

# Cisco Nexus 5648Q

## Switch Configuration Guide for Dell PS Series SANs

### [Abstract](#)

This document illustrates how to configure a Cisco® Nexus® 5648Q switch for use with Dell™ PS Series storage using Dell EMC™ best practices.

August 2017

## Revisions

Date	Description
August 2017	Initial release

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# 1 Introduction

This document illustrates how to configure a Cisco® Nexus 5648Q switch for use with Dell™ PS Series storage using Dell EMC™ best practices.

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

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## 1.1 Document conventions

Table 1 lists the formatting conventions used in this document.

Table 1 Document conventions

Format	Description	Example
<b>Bold</b>	User input	Dell> <b>enable</b>
<i>Italic</i>	Placeholder or variable	<i>ip address</i>
<b><i>Bold italic</i></b>	User input (variable)	Dell> <b><i>my password</i></b>
< <i>Italic</i> > < <i>brackets</i> >	Separate variables	< <i>ip address</i> > < <i>mask</i> >

## 1.2 Audience

This switch configuration guide describes a verified configuration following Dell EMC best practices for a dedicated 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

Cisco Nexus 5648Q	
<b>Switch vendor</b>	Cisco
<b>Switch model</b>	Nexus 5648Q
<b>Switch firmware</b>	7.3(2)N1(1)

---

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

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**Note:** The latest firmware updates and documentation can be found at: [www.cisco.com](http://www.cisco.com). This site requires a login credential.

