This section provides more information about the configuration changes that are required to support an uplink connection to dual upstream switches with MLAG and dual upstream switches without MLAG.

Dual switch configuration using MLAG

In this configuration, the aggregation switches require Multi-chassis LAG (including MLAG, VLT, and vPC) and you will split a single existing port channel on the PowerSwitch between the two upstream switches.

[Uplink to two upstream switches with MLAG configured](#) on page 5 illustrates a dual switch configuration that uses MLAG, where QSFP28 ports 29 and 30 are used.

 **NOTE:** Port channel configuration changes are not required on the Dell EMC PowerSwitch S4148-ON. [Pre-configured uplink configuration on the PowerSwitch](#) on page 4 provides more information about pre-configured PowerSwitch configurations.

Uplink configuration required on the Cisco switch for dual switch configurations using MLAG

Different upstream switch vendors require different configuration settings to support the uplink. The following section provides an overview of the configuration settings that are required on a Cisco Nexus 5000 switch to configure an uplink to a Dell EMC PowerSwitch S4148-ON.

 **NOTE:** This example assumes that vPC is enabled and configured on the Cisco switches and the backup VLAN is the 123 VLAN.

Switch-1 Cisco Nexus 5000 customer upstream switch

To configure the port channel and port channel member links for downstream connectivity from Switch-1 to the Dell EMC PowerSwitch S4148-ON, type the following commands:

```
interface port-channel 50
description "vPC to Dell"
switchport mode trunk
switchport trunk allowed vlan 1,123
vpc 50
```

```

no shutdown
exit

interface ethernet 1/1
description "Link to Dell"
switchport mode trunk
switchport trunk allowed vlan 1,123
channel-group 50 mode active
no shutdown
exit

interface ethernet 1/2
description "Link to Dell"
switchport mode trunk
switchport trunk allowed vlan 1,123
channel-group 50 mode active
no shutdown
exit

```

Switch-2 Cisco Nexus 5000 customer upstream switch

To configure the port channel and port channel member links for downstream connectivity from Switch-2 to the Dell EMC PowerSwitch S4148-ON, type the following commands:

```

interface port-channel 50
description "vPC to Dell"
switchport mode trunk
switchport trunk allowed vlan 1,123
vpc 50
no shutdown
exit

interface ethernet 1/1
description "Link to Dell"
switchport mode trunk
switchport trunk allowed vlan 1,123
channel-group 50 mode active
no shutdown
exit

interface ethernet 1/2
description "Link to Dell"
switchport mode trunk
switchport trunk allowed vlan 1,123
channel-group 50 mode active
no shutdown
exit

```

Dual switch configuration without MLAG

If the customer environment uses an inter-switch trunk link between the two switches instead of MLAG, connect to the switch by using two individual uplinks from the Dell EMC PowerSwitch S4148-ON.

Consider the following:

- The uplink configuration can use two single physical links or two separate LAGs; for example, port channel 1 (po1) and port channel 2 (po2).
- The customer spanning tree implementation might require you to suppress one of the two uplinks to prevent a Layer 2 loop from forming. For more information about STP feature configurations, see <https://www.dell.com/support/home/en-us/product-support/product/networking-s4148f-on/overview>.

[Uplink to two upstream switches without MLAG](#) on page 6 shows a dual switch configuration without MLAG, where the spanning tree has blocked the redundant link in the topology to prevent layer 2 loops.

Uplink configuration required on the PowerSwitch for dual switch configurations without MLAG

In the following example, the uplink configuration splits ports 29 and 30 into 25 GbE interfaces. The specified interfaces are examples only. Replace the specified interface in each sample command with the actual interface that is used to configure the uplink in the customer environment. Also note that although port channels are used here in the example, if the customer does not want to use port channels, then the PowerSwitch can be configured accordingly.

About this task

Refer to [Removing the uplink ports on the PowerSwitch from port channels](#) for more information.

 **NOTE:** This example does not include how to make STP-related configuration changes in the spanning tree implementation.

Steps

1. Create two different port channels for the uplink by typing the following commands:

```
interface port-channel1
description "25g port channel used for uplink"
no shutdown
switchport mode trunk
switchport trunk allowed vlan 123

interface port-channel2
description "25g port channel used for uplink"
no shutdown
switchport mode trunk
switchport trunk allowed vlan 123
```

2. Add one set of uplink interface to po1. This will connect to the first customer upstream switch and the second set will connect to the second customer upstream switch by typing the following commands:

```
interface ethernet1/1/29:1
description port channel member po1 used for uplink
channel-group 1 mode active
no shutdown

interface ethernet1/1/29:2
description port channel member po1 used for uplink
channel-group 1 mode active
no shutdown

interface ethernet1/1/29:3
description port channel member po1 used for uplink
channel-group 2 mode active
no shutdown

interface ethernet1/1/29:4
description port channel member po1 used for uplink
channel-group 2 mode active
no shutdown
```

3. Add one set of uplink interface to po2. This will connect to the first customer upstream switch and the second set will connect to the second customer upstream switch by typing the following commands:

```
interface ethernet1/1/30:1
description port channel member po1 used for uplink
channel-group 1 mode active
no shutdown

interface ethernet1/1/30:2
description port channel member po1 used for uplink
channel-group 1 mode active
no shutdown

interface ethernet1/1/30:3
description port channel member po1 used for uplink
```

```
channel-group 2 mode active
no shutdown

interface ethernet1/1/30:4
description port channel member po1 used for uplink
channel-group 2 mode active
no shutdown
```

Uplink configuration required on the Cisco switch for dual switch configurations without MLAG

Different upstream switch vendors require different configuration settings to support the uplink. The following section provides an overview of the configuration settings that are required on a Cisco Nexus 5000 switch to configure an uplink to a Dell EMC PowerSwitch S4148-ON.

NOTE: This example assumes that vPC is disabled on the Cisco switches, VLAN 123 is the backup VLAN, and that port channels 101 and 103 are available for the uplink configuration. This example does not include how to make STP-related configuration changes in the spanning tree implementation.

Switch-1 Cisco Nexus 5000 customer upstream switch

To configure the port channel for the uplink, type the following commands:

```
interface port-channel 101
switchport mode trunk
switchport trunk allowed vlan 123
exit
```

To configure the downstream connectivity to the Dell EMC PowerSwitch S4148-ON, type the following commands:

```
interface ethernet 1/1-2
switchport mode trunk
switchport trunk allowed vlan 123
channel-group 101 mode active
exit
```

Switch-2 Cisco Nexus 5000 customer upstream switch

To configure the port channel for the uplink, type the following commands:

```
interface port-channel 103
switchport mode trunk
switchport trunk allowed vlan 123
exit
```

To configure the downstream connectivity to the Dell EMC PowerSwitch S4148-ON, type the following commands:

```
interface ethernet 1/1-2
switchport mode trunk
switchport trunk allowed vlan 123
channel-group 103 mode active
exit
```

Changing the standard VLAN used for external communications on the PowerSwitch

By default, the PowerSwitch configures the backup VLAN on the 123 VLAN. Once the switch reaches the customer site, the backup VLAN should be configured according to the customer environment. You can change the VLAN configuration on the PowerSwitch to use the VLAN number of the customer backup VLAN.

For example, to change the backup VLAN from the 123 VLAN to the 20 VLAN, type the following commands on the PowerSwitch.

NOTE: The `show vlan` command provides you with a list of the ports in the 123 VLAN that you will move to the 20 VLAN.

```
DPappliance-switch#show vlan 123
DPappliance-switch#conf
DPappliance-switch#no interface vlan 123
DPappliance-switch#interface vlan 20
DPappliance-switch(conf-if-vl-20)#description "backup vlan"
DPappliance-switch(conf-if-vl-20)#no shutdown
DPappliance-switch(config)#interface range ethernet 1/1/1-1/1/2,1/1/5-1/1/6,1/1/9-1/1/10
(conf-range-eth1/1/1-1/1/2,1/1/5-1/1/6,1/1/9-1/1/10)# switchport access vlan 20
```

Similarly, allow the 20 VLAN traffic in the remaining ports (1/1/15-1/1/24,1/1/25:1-1/1/25:4,1/1/26:1-1/1/26:4,1/1/31-1/1/39,1/1/45).

Removing the uplink ports on a PowerSwitch from port channels

There could be instances where the customer does not want to use port channels for uplink configurations. The following procedure explains how to remove ports from port channels on a PowerSwitch.

About this task

Removing 1/29 and 1/30 ports from port channel 1.

Steps

1. Log in to the PowerSwitch and enter interface mode via configuration mode.

```
DPappliance-switch#conf
DPappliance-switch(config)#interface ethernet 1/1/29
DPappliance-switch(conf-if-eth1/1/29)#show configuration
!
interface ethernet1/1/29
description "port channel member po1 used for uplink"
no shutdown
channel-group 1 mode active
```

2. Remove the 1/1/29 port from the port channel.

```
DPappliance-switch (conf-if-eth1/1/29)# no channel-group
```

3. Mark the 1/1/29 port as trunk so that it can accept both tagged and untagged traffic, and allow the required VLAN traffic.

```
DPappliance-switch(conf-if-eth1/1/29)# switchport mode trunk
DPappliance-switch(conf-if-eth1/1/29)# switchport trunk allowed vlan 123
```

4. Repeat steps 1, 2, and 3 for the 1/1/30 port.

5. Remove the port channels from the customer VLAN. The example configuration below uses VLAN 123.

```
DPappliance-switch(conf)# interface port-channel 1
DPappliance-switch(conf-if-po-1)# no switchport trunk allowed vlan 123
DPappliance-switch(conf-if-po-1)# shutdown
```

6. Repeat steps 1 through 5 for ports 1/13 and 1/14.

Configuring the PowerSwitch for access port configuration

There could be instances where for some reason customer does not want to set the uplink port on upstream switch in trunk mode and wants to keep it in access mode only. Note that configuring the uplink in access mode allows only single VLAN traffic. Below procedure will show how to use access mode uplink configuration along with port channels.

