Dell EMC Networking S5148F-ON

Switch Configuration Guide for Dell EMC SC Series and Dell PS Series SANs

Abstract

This document illustrates how to configure the Dell EMC™ Networking S5148F-ON switch for use with Dell EMC™ SC Series or Dell™ PS Series storage using Dell EMC best practices.

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Revisions

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1 Introduction

This document illustrates how to configure the Dell EMC™ Networking S5148F-ON switch for use with Dell EMC™ SC Series or Dell™ PS Series storage using Dell EMC best practices.

The host servers and storage controllers are connected to the switches using twinaxial or optical cabling.

Link aggregation groups (LAGs) for inter-switch connections are mandatory for PS Series iSCSI SAN environments and optional for SC Series iSCSI SAN environments. The switches are interconnected to each other using QSFP28 cables.

Note: For more information on SC Series or PS Series SAN design recommendations, see the *Dell EMC Storage Compatibility Matrix*.

1.1 Document conventions

Table 1 lists the formatting conventions used in this document.

Table 1 Document conventions

Item	Convention	Example
Code samples	Monospace	`System configuration has been modified.`
Parameters	Italic	`Dell(profile-name)#`
Command-line commands	Bold	`OS#show version`
Command-line user-supplied variables	Bold, italic, brackets	***<vlan-id>***

1.2 Audience

This switch configuration guide describes an optimal configuration following Dell EMC best practices for an SC Series or 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 S5148F-ON	
Switch vendor	Dell EMC
Switch model	S5148F-ON
Switch operating system	10.3.2 R2 or later

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

Note: The latest switch OS updates and documentation can be found at the Force10 Portal.

1.4 Cabling diagram

Refer to one of the following cabling sections that is applicable to your storage system: SC Series (section 1.4.1) or PS Series (section 1.4.2).

1.4.1 SC Series cabling diagram

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

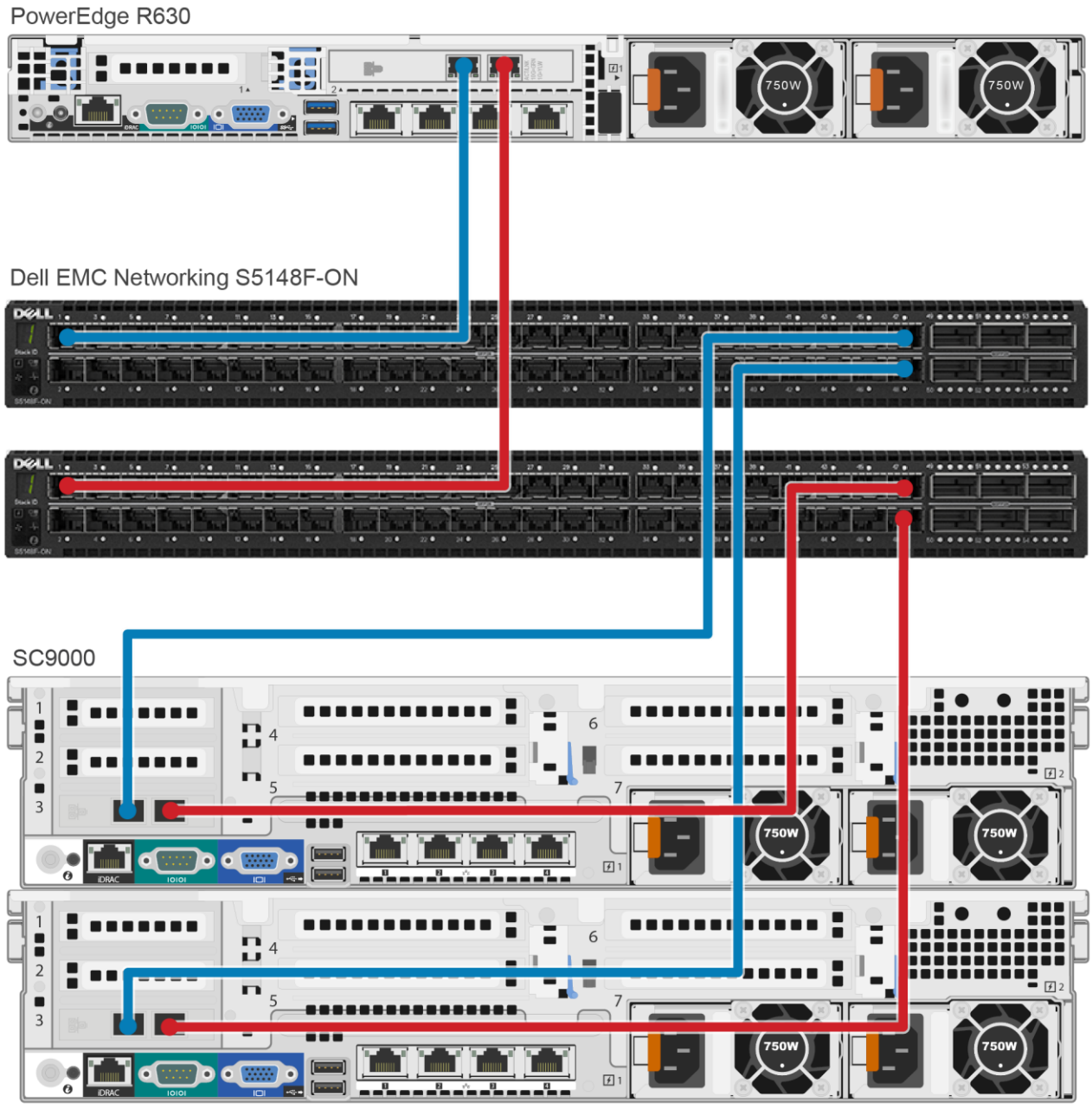

Figure 1 SC Series cabling diagram

1.4.2 PS Series cabling diagram

The cabling diagram shown in Figure 2 represents the Dell EMC recommended method for deploying servers and PS Series storage arrays. The two switches are connected to each other using a port-channel interconnect.

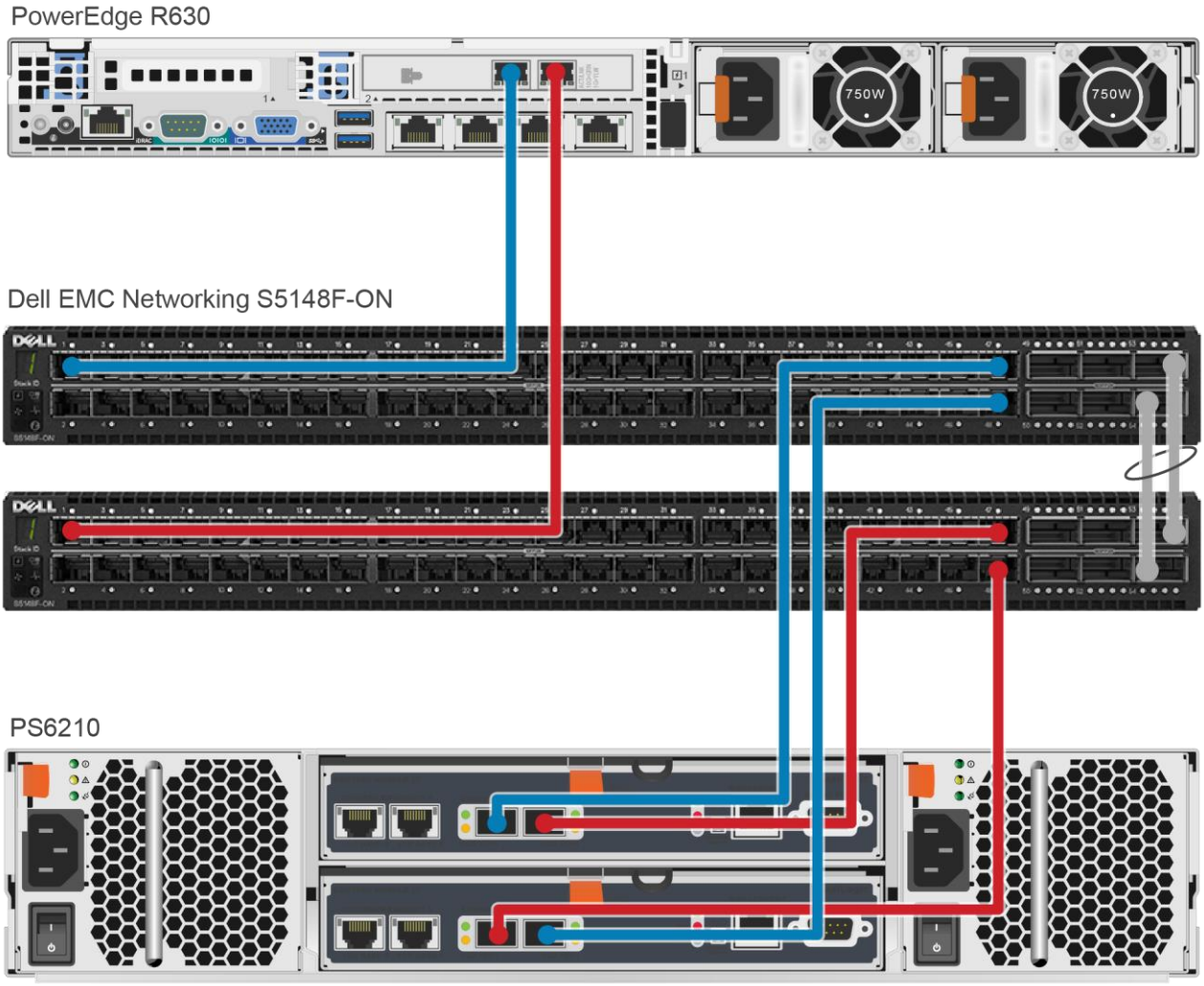

Figure 2 PS Series cabling diagram

2 Dell EMC recommended switch configuration

The steps in this section show how to configure two Dell EMC™ Networking S5148F-ON switches with a Link Aggregation Group (LAG). The switches are interconnected using two of the 100 GbE Quad Small Form-factor Pluggable (QSFP28) ports. The LAG is configured for Dynamic Link Aggregation Control Protocol (LACP). This example uses physical ports 53 and 54 for the 100 GbE interconnect between the two switches.

Note: LAGs for inter-switch connections are mandatory for PS Series iSCSI SAN environments and optional for SC Series iSCSI SAN environments.

Note: The factory default user ID/password is **admin/admin.**

2.1 Hardware configuration

Note: Do not connect any server NIC or storage controller cables to the switch before performing the following configuration steps.

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. Perform all CLI steps from section 2 and section 3 (optional) on switch 1. Repeat this process for switch 2.
6. **Required for PS Series (optional for SC Series):** Connect the interconnect cables between the switches by connecting physical port 53 on switch 1 to physical port 53 on switch 2, and physical port 54 on switch 1 to physical port 54 on switch 2. See the interconnect configuration in Figure 2.
7. Connect all server NIC and storage controller cables to the switch.

2.2 Check switch operating system version

```
OS10# show version
```

Note: If the active version displayed here is not 10.3.2.x or later, visit the Force10 Portal and download the latest update for the switches.

2.3 Delete startup configuration

Note: This example assumes a switch is using the default configuration settings. Using the **delete startup-configuration** command will set the startup configuration file to its default settings. Always back up your configuration settings prior to performing any configuration changes.

```
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.

2.4 Configure out-of-band 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)# no shutdown
OS10(conf-if-ma-1/1/1)# exit
OS10(config)#
```

2.5 Configure login credentials

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

2.6 Disable link auto-negotiation (SC Series SAN with T6225 adapter)

Note: This section applies only to SC Series iSCSI SANs that use the Chelsio® T6225 adapter.

Before connecting the network cable between the Chelsio T6225 storage controller adapter and the switch, disable link auto-negotiation on the switch. For example, if the T6225 will be connected to port eth 1/1/1, use the following procedure to disable link auto-negotiation:

```
OS10(config)#interface ethernet 1/1/1
OS10(conf-if-eth1/1/1)# negotiation off
OS10(conf-if-eth1/1/1)# exit
```

2.7 Enable switch ports

Switch ports are enabled and are configured for **switchport mode access** by default for the S5148F-ON switch. 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
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 1/1/1-1/1/52
OS10(conf-range-eth1/1/1-1/1/52)# switchport access mode
OS10(conf-range-eth1/1/1-1/1/52)# no shutdown
OS10(conf-range-eth1/1/1-1/1/52)# exit
```

2.8 Enable Jumbo frames and 802.3x flow control

```
OS10(config)# interface range ethernet 1/1/1-1/1/52
OS10(conf-range-eth1/1/1-1/1/52)# mtu 9216
OS10(conf-range-eth1/1/1-1/1/52)# flowcontrol receive on
OS10(conf-range-eth1/1/1-1/1/52)# flowcontrol transmit off
```

2.9 Configure spanning tree on edge ports

```
OS10(conf-range-eth1/1/1-1/1/52)# spanning-tree port type edge
OS10(conf-range-eth1/1/1-1/1/52)# 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
```

2.10 Configure port channel for link aggregation

Note: This section is mandatory for PS Series SANs and optional for SC Series SANs.

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
```

This configuration guide uses ports 1/1/53 and 1/1/54 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 40 GbE ports for port channel, do not add any member ports with a different port speed such as 100 GbE or 10 GbE.

```
OS10(config)# interface range ethernet 1/1/53-1/1/54
OS10(conf-range-eth1/1/53-1/1/54)# no switchport
OS10(conf-range-eth1/1/53-1/1/54)# channel-group 1 mode active
OS10(conf-range-eth1/1/53-1/1/54)# mtu 9216
OS10(conf-range-eth1/1/53-1/1/54)# flowcontrol receive on
OS10(conf-range-eth1/1/53-1/1/54)# flowcontrol transmit off
OS10(conf-range-eth1/1/53-1/1/54)# exit
OS10(config)# exit
```

2.11 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
```

2.12 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 (optional)

To enable Data Center Bridging (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 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
```

3.4 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)#
```

3.5 Create Priority Flow Control 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)#
```

3.6 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)# 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)#
```

3.7 Configure queue to traffic-class mapping

```
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)#
```

3.8 Configure class-map queuing policies

```
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 traffic-class 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 Apply service-policies and VLAN ID to all switch edge ports (except port-channel member ports)

```
OS10(config)# interface range ethernet 1/1/1-1/1/52
OS10(conf-range-eth1/1/1-1/1/52)# switchport mode trunk
OS10(conf-range-eth1/1/1-1/1/52)# switchport trunk allowed vlan <vlan-id>
OS10(conf-range-eth1/1/1-1/1/52# service-policy input type network-qos <policy-map-name>
OS10(conf-range-eth1/1/1-1/1/52)# service-policy output type queuing <queuing-policy-name>
OS10(conf-range-eth1/1/1-1/1/52)# ets mode on
OS10(conf-range-eth1/1/1-1/1/52)# qos-map traffic-class <queue-map-name>
OS10(conf-range-eth1/1/1-1/1/52# priority-flow-control mode on
OS10(conf-range-eth1/1/1-1/1/52# exit
OS10(config)#
```

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

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

This configuration guide uses ports 1/1/53 and 1/1/54 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 100 GbE ports for the port channel, do not add any member ports with a different port speed such as 40 GbE or 10 GbE.

```
OS10(config)# interface range ethernet 1/1/53-1/1/54
OS10(conf-range-eth1/1/53-1/1/54)# service-policy input type network-qos
<policy-map-name>
OS10(conf-range-eth1/1/53-1/1/54)# service-policy output type queuing <queuing-
policy-name>
OS10(conf-range-eth1/1/53-1/1/54)# ets mode on
OS10(conf-range-eth1/1/53-1/1/54)# qos-map traffic-class <queue-map-name>
OS10(conf-range-eth1/1/53-1/1/54)# priority-flow-control mode on
OS10(conf-range-eth1/1/53-1/1/54)# end
```

3.12 Set system QoS policies

```
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)#
```

3.13 Enable DCB

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

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.

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 best practices white papers, reference architectures, and sizing guidelines for enterprise applications and SANs, refer to the following pages:

- SC Series Technical Documents
- PS Series Technical Documents