---

## 1.4 Cabling diagram

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

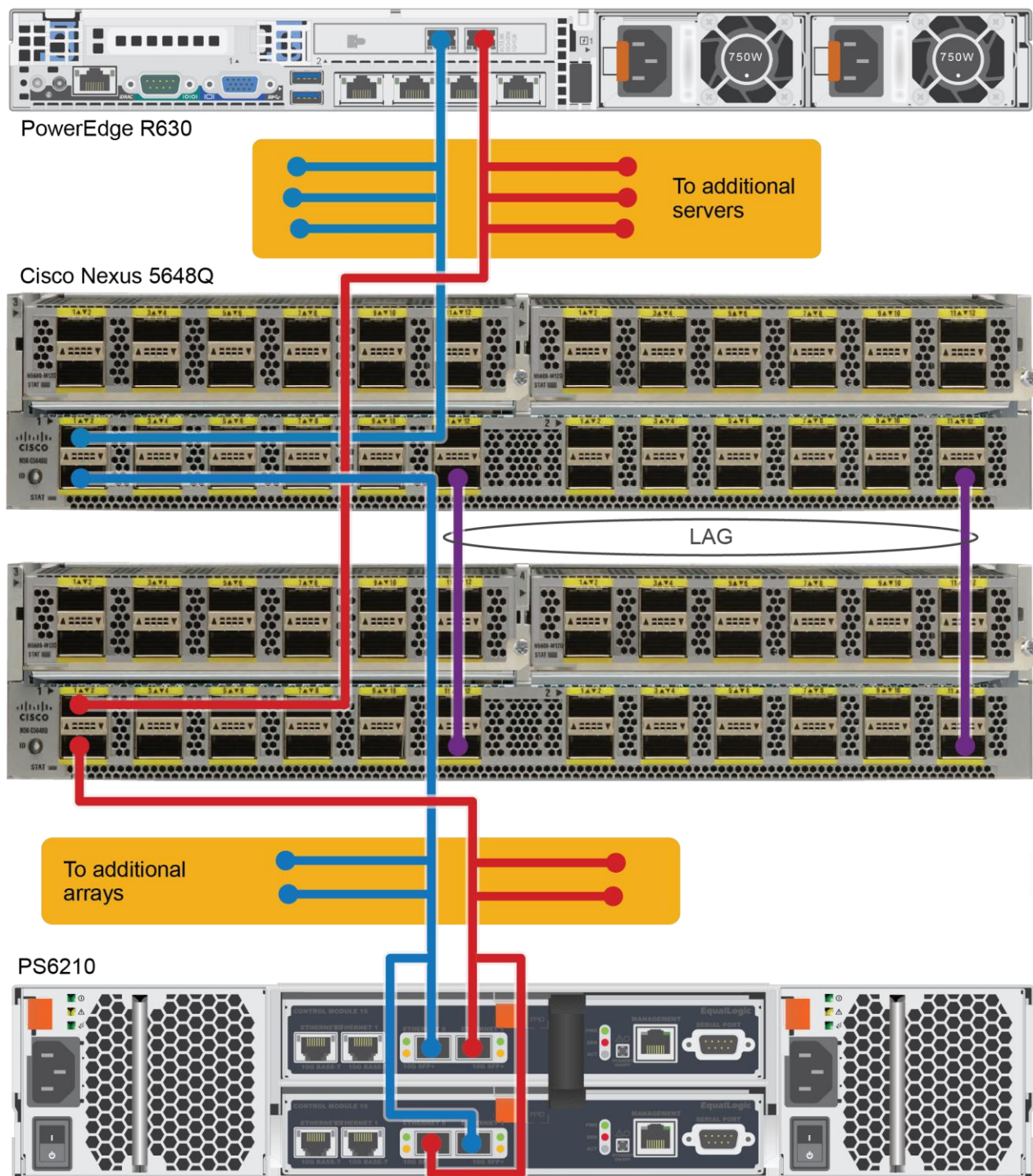


Figure 1 Cabling diagram

## 2 Dell EMC recommended switch configuration

Use the following steps to configure the Cisco Nexus 5648Q switch.

---

**Note:** The configuration steps in this section are only recommended when the switch is used as a dedicated SAN for iSCSI traffic (not shared with LAN traffic).

---

### 2.1 Hardware configuration

1. Power on the chassis.
2. Connect a serial cable to the active supervisor management port.
3. Using PuTTY or another terminal utility, open a serial connection session to the switch.
4. Open a terminal emulator and configure it to use the serial port (usually COM1 but this may vary depending on your system). Configure serial communications for 9600,N,8,1 and no flow control.

### 2.2 Delete startup configuration

---

**Note:** This example assumes a switch at its default configuration settings. Using the `write erase` command will set the startup configuration file to its default settings. Always back up the configuration settings prior to performing any configuration changes

---

```
switch#write erase
Warning: This command will erase the startup-configuration
Do you wish to proceed anyway ? (y/n) [n]y
switch#reload
This command will reboot the system
Do you want to continue? (y/n) [n]y
```

---

**Note:** The switch will reboot.

---

## 2.3 Run the basic system configuration

The following steps use the setup utility to configure connectivity for basic management of the system.

After the switch fully reboots, the following prompts will appear:

```
Abort Power On Auto Provisioning and continue with normal setup ?(yes/no) [n]:y
---- System Admin Account Setup ----
Do you want to enforce secure password standard (yes/no):yes
Enter the password for "admin":my password
Confirm the password for "admin":my password
```

```
---- Basic System Configuration Dialog VDC: 1 ----
```

This setup utility will guide you through the basic configuration of the system. Setup configures only enough connectivity for management of the system.

Please register Cisco Nexus 6000 Family devices promptly with your supplier. Failure to register may affect response times for initial service calls. Nexus devices must be registered to receive entitled support services.

```
Press Enter at anytime to skip a dialog. Use ctrl-c at anytime
to skip the remaining dialogs.
Would you like to enter the basic configuration dialog (yes/no):yes
Create another login account (yes/no) [n]:n
Configure read-only SNMP community string (yes/no) [n]:n
Configure read-write SNMP community string (yes/no) [n]:n
Enter the switch name :my switch name
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]:y
Mgmt0 IPv4 address :my IP address
Mgmt0 IPv4 netmask :my netmask
Configure the default gateway? (yes/no) [y]:y
Enable the telnet service? (yes/no) [n]:y
Enable the ssh service? (yes/no) [y]:n
Configure the ntp server? (yes/no) [n]:n
Configure default interface layer (L3/L2) [L2]:L2
Configure default switchport interface state (shut/noshut) [noshut]:shut
Enter basic FC configurations (yes/no) [n]:n
```

The following configuration will be applied:

*<Your settings will be displayed>*

```
Would you like to edit the configuration? (yes/no) [n]:n
Use this configuration and save it? (yes/no) [y]:y
[#####] 100%
Copy complete.
```



Log into the switch using the credentials created previously.

## 2.4 Convert ports to 10g-4x breakout mode

```
switch#config
switch(config)#interface breakout slot 1 port 1-3 map 10g-4x
switch(config)#interface breakout slot 1 port 4-6 map 10g-4x
switch(config)#poweroff module 1
switch(config)#no poweroff module 1
```

---

**Note:** It will take two minutes for the module to power back up. The following message will appear when the module is powered back up:

```
Switch(config)# 2001 May 18 09:08:10 S-56 %$ VDC-1 %$ %PFMA-2-MOD_PWRUP: Module
1 powered up"
```

---



---

**Note:** Once the module is fully powered up, the `show interface brief` command will display status of 4x10Gbps ports.

---

```
switch(config)#show interface brief
```

## 2.5 Disable Data Center Bridging (DCB)

---

**Note:** By default, DCB is enabled. This section provides commands to disable DCB. Perform all operations during a maintenance window, because a temporary loss of communication between host servers and storage arrays may occur.

---

```
switch(config)#lldp tlv-select dcbxp
switch(config)#copy running-config startup-config
switch(config)#no lldp tlv-select dcbxp
switch(config)#copy running-config startup-config
```

---

**Note:** Each time when converting 40Gbps port to a 10g-4x map, the steps in this section must be performed. This ensures that the new 10Gbps ports have DCBx disabled.

---

## 2.6 Configure the vPC domain

```
switch(config)#feature lacp
switch(config)#feature vpc
switch(config)#vpc domain 1
switch(config-vpc-domain)#peer-keepalive destination <peer IP address>

-----:: Management VRF will be used as the default VRF ::-----

switch(config-vpc-domain)#exit
```

## 2.7 Configure the port-channel

```
switch(config)#interface port-channel 1
switch(config-if)#switchport mode trunk
switch(config-if)#spanning-tree port type network
switch(config-if)#vpc peer-link
```

Please note that spanning tree port type is changed to "network" port type on vPC peer-link.

This will enable spanning tree Bridge Assurance on vPC peer-link provided the STP Bridge Assurance (which is enabled by default) is not disabled.

```
switch(config-if)#exit
switch(config)#interface ethernet 1/12 , Ethernet 2/12
switch(config-if-range)#switchport mode trunk
switch(config-if-range)#channel-group 1
switch(config-if-range)#no shutdown
switch(config-if-range)#exit

switch(config)#interface port-channel 1
switch(config-if)#flowcontrol receive on
switch(config-if)#flowcontrol send off
switch(config-if)#exit
```

## 2.8 Enable Jumbo Frames globally

```
switch(config)#policy-map type network-qos jumbo
switch(config-pmap-nq)#class type network-qos class-default
switch(config-pmap-nq)#mtu 9216
switch(config-pmap-nq-c)#exit
switch(config-pmap-nq)#exit
switch(config)#system qos
switch(config-sys-qos)#service-policy type network-qos jumbo
switch(config-sys-qos)#exit
```

## 2.9 Enable link level flow control (802.3x) on edge ports

Perform this step for each individual port that is connected to a storage controller or a host server interface port, or specify a range of ports to configure.

```
switch(config)#interface ethernet 1/1/1-4 , eth1/2/1-4 , eth1/3/1-4 , eth1/4/1-4
switch(config-if-range)#flowcontrol send off
switch(config-if-range)#flowcontrol receive on
```

## 2.10 Configure portfast on edge ports

```
switch(config-if-range)#spanning-tree port type edge
```

Warning: edge port type (portfast) should only be enabled on ports connected to a single host. Connecting hubