

# Dell EMC Networking S5148F-ON

## Switch Configuration Guide for Dell EMC Unity, SC Series, and Dell PS Series iSCSI SANs

### [Abstract](#)

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

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## Revisions

Date	Description
May 2018	Initial release
November 2018	DCB updates for different OS versions
February 2019	Added Dell EMC Unity configuration

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# 1 Introduction

This document illustrates how to configure the Dell EMC™ Networking S5148F-ON switch for use with Dell EMC Unity, 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, optional for SC Series, and not connected for Dell EMC Unity iSCSI SAN environments. If using inter-switch connections, 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](#). For information on Dell EMC Unity SAN design recommendations, see the Dell EMC Unity [Simple Support 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 ( <i>profile-name</i> ) #
Command-line commands	Bold	OS# <b>show version</b>
Command-line user-supplied variables	Bold, italic, brackets	<b>&lt;vlan-id&gt;</b>

## 1.2 Audience

This switch configuration guide describes an optimal configuration following Dell EMC best practices for a Dell EMC Unity, 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	
<b>Switch vendor</b>	Dell EMC
<b>Switch model</b>	S5148F-ON
<b>Switch operating system</b>	10.3.2.x 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), Dell EMC Unity (section 1.4.2), or PS Series (section 1.4.3).

### 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.

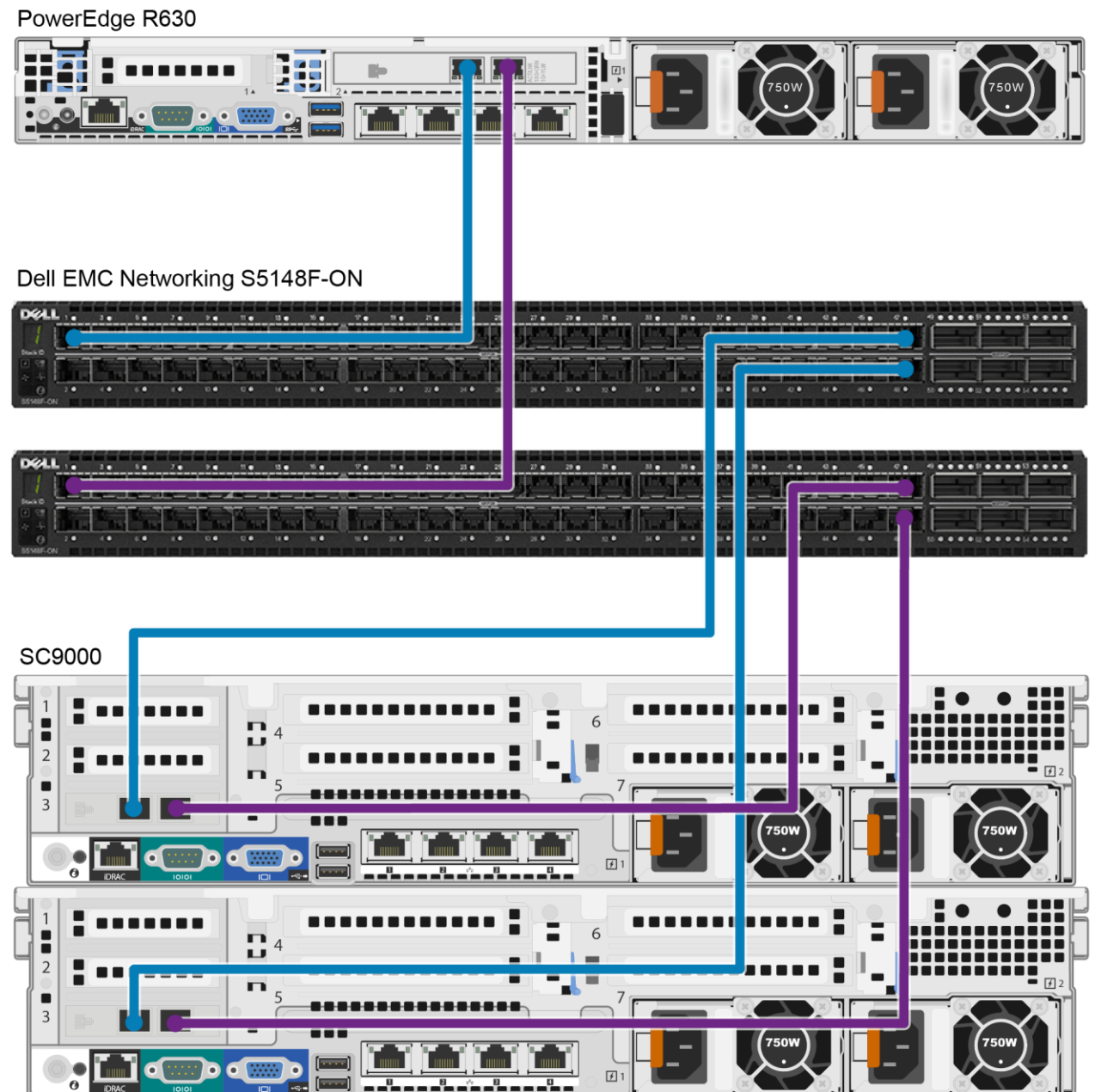
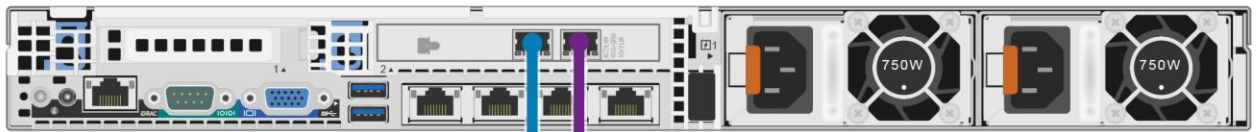