Steps

1. Log in to the PowerSwitch and enter interface mode via configuration mode. Note that the following example uses VLAN 123. Replace it with the actual VLAN in your environment.

```
DPappliance-switch#conf
DPappliance-switch(conf)#int vlan 123
```

2. Mark uplink port channels as access ports and allowing VLAN 123 traffic.

```
DPappliance-switch(conf)# interface port-channel 1
DPappliance-switch(conf-if-po-1)# no switchport trunk allowed vlan 123
DPappliance-switch(conf-if-po-1)# switchport access vlan 123
```

Spanning tree configurations

STP is a Layer 2 protocol that eliminates loops in bridged topology by enabling only a single path through the network. By eliminating loops, the protocol improves scalability in a large network and allows you to implement redundant paths, which can be activated after the failure of active paths.

Spanning tree configurations available

Dell networking OS supports below variations of spanning tree:

- Rapid Spanning Tree Protocol (RSTP)
- Multiple Spanning Tree Protocol (MSTP)
- Per-VLAN Spanning Tree Plus (RPVST)

The following table lists the steps required to configure different spanning tree variations.

Table 2. Spanning tree configuration steps

Standard	Spanning Tree Protocol Variation	Description	Steps to Complete
IEEE802.1w	Rapid Spanning Tree Protocol (RSTP)	<ul style="list-style-type: none"> • Rapid spanning tree protocol • Improved STP with faster convergence 	<ol style="list-style-type: none"> 1. Log in to the PowerSwitch 2. Config 3. Spanning-tree mode rstp 4. Bridge-priority 61440 5. Exit 6. Show spanning-tree rstp

Table 2. Spanning tree configuration steps (continued)

Standard	Spanning Tree Protocol Variation	Description	Steps to Complete
Cisco Proprietary	Rapid Per-VLAN Spanning Tree (RPVST)	<ul style="list-style-type: none"> Per-VLAN Spanning Tree 1STP instance per VLAN RPVST is an improved variant of PVST 	<ol style="list-style-type: none"> Log in to the PowerSwitch Config Spanning-tree mode rapid-pvst Spanning-tree vlan <VLAN_NO> priority 61440
IEEE 802.1s	Multiple Spanning Tree Protocol (MSTP)	<ul style="list-style-type: none"> Multiple (Instance) Spanning Tree protocol Multiple instance of VLAN mapped to 1 STP (both CST and PVST) 	<ol style="list-style-type: none"> Log in to the PowerSwitch Config Spanning-tree mode mst Spanning-tree mst 1 priority 61440 Spanning-tree mst configuration <ul style="list-style-type: none"> name my-mstp-region revision 10 instance 1 vlan <VLAN_NO> Exit Show spanning tree mst <customer vlan> <p>i NOTE: You must consult with the customer to determine if using single msti instance or one per VLAN.</p>

Configure ports which connect to end devices as edge ports

i **NOTE:** Configure EdgePort only on links connecting to an end station. If you enable EdgePort on an interface connected to a network, it can cause loops.

In addition to the spanning tree configurations described in the above table, you will also have to configure edge ports.

Required steps to configure edge ports on a PowerSwitch

- conf
- interface interface ethernet1/1/1
- spanning-tree port type edge
- exit

Similarly, set the edge port on ports which are not being used for uplinks.

STP Loop Guard

The STP loop guard feature provides protection against Layer 2 forwarding loops (STP loops) caused by a hardware failure such as a cable failure or an interface fault. To enable a loop guard on an STP-enabled port or port-channel interface, use the commands shown in the following example for a PowerSwitch.

```
DPappliance-switch#int po 1 (replace it with port channel which you are actually using)
DPappliance-switch (conf-if-po-1)# spanning-tree guard loop
DPappliance-switch (conf-if-po-1)#exit
```

Reference guide

Review the following guide for supplemental networking information.

<https://www.dell.com/support/manuals/in/en/inbsdt1/networking-z9100/smartfabric-os-user-guide-10-5-1/install-os10-upgrade?guid=guid-c44fb99f-f16d-4673-b32a-1fdf960e02f4&lang=en-us>

Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.