

Dell EMC Networking S4048-ON

Switch Configuration Guide for Dell EMC SC Series SANs

[Abstract](#)

This document illustrates how to configure Dell EMC™ Networking S4048-ON switches for use with Dell EMC SC Series storage while using Dell EMC best practices.

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Revisions

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August 2015	Initial release
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1 Introduction

This document illustrates how to configure Dell EMC™ Networking S4048-ON switches for use with Dell EMC SC Series storage using Dell EMC best practices.

1.1 Firmware support

The Dell EMC Networking S4048-ON Open Networking switch has the ability to run different switch operating systems software/firmware. This document provides configuration steps specific to Dell Networking OS 9.x (firmware 9.x) and Dell Networking OS 10.x (firmware 10.x). Refer the section of this document that is applicable to your firmware version:

- Dell Networking OS 9.x (firmware 9.x): section 2
- Dell Networking OS 10.x (firmware 10.x): section 3

1.2 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# show version
Command-line user-supplied variables	Bold, italic, brackets	<<i>vlan-id</i>>

1.3 Audience

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

1.4 Cabling diagram

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

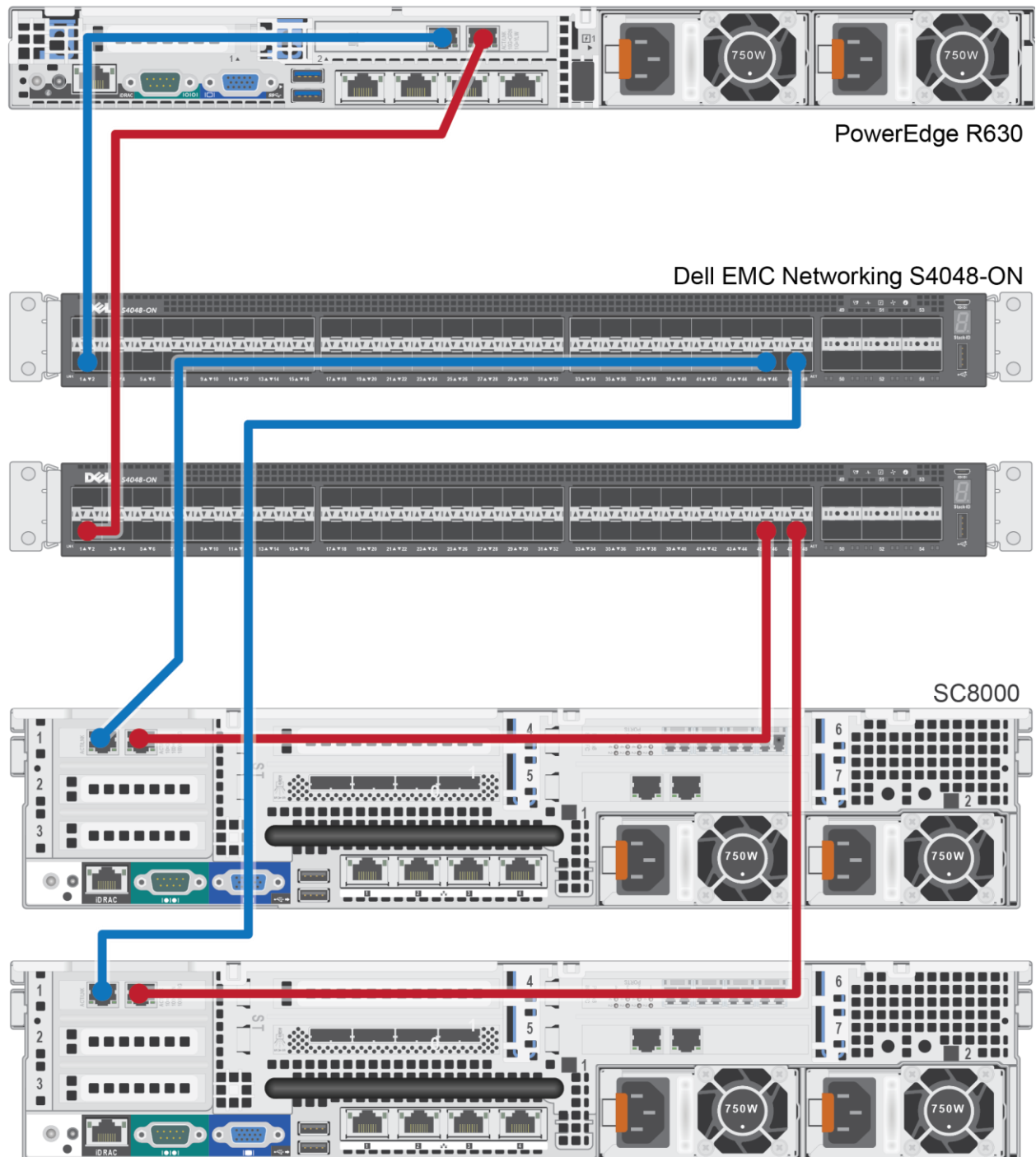


Figure 1 Cabling diagram

2 Switch configuration (OS 9.x)

This section provides steps to configure Dell EMC Networking S4048-ON switches running Dell Networking OS 9.x (firmware 9.x). If your switches are running Dell Networking OS 10.x (firmware 10.x), follow the steps in section 3 instead.

Table 2 provides an overview of the switch configuration.

Table 2 Switch specifications (OS 9.x)

Dell EMC Networking S4048-ON	
Switch vendor	Dell EMC
Switch model	S4048-ON
Switch firmware	9.x (9.10.0.0 or above)

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

Note: Firmware downloads and documentation can be found at Dell.com/support.

2.1 Dell recommended switch configuration

These steps show how to configure two S4048-ON switches for use with an SC Series iSCSI SAN.

2.1.1 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 your terminal emulator and configure it to use the serial port (usually COM1 but this may vary depending on your system). Configure serial communications for 115200,N,8,1 and no flow control.

2.1.2 Delete startup configuration

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

```
Dell>enable
Dell#delete startup-config
Proceed to delete startup-config [confirm yes/no]yes
Dell#reload
System configuration has been modified. Save? [yes/no]no
Proceed with reload [confirm yes/no]yes
```

Note: The switch will reboot.

2.1.3 Configure out of band (OOB) management port

```
Dell>enable
```

Note: After the startup configuration is deleted, the factory default enable mode password is **calvin**.

```
Dell>#config
Dell (conf) #interface ManagementEthernet 1/1
Dell (conf-if-ma-1/1) #no shutdown
Dell (conf-if-ma-1/1) #ip address <ipaddress> <mask>
Dell (conf-if-ma-1/1) #exit
```

2.1.4 Configure route for OOB management port (optional)

```
Dell (conf) #management route <X.Y.Z.0> /24 <A.B.C.1>
```

Note: In the previous command, <X.Y.Z.0> is the network your management system is connecting from and <A.B.C.1> is the gateway for the switch. If your management system is on the same subnet as the switch, the previous step may be omitted. The previous example assumes a class C subnet mask.

2.1.5 Configure login credentials

```
Dell (conf) #username admin privilege 15 password 0 <yourpassword>
Dell (conf) #enable password level 15 0 <yourpassword>
```

2.1.6 Enable switch ports

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

```
Dell#configure
Dell (conf) #interface tengigabitethernet 1/1
Dell (conf-if-te-1/1) #switchport
Dell (conf-if-te-1/1) #no shutdown
Dell (conf-if-te-1/1) #exit
Dell (conf) #exit
```

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

```
Dell#configure
Dell (conf) #interface range tengigabitethernet 1/1-1/48
Dell (conf -if-range-te-1/1-48) #switchport
Dell (conf -if-range-te-1/1-48) #no shutdown
Dell (conf -if-range-te-1/1-48) #exit
Dell (conf) #exit
```

2.1.7 Enable Jumbo frames

```
Dell#configure
Dell(conf)#interface range tengigabitethernet 1/1-48
Dell(conf-if-range-te-1/1-48)#mtu 12000
```

2.1.8 Configure flow control

```
Dell(conf-if-range-te-1/1-48)#flowcontrol rx on tx off
```

2.1.9 Configure spanning tree on edge ports

Note: Make sure that the following command is used only on server- and storage-connected edge ports.

```
Dell(conf-if-range-te-1/1-48)#spanning-tree rstp edge-port
Dell(conf-if-range-te-1/1-48)#exit
Dell(conf)#protocol spanning-tree rstp
Dell(conf-rstp)#no disable
Dell(conf-rstp)#exit
```

2.1.10 Configure VLAN (example)

Note: Dell EMC recommends assigning a unique **vlan_id** (between 2-4094) for each switch fabric. For example, assign VLAN 100 on the first switch and VLAN 200 on the second switch. The following example assigns all the ports to the VLAN, however, you may also assign individual ports to the VLAN after they are enabled (section 2.1.6). If you prefer to use the default VLAN, skip this section. **In addition, edge devices (server NIC ports and the storage NIC ports) need to be configured with the corresponding VLAN tag.**

```
Dell(config)#interface vlan <vlan_id>
Dell#(config-if-vl-###)#no shutdown
Dell#(config-if-vl-###)#tagged tengigabitethernet 1/1-1/48
Dell#exit
```

2.1.11 Save configuration

```
Dell#copy running-config startup-config
```

2.1.12 Configure additional switch

Repeat the commands from section 2.1 to configure the second switch. Be sure to use a different VLAN number for the second switch.

3 Switch configuration (OS 10.x)

This section provides steps to configure Dell EMC Networking S4048-ON switches running Dell Networking OS 10.x (firmware 10.x). If your switches are running Dell Networking OS 9.x (firmware 9.x), follow the steps in section 2 instead.

Table 3 provides an overview of the switch configuration.

Table 3 Switch specifications (OS 10.x)

Dell EMC Networking S4048-ON	
Switch vendor	Dell EMC
Switch model	S4048-ON
Switch firmware	10.3.1 or above

Note: For proper functionality, the switch must be at the switch firmware version shown in Table 3 before proceeding with this configuration. Using firmware other than the versions specified in this document may have unpredictable results.

Note: Firmware downloads and documentation can be found at Dell.com/support.

3.1 Dell EMC recommended switch configuration

Follow the steps in this section to configure two S4048-ON switches for use within an SC Series iSCSI SAN.

3.1.1 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 your terminal emulator and configure it to use the serial port (usually COM1 but this may vary depending on your system). Configure serial communications for 115200,N,8,1 and no flow control.

3.1.2 Check firmware version

OS10# **show version**

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

3.1.3 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.

3.1.4 Configure out of band (OOB) management port

Note: After the startup configuration is deleted, the factory default password is **admin**.

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

3.1.5 Configure login credentials

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

3.1.6 Configure QSFP ports to 4 x 10GbE breakout ports

QSFP ports 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
```

3.1.7 Enable switch ports

Switch ports are enabled and are configured for **switchport mode access** by default for S4048 switches. In case you want 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 the port number, and **<yy>** represents the 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 1/1/1-1/1/48
```

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

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

```
OS10(conf-range-eth1/1/1-1/1/48)# switchport
OS10(conf-range-eth1/1/1-1/1/48)# no shutdown
OS10(conf-range-eth1/1/1-1/1/48)# exit
```

3.1.8 iSCSI enable

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

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

Note: Do not change the LLDP description on the SC Series storage device. Changing this will disable iSCSI storage detection and iSCSI auto-configuration.

Note: iSCSI auto-configuration on OS 10.x switch ports is not supported with QLogic® QLE4062 network adapters on SC Series storage devices.

3.1.9 Enable Jumbo frames and flow control (optional)

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

```
OS10(config)# interface range ethernet 1/1/1-1/1/48
OS10(config-range-eth1/1/1-1/1/48)# mtu 9216
OS10(config-range-eth1/1/1-1/1/48)# flowcontrol receive on
OS10(config-range-eth1/1/1-1/1/48)# flowcontrol transmit off
```

3.1.10 Configure spanning tree on edge ports

```
OS10(config-range-eth1/1/1-1/1/48)# spanning-tree port type edge
OS10(config-range-eth1/1/1-1/1/48)# exit
```

Note: Spanning tree is enabled by default. If it needs to be reconfigured, use the following command.

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

3.1.11 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
```

3.1.12 Configure additional switch

Repeat the commands from section 3.1 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.

3.2 Configure Data Center Bridging (DCB) (optional)

To enable DCB mode on the switch, use the following commands.

Note: You must complete the Dell EMC recommended switch configuration steps in section 3.1 before configuring the switch for DCB mode.

Note: DCB switch configuration is applicable only for environments with DCB-capable SC Series storage arrays.

3.2.1 Disable iSCSI

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

3.2.2 Disable 802.3x flowcontrol on all ports

```
OS10(config)# interface range ethernet 1/1/1-1/1/48
OS10(conf-range-eth1/1/1-1/1/48)# no flowcontrol receive
OS10(conf-range-eth1/1/1-1/1/48)# no flowcontrol transmit
OS10(conf-range-eth1/1/1-1/1/48)# exit
OS10(config)#
```

3.2.3 Enable DCB

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

3.2.4 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 configure a 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
```

3.2.5 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)#
```

3.2.6 Create PFC dot1p traffic class

The following commands configure a network QoS class map and match 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)#
```

3.2.7 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)#
```

3.2.8 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)#
```

3.2.9 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 be equal to 100. Monitor the LAN and SAN performance in your environment to determine optimal bandwidth settings.

3.2.10 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)#
```

3.2.11 Apply policies and VLAN ID to all switch edge ports

```
OS10(config)# interface range ethernet 1/1/1-1/1/48
OS10(conf-range-eth1/1/1-1/1/48)# switchport mode trunk
OS10(conf-range-eth1/1/1-1/1/48)# switchport trunk allowed vlan <vlan-id>
OS10(conf-range-eth1/1/1-1/1/48)# service-policy input type network-qos <policy-
map-name>
OS10(conf-range-eth1/1/1-1/1/48)# service-policy output type queuing <queuing-
policy-name>
OS10(conf-range-eth1/1/1-1/1/48)# ets mode on
OS10(conf-range-eth1/1/1-1/1/48)# qos-map traffic-class <queue-map-name>
OS10(conf-range-eth1/1/1-1/1/48)# priority-flow-control mode on
OS10(conf-range-eth1/1/1-1/1/48)# exit
OS10(config)#
```

3.2.12 iSCSI enable

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

3.2.13 Save configuration

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

3.2.14 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
```

3.2.15 Configure additional switches

Repeat the commands from section 3.2 to configure DCB on additional switches.

3.3 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 3.1. 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.

3.3.1 Disable DCB

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

3.3.2 Disable iSCSI

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

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

```
OS10(config)# interface range ethernet 1/1/1-1/1/48
OS10(conf-range-eth1/1/1-1/1/48)# no priority-flow-control
OS10(conf-range-eth1/1/1-1/1/48)# no qos-map traffic-class
OS10(conf-range-eth1/1/1-1/1/48)# no ets
OS10(conf-range-eth1/1/1-1/1/48)# no service-policy output type queuing
<queuing-policy-name>
OS10(conf-range-eth1/1/1-1/1/48)# no service-policy input type network-qos
<policy-map-name>
OS10(conf-range-eth1/1/1-1/1/48)# no switchport trunk allowed vlan <vlan-id>
OS10(conf-range-eth1/1/1-1/1/48)# no switchport mode
OS10(conf-range-eth1/1/1-1/1/48)# switchport mode access
OS10(conf-range-eth1/1/1-1/1/48)# flowcontrol receive on
OS10(conf-range-eth1/1/1-1/1/48)# flowcontrol transmit off
OS10(conf-range-eth1/1/1-1/1/48)# exit
OS10(config)#
```

3.3.4 Revert to default VLAN ID on switch and arrays

Once DCB is disabled on the switch, the SC 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 SC 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 section 3.3.3 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>
```

3.3.5 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)# ss 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)#
```

3.3.6 iSCSI enable

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

3.3.7 Save configuration

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

3.3.8 Reload

```
OS10# reload
```

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

Note: The switch will reboot.

3.3.9 Verify DCB status

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

3.3.10 Configure additional switch

Repeat the commands from section 3.3 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

See the following referenced or recommended Dell EMC publications:

[Dell EMC Storage Compatibility Matrix](#)

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