Figure 1 SC Series cabling diagram

### 1.4.2 Dell EMC Unity cabling diagram

The cabling diagram in Figure 2 represents the Dell EMC recommended method for deploying servers and Dell EMC Unity storage arrays.

PowerEdge R630



Dell EMC Networking S5148F-ON



Dell EMC Unity 300



Figure 2 Dell EMC Unity cabling diagram

### 1.4.3 PS Series cabling diagram

The cabling diagram shown in Figure 3 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.

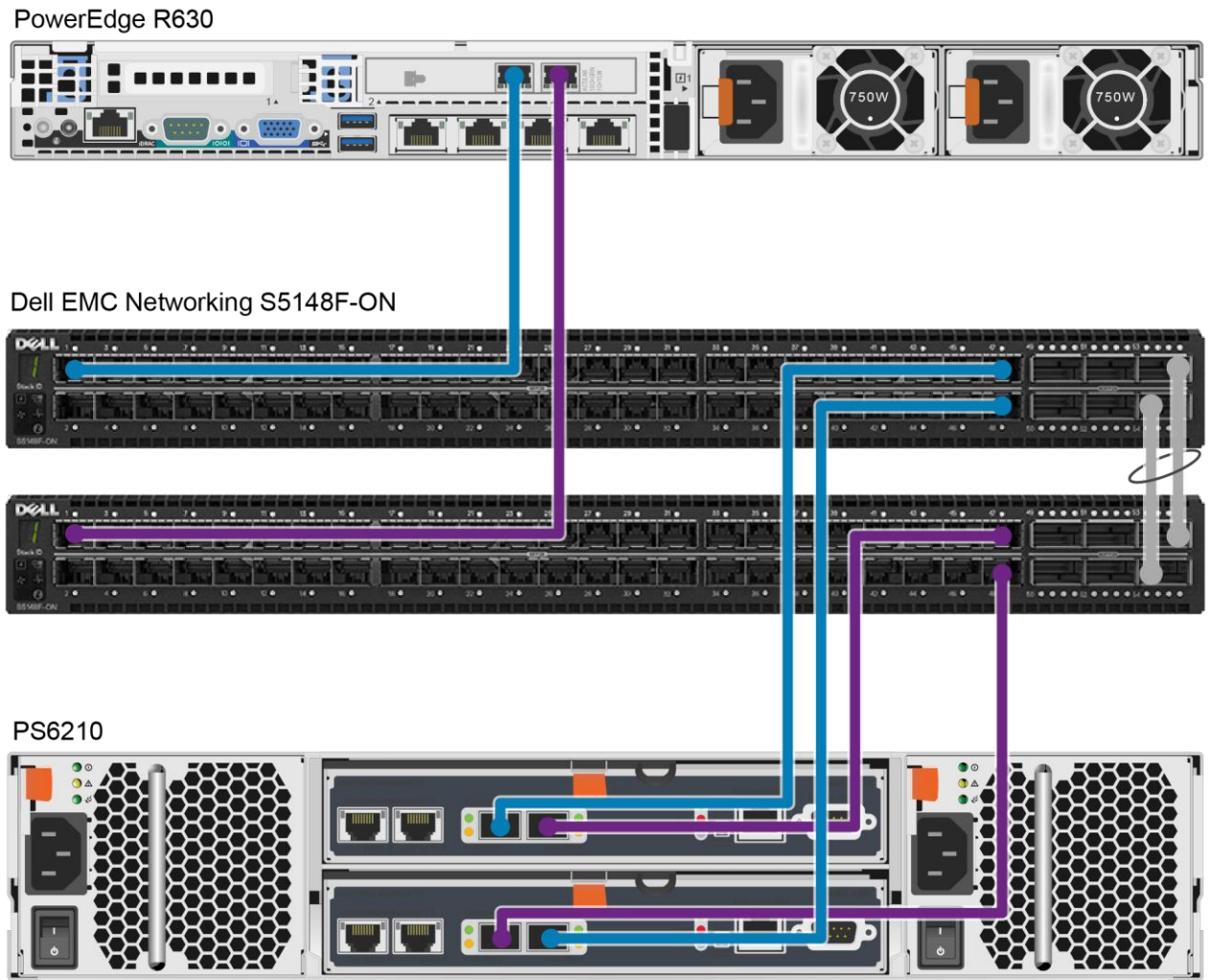


Figure 3 PS Series cabling diagram



## 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 100GbE 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 100GbE interconnect between the two switches.

---

**Note:** LAGs for inter-switch connections are mandatory for PS Series, optional for SC Series, and not connected for Dell EMC Unity 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 and not applicable to Dell EMC Unity):** 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 3.
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 or T62100 adapter)

---

**Note:** This section applies only to SC Series iSCSI SANs that use the Chelsio® T6225 or T62100 adapter.

---

**Note:** If your switch OS version is 10.4.1 or later and SC Series controller version is 7.3.2 or later, skip this step and proceed to section 2.7.

---

Before connecting the network cable between the Chelsio T6225/T62100 storage controller adapter and the switch, disable link auto-negotiation on the switch. For example, if the T6225 adapter 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

By default, switch ports for the S5148F-ON switch are enabled and configured for **switchport mode access**. 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:** Configuring for a port channel is mandatory for PS Series, optional for SC Series, and not applicable to Dell EMC Unity 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 the 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 1/1/53-1/1/54
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.

---

**Note:** To avoid exceeding the default QoS buffer pool size, do not configure DCB parameters on all switch ports. Configure only the switch ports that will be operating with DCB traffic. The following example configures DCB on ports 1 to 30, and on ports 53 and 54.

---

### 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 selected ports

```
OS10# configure terminal
OS10(config)# interface range ethernet 1/1/1-1/1/30
OS10(conf-range-eth1/1/1-1/1/30)# no flowcontrol receive
OS10(conf-range-eth1/1/1-1/1/30)# no flowcontrol transmit
OS10(conf-range-eth1/1/1-1/1/30)# exit
```

### 3.3 Create tagged VLAN for selected ports and port-channels

---

**Note:** You must supply a VLAN ID. The valid range is 2 to 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

---

**Note:** This section only applies to switches running OS versions 10.3.2 to 10.4.0. Skip this section if your switch is running OS version 10.4.1 or later.

---

```
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)# 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 selected switch edge ports (except port-channel member ports)

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

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

---

**Note:** Configuring for a port channel is mandatory for PS Series, optional for SC Series, and not applicable to Dell EMC Unity SANs.

---

```
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
```

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 100GbE ports for the port channel, do not add any member ports with a different port speed such as 40GbE or 10GbE.

---

```
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

### 3.12.1 Switch OS 10.3.2 to 10.4.0

---

**Note:** Perform these steps if your switch is running OS versions 10.3.2 to 10.4.0. If your switch is running OS version 10.4.1 or later, skip this section and perform the steps in section 3.12.2.

---

```
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
```

### 3.12.2 Switch OS 10.4.1 or later

---

**Note:** Perform these steps if your switch is running OS version 10.4.1 or later. If your switch is running OS versions 10.3.2 to 10.4.0, skip this section and perform the steps in section 3.12.1.

---

```
OS10(config)# system qos
OS10(config-sys-qos)# trust-map dot1p default
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](https://dell.com/support) is focused on meeting customer needs with proven services and support.

[Storage technical documents and videos](#) 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](#)
- [Dell EMC Unity Simple Support 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](#)
- [Dell EMC Unity technical documents and videos](#)