

Dell EMC Networking S4148-ON and S4128-ON

Switch Configuration Guide for Dell PS Series SANs

[Abstract](#)

This document illustrates how to configure Dell EMC™ Networking S4148-ON and S4128-ON switches for use with Dell™ PS Series storage using Dell EMC best practices.

October 2017

Revisions

| Date | Revision |
|--------------|-----------------|
| October 2017 | Initial release |

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1 Introduction

This document illustrates how to configure Dell EMC™ Networking S4148-ON and S4128-ON switches for use with Dell PS Series storage using Dell EMC best practices. The recommended configuration uses link aggregation groups (LAGs) for inter-switch connections.

The host servers and storage controllers can be connected to the switches using the QSFP+ and QSFP28 ports with appropriate breakout cables. The switches are interconnected to each other using 40GbE cables or 100GbE cables.

Optional steps are provided in section 3 to enable Data Center Bridging (DCB).

Note: If you are following the **Rapid EqualLogic Configuration** steps at <http://en.community.Dell.com/techcenter/storage/w/wiki/3615.rapid-equallogic-configuration-portal-by-sis.aspx>, use sections 1 and 2, or 1 and 3 (DCB environment) in this Switch Configuration Guide.

Note: For more information on PS Series SAN design recommendations, see the [Dell PS Series Configuration Guide](#).

1.1 Document conventions

Table 1 lists the formatting conventions used in this document.

Table 1 Document conventions

| Format | Description | Example |
|--|-----------------------|--|
| Bold | User input | OS# show version |
| <i>Bold italic</i> | User input (variable) | OS# <i>my password</i> |
| <Italic> <brackets> | Separate variables | <ip address> <mask> |

1.2 Audience

This switch configuration guide describes an optimal configuration following Dell EMC best practices for a PS Series iSCSI SAN and is intended for storage or network administrators and deployment personnel.

1.3 Switch details

Table 2 provides an overview of the switch configuration.

Table 2 Switch specifications

| Dell EMC Networking S4148-ON/S4128-ON | |
|---------------------------------------|---|
| Switch vendor | Dell EMC |
| Switch model | S4148U-ON, S4148F-ON, S4148FE-ON, S4148T-ON, S4128F-ON, and S4128T-ON |
| Switch firmware | 10.3.1 or later |

Note: For proper functionality, the switch must be at the switch firmware version shown in Table 2 before proceeding with this configuration. Using previous firmware versions may have unpredictable results.

Note: The latest firmware updates and documentation can be found at [Dell.com/support](https://dell.com/support).

1.4 Cabling diagram

The cabling diagram shown in Figure 1 represents the Dell EMC recommended method for deploying servers and PS Series arrays.

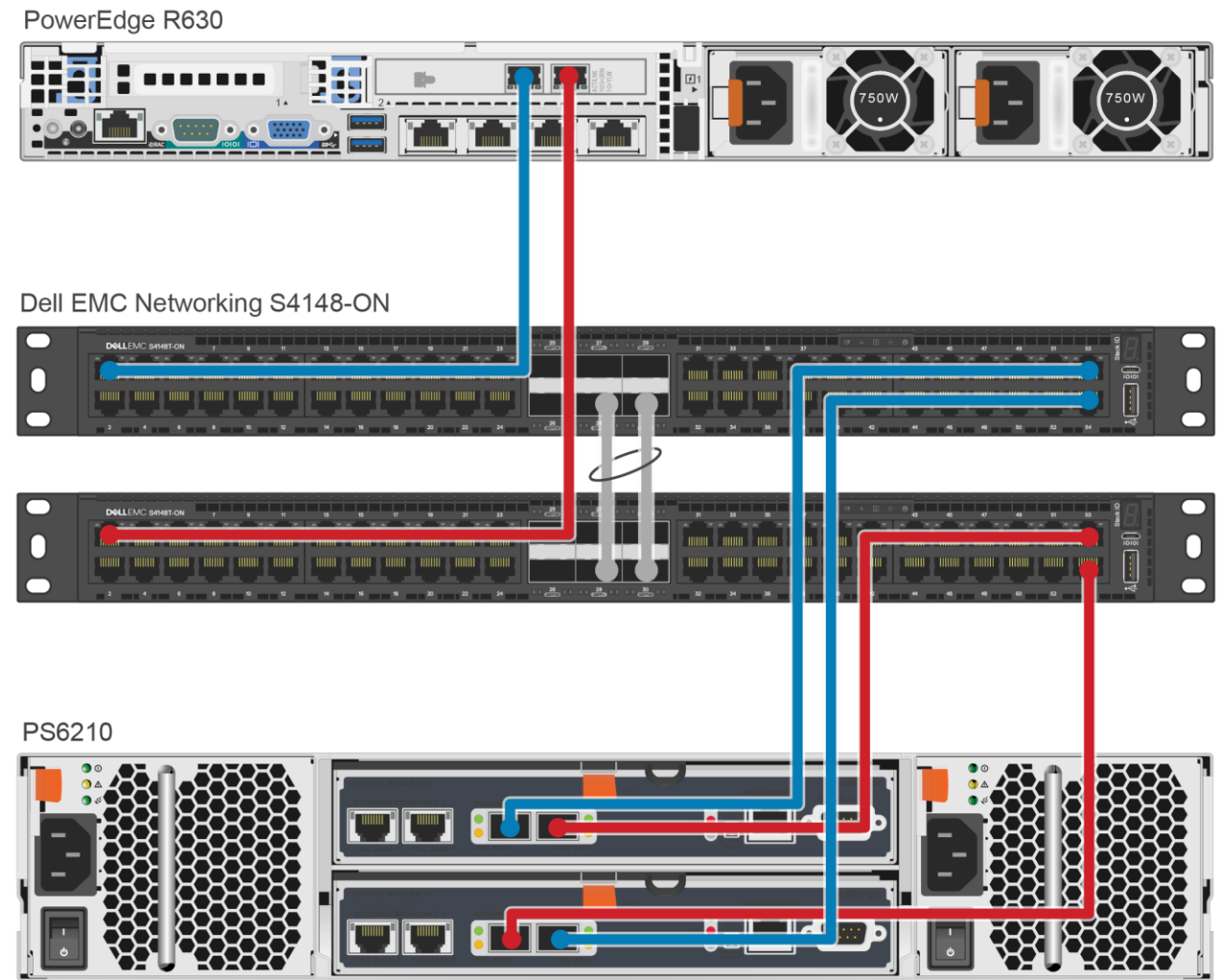


Figure 1 Cabling diagram

2 Dell EMC recommended switch configuration

The steps in this section show how to configure two Dell EMC Networking S4148-ON/S4128-ON switches with a Link Aggregation Group (LAG). The switches are interconnected using two of the 40 GbE Quad Small Form-factor Pluggable (QSFP+) ports. They can be also connected using a 100GbE (QSFP28) interconnect, and the LAG is configured for Dynamic Link Aggregation Control Protocol (LACP). This example uses physical ports 28 and 30 for the host server and storage controller connections.

2.1 Hardware configuration

1. Power on the two switches.
2. Connect a serial cable to the serial port of the first switch.
3. Using PuTTY or another terminal utility, open a serial connection session to the switch.
4. Open the terminal emulator and configure it to use the serial port (COM1, COM2). Configure serial communications for 115200 N, 8, 1 and no flow control.
5. Connect the (QSFP+) LAG cables between the switches by connecting physical port 28 on switch 1 to physical port 28 on switch 2, and physical port 30 on switch 1 to physical port 30 on switch 2. See this configuration in Figure 1.

2.1 Check firmware version

```
OS10# show version
```

Note: If the active version displayed here is not 10.3.1.x or later, visit Dell.com/support and download the latest update for the switches.

2.2 Delete startup configuration

Note: The following commands will delete all configuration settings.

```
OS10# delete startup-configuration
Proceed to delete startup-config [confirm yes/no(default)]yes
OS10# reload
System configuration has been modified. Save? [yes/no]no
Proceed to reboot the system? [confirm yes/no]yes
```

Note: The switch will reboot. After the startup configuration is deleted, the factory default password is **admin**.

2.3 Switch profiles (only for S4148-ON and its variants)

On the S4148-ON switch and its variants, switch port profiles determine the available front-panel Ethernet ports and supported breakout interfaces on uplink ports. Refer to the switch user's guide to determine which switch profile fits for your environment.

Note: Changing switch profiles will delete all configuration information from the switch except for the management port configuration. Save and reload the switch for the new switch profile to take effect.

```
OS10# configure terminal
OS10(config)# switch-port-profile 1/1 profile-<number>
Warning: Switch port profile will be applied only after a save and reload. All
management port configurations will be retained but all other configurations
will be wiped out after the reload.
OS10(config)# exit
OS10# copy running-configuration startup-configuration
OS10# reload
Proceed to reboot the system? [confirm yes/no]yes
```

2.4 Configure unified ports on S4148U-ON

Note: This section applies to the S4148U-ON switch only. Skip this section if using other switches.

This section configures unified ports on S4148U-ON switches to Ethernet ports. Refer to the switch user's guide for further details. Port-group 1/1/1-1/1/6 refers to the first 24 SFP+ ports on the switch. Use the following commands to convert these ports to Ethernet port.

```
OS10# configure terminal
OS10(config)# port-group 1/1/<port-group-number>
OS10(conf-pg-1/1/1)# mode Eth 10g-4x
OS10(conf-pg-1/1/1)# exit
OS10(config)#
```

Repeat the prior steps for port-group 1/1/1 to 1/1/6.

Note: QSFP+ and QSFP28 ports are by default in Ethernet mode. They can be configured by configuring port-group 1/1/7-1/1/10 using the prior commands. Refer to the S4148-ON switch user's guide for more information.

2.5 Configure out of band (OOB) management port

```
OS10(config)# interface mgmt 1/1/1
OS10(conf-if-ma-1/1/1)# no ip address dhcp
OS10(conf-if-ma-1/1/1)# ip address <ipaddress>/<subnet>
OS10(conf-if-ma-1/1/1)# exit
OS10(config)#
```

2.6 Configure login credentials

```
OS10(config)# username admin password $0$<password>
```

2.7 Configure QSPF+ and QSFP28 ports to 4 x 10GbE breakout ports

QSFP+ and QSFP28 ports on S4148-ON and S4128-ON switches can be configured as breakouts to be used with 10GbE iSCSI storage or server network adapters. To configure these ports as 4 x 10GbE ports, use the following commands.

```
OS10(config)# interface breakout 1/1/<port-number> map 10g-4x
OS10(config)# exit
OS10#
```

Use the following command to check port interface status:

```
OS10# show interface status
```

2.8 Enable switch ports

Switch ports are enabled and are configured for `switchport mode access` by default for S4148-ON and S4128-ON switches. If choosing to reconfigure the ports, use the following steps.

Option 1: Enable ports individually by entering the port number.

```
OS10# configure terminal
OS10(config)# interface ethernet 1/1/1
```

Note: For ports configured as 4 x 10GbE breakout ports, use the following command in which 1/1 represents the switch number, `xx` represents port number, and `yy` represents sub port number:

```
OS10(conf)# interface ethernet 1/1/xx:yy
```

```
OS10(conf-if-eth1/1/1)# switchport mode access
OS10(conf-if-eth1/1/1)# no shutdown
OS10(conf-if-eth1/1/1)# exit
```

Option 2: Enable multiple ports at once using the `range` parameter.

```
OS10# configure terminal
OS10(config)# interface range ethernet 1/1/1-1/1/54
```

Note: For ports configured as 4 x 10GbE breakout ports, use the following command in which 1/1 represents the switch number, xx represents port number, and yy represents sub port number:

```
OS10(config)# interface range ethernet 1/1/xx:yy-1/1/xx:yy
```

```
OS10(config-range-eth1/1/1-1/1/54)# switchport access mode
OS10(config-range-eth1/1/1-1/1/54)# no shutdown
OS10(config-range-eth1/1/1-1/1/54)# exit
```

2.9 iSCSI enable

The steps in this section enable iSCSI auto-detection of attached storage arrays and switch auto-configuration. PS Series and SC Series storage arrays are detected by the switch when iscsi is enabled. The switch will auto-configure for Jumbo frames with MTU 9216 and flowcontrol receive on, and transmit off for all the ports. The ports detected to be connected to the storage units will be auto-configured as spanning-tree edge ports with unicast storm control disabled.

```
OS10(config)# iscsi enable
OS10(config)# iscsi session-monitoring enable
```

2.10 Enable Jumbo frames and flow control (optional)

Note: This step is optional because iSCSI auto-detection and auto-configuration enabled in the previous step will enable Jumbo frames with MTU 9216 and enable receive flowcontrol on all ports, once PS Series or SC Series storage ports are detected on the switch.

```
OS10(config)# interface range ethernet 1/1/1-1/1/54
OS10(config-range-eth1/1/1-1/1/54)# mtu 9216s
OS10(config-range-eth1/1/1-1/1/54)# flowcontrol receive on
OS10(config-range-eth1/1/1-1/1/54)# flowcontrol transmit off
```

2.11 Configure spanning tree on edge ports

```
OS10(config-range-eth1/1/1-1/1/54)# spanning-tree port type edge
OS10(config-range-eth1/1/1-1/1/54)# exit
```

Note: Spanning tree is enabled by default. If there is a need to reconfigure it, use the following command.

```
OS10(config)# no spanning-tree disable
OS10(config)# exit
```

2.12 Configure port channel for link aggregation

These commands create a port channel or link aggregation used as an interconnect between two switches.

```
OS10(config)# interface port-channel 1
OS10(conf-if-po-1)#mtu 9216
OS10(conf-if-po-1)#no shutdown
OS10(conf-if-po-1)#exit
```

2.13 Configure port channel member ports

This configuration guide uses ports 1/1/28 and 1/1/30 as port channel member ports. They are configured using following commands.

Note: All port channel member ports need to be of same speed. For example, when using 40GbE ports for port channel, do not add any member ports with a different port speed such as 100GbE or 10GbE.

```
OS10(config)# interface range ethernet 1/1/28,1/1/30
OS10(conf-range-eth1/1/28,1/1/30)# no switchport
OS10(conf-range-eth1/1/28,1/1/30)# channel-group 1 mode active
OS10(conf-range-eth1/1/28,1/1/30)# mtu 9216
OS10(conf-range-eth1/1/28,1/1/30)# flowcontrol receive on
OS10(conf-range-eth1/1/28,1/1/30)# flowcontrol transmit off
OS10(conf-range-eth1/1/28,1/1/30)# exit
OS10(config)# exit
```

2.14 Save configuration

```
OS10#copy running-configuration startup-configuration
OS10#reload
System configuration has been modified. Save? [yes/no]: yes
Proceed to reboot the system? [confirm yes/no]:yes
```

2.15 Configure additional switch

Repeat the commands from section 2 to configure the second switch.

Note: The preceding procedure places all switch ports in the default VLAN. If preferring to place ports in a non-default VLAN, refer to the switch documentation.

3 Configure Data Center Bridging (DCB) (optional)

To enable DCB mode on the switch, use the commands in this section.

Note: Complete the switch configuration steps in section 2 before configuring the switch for DCB mode.

3.1 Disable iSCSI

```
OS10# configure terminal
OS10(config)# no iscsi enable
OS10(config)# no iscsi session-monitoring enable
OS10(config)# exit
```

3.2 Disable 802.3x flowcontrol on all ports

```
OS10# configure terminal
OS10(config)# interface range ethernet 1/1/1-1/1/54
OS10(conf-range-eth1/1/1-1/1/54)# no flowcontrol receive
OS10(conf-range-eth1/1/1-1/1/54)# no flowcontrol transmit
OS10(conf-range-eth1/1/1-1/1/54)# exit
OS10(config)#
```

3.3 Enable DCB

```
OS10(config)# dcbx enable
```

3.4 Create tagged VLAN for all ports and port-channels

Note: You must supply a VLAN ID. The valid range is 2-4093.

The following commands will configure single VLAN ID. If desired, multiple VLAN IDs can be created on the switch and assigned to ports.

```
OS10(config)# interface vlan <vlan-id>
OS10(conf-if-vl-<vlan-id>)# mtu 9216
OS10(conf-if-vl-<vlan-id>)# no shutdown
OS10(conf-if-vl-<vlan-id>)# exit
```

3.5 Create QoS policy map with dot1p values as trusted

```
OS10(config)# policy-map type qos <trust-policy-map-name>
OS10(config-pmap-qos)# class class-trust
OS10(config-pmap-c-qos)# trust dot1p
OS10(config-pmap-c-qos)# exit
OS10(config-pmap-qos)# exit
OS10(config)#
```

3.6 Create PFC dot1p traffic class

The following commands configure a network QoS class map and the iSCSI traffic class.

```
OS10(config)# class-map type network-qos <iSCSI-class-map-name>
OS10 (config-cmap-nqos)# match qos-group 4
OS10 (config-cmap-nqos)# exit
OS10(config)#
```

3.7 Configure network QoS policy map

```
OS10(config)# policy-map type network-qos <policy-map-name>
OS10(config-pmap-network-qos)# class <iSCSI-class-map-name>
OS10 (config-pmap-c-nqos)# pause
OS10 (config-pmap-c-nqos)# pfc-cos 4
OS10 (config-pmap-c-nqos)# exit
OS10(config-pmap-network-qos)# exit
OS10(config)#
OS10(config)# policy-map type application <qos-policy-map-name>
OS10(config-pmap-application)# class class-iscsi
OS10 (config-pmap-c-app)# set qos-group 4
OS10 (config-pmap-c-app)# set cos 4
OS10 (config-pmap-c-app)# exit
OS10(config-pmap-application)# exit
OS10(config)#
```

3.8 Configure ETS policies

```
OS10(config)# qos-map traffic-class <queue-map-name>
OS10(config-qos-map)# queue 0 qos-group 0-3,5-7
OS10(config-qos-map)# queue 4 qos-group 4
OS10(config-qos-map)# exit
OS10(config)#
OS10(config)# class-map type queuing <LAN-traffic-map-name>
OS10(config-cmap-queuing)# match queue 0
OS10(config-cmap-queuing)# exit
OS10(config)#
OS10(config)# class-map type queuing <iSCSI-traffic-map-name>
OS10(config-cmap-queuing)# match queue 4
OS10(config-cmap-queuing)# exit
OS10(config)#
```

3.9 Create ETS policy-map for bandwidth allocations

```
OS10(config)# policy-map type queuing <queuing-policy-name>
OS10(config-pmap-queuing)# class <LAN-traffic-map-name>
OS10(config-pmap-c-que)# bandwidth percent <bandwidth-percentage>
OS10(config-pmap-c-que)# exit
OS10(config-pmap-queuing)# class <iSCSI-traffic-map-name>
OS10(config-pmap-c-que)# bandwidth percent <bandwidth-percentage>
OS10(config-pmap-c-que)# exit
OS10(config-pmap-queuing)# exit
OS10(config)#
```

Note: The sum of the bandwidth percentages must equal 100. Monitor the LAN and SAN performance in your environment to determine optimal bandwidth settings.

3.10 QoS policy

```
OS10(config)# system qos
OS10(config-sys-qos)# service-policy input type qos <trust-policy-map-name>
OS10(config-sys-qos)# service-policy type application <qos-policy-map-name>
OS10(config-sys-qos)# ets mode on
OS10(config-sys-qos)# exit
OS10(config)#
```

3.11 Apply policies and VLAN ID to all switch edge ports (except port-channel member ports)

```
OS10(config)# interface range ethernet 1/1/1-1/1/27,1/1/29,1/1/31-1/1/54
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# switchport mode trunk
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# switchport trunk allowed
vlan <vlan-id>
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# service-policy input type
network-qos <policy-map-name>
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# service-policy output
type queuing <queuing-policy-name>
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# ets mode on
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# qos-map traffic-class
<queue-map-name>
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# priority-flow-control
mode on
OS10(config-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# exit
OS10(config)#
```

3.12 Apply policies and VLAN ID on port channel and its member ports

```
OS10(config)# interface port-channel 1
OS10(config-if-po-1)# switchport mode trunk
OS10(config-if-po-1)# switchport trunk allowed vlan <vlan-id>
OS10(config-if-po-1)# no shutdown
OS10(config-if-po-1)# exit
OS10(config)#
```

This configuration guide uses ports 1/1/28 and 1/1/30 as port channel member ports. They are configured using the following commands.

Note: All port channel member ports need to be of same speed. For example, when using 40GbE ports for the port channel, do not add any member ports with a different port speed such as 100GbE or 10GbE.

```
OS10(config)# interface range ethernet 1/1/28,1/1/30
OS10(config-range-eth1/1/28,1/1/30)# service-policy input type network-qos
<policy-map-name>
OS10(config-range-eth1/1/28,1/1/30)# service-policy output type queuing <queuing-
policy-name>
OS10(config-range-eth1/1/28,1/1/30)# ets mode on
OS10(config-range-eth1/1/28,1/1/30)# qos-map traffic-class <queue-map-name>
OS10(config-range-eth1/1/28,1/1/30)# priority-flow-control mode on
OS10(config-range-eth1/1/28,1/1/30)# exit
OS10(config)# exit
OS10(config)#
```


3.13 iSCSI enable

```
OS10(config)# iscsi enable  
OS10(config)# iscsi session-monitoring enable  
OS10(config)# exit
```

3.14 Save configuration

```
OS10# copy running-configuration startup-configuration
```

3.15 Show commands to verify DCBx, ETS, and PFC status on individual ports

```
OS10# show lldp dcbx interface ethernet 1/1/<port-number>  
OS10# show lldp dcbx interface ethernet 1/1/<port-number> pfc detail  
OS10# show lldp dcbx interface ethernet 1/1/<port-number> ets detail
```

3.16 Configure additional switches

Repeat the commands from section 3 to configure DCB on additional switches.

4 Revert from DCB to non-DCB configuration (optional)

One method to revert from a DCB configured switch to a non-DCB configured switch is to delete the current configuration (startup-config) and follow the steps in section 2. If deleting the current configuration is not an option, use the following procedure to unconfigure DCB and enable standard flow control.

Note: This is a disruptive operation that requires downtime. The arrays will temporarily lose communication with each other. Power off all arrays and hosts connected to the SAN before proceeding with these steps.

4.1 Disable DCB

```
OS10# configure terminal
OS10(config)# no dcbx enable
OS10(config)#
```

4.2 Disable iSCSI

```
OS10(config)# no iscsi enable
OS10(config)# no iscsi session-monitoring enable
```

4.3 Remove DCB policies and apply standard flow control on edge ports

```
OS10(config)# interface range ethernet 1/1/1-1/1/27,1/1/29,1/1/31-1/1/54
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no priority-flow-control
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no qos-map traffic-class
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no ets
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no service-policy output
type queuing <queuing-policy-name>
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no service-policy input
type network-qos <policy-map-name>
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no switchport trunk
allowed vlan <vlan-id>
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# no switchport mode
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# switchport mode access
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# flowcontrol receive on
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# flowcontrol transmit off
OS10(conf-range-eth1/1/1-1/1/27,1/1/29,1/1/31-1/1/54)# exit
OS10(config)#
```

4.4 Remove DCB policies and apply standard flow control on port-channel member ports

```
OS10(config)# interface range ethernet 1/1/28,1/1/30
OS10(conf-range-eth1/1/28,1/1/30)# no priority-flow-control
OS10(conf-range-eth1/1/28,1/1/30)# no ets
OS10(conf-range-eth1/1/28,1/1/30)# no qos-map traffic-class
OS10(conf-range-eth1/1/28,1/1/30)# no service-policy output type queuing
<queuing-policy-name>
OS10(conf-range-eth1/1/28,1/1/30)# no service-policy input type network-qos
<policy-map-name>
OS10(conf-range-eth1/1/28,1/1/30)# flowcontrol receive on
OS10(conf-range-eth1/1/28,1/1/30)# flowcontrol transmit off
OS10(conf-range-eth1/1/28,1/1/30)# exit
OS10(config)#
OS10(config)# interface port-channel 1
OS10(conf-if-po-1)# no switchport trunk allowed vlan <vlan-id>
OS10(conf-if-po-1)# switchport access vlan 1
OS10(conf-if-po-1)# exit
OS10(config)#
```

4.5 Revert to default VLAN ID on switch and arrays

Once DCB is disabled on the switch, the PS Series arrays will no longer use the VLAN ID that was configured when DCB was enabled. The arrays will revert to the default or native VLAN. Therefore, a valid VLAN must be configured for all host servers, switches, and PS Series array members. A valid VLAN can use the default or native VLAN ID (typically 0 or 1) or a specific VLAN can be configured (for example, VLAN 100). If a non-default VLAN is configured, any ports connected to the arrays must be configured as untagged.

The prior steps in sections 4.3 and 4.4 revert the switch ports to default native vlan 1. Use the following command to remove VLANs other than vlan 1 from the switch configuration.

```
OS10(config)# no interface vlan <vlan-id>
```

4.6 Remove ETS, PFC, and other policies from switch configuration

```
OS10(config)# no policy-map type queuing <queuing-policy-name>
OS10(config)# no class-map type queuing <LAN-traffic-map-name>
OS10(config)# no class-map type queuing <iSCSI-traffic-map-name>
OS10(config)# system qos
OS10(config-sys-qos)# no ets
OS10(config-sys-qos)# no service-policy input type qos <trust-policy-map-name>
OS10(config-sys-qos)# no service-policy type application <qos-policy-map-name>
OS10(config-sys-qos)# exit
OS10(config)# no policy-map type network-qos <policy-map-name>
OS10(config)# no policy-map type qos <trust-policy-map-name>
OS10(config)# policy-map type application <qos-policy-map-name>
OS10(config-pmap-application)# no class class-iscsi
OS10(config-pmap-application)# exit
OS10(config)# no qos-map traffic-class <queue-map-name>
OS10(config)# no class-map type network-qos <iSCSI-class-map-name>
OS10(config)# no class-map type application <qos-policy-map-name>
OS10(config)#
```

4.7 iSCSI enable

```
OS10(config)# iscsi enable
OS10(config)# iscsi session-monitoring enable
OS10(config)# exit
```

4.8 Save configuration

```
OS10# copy running-configuration startup-configuration
```

4.9 Reload

```
OS10# reload
Proceed to reboot the system? [confirm yes/no]:yes
```

Note: The switch will reboot.

4.10 Verify DCB status

```
OS10# show lldp dcbx interface ethernet 1/1/<port-number>
```

4.11 Configure additional switch

Repeat the commands from section 4 to disable DCB on any additional switches.

A Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

[Dell TechCenter](#) is an online technical community where IT professionals have access to numerous resources for Dell EMC software, hardware, and services.

[Storage Solutions Technical Documents](#) on Dell TechCenter provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1 Related resources

Referenced or recommended publications:

- [Dell PS Series Configuration Guide](#)
- [Dell EMC Storage Compatibility Matrix](#)

For PS Series best practices white papers, reference architectures, and sizing guidelines for enterprise applications and SANs, refer to [PS Series Technical Documents](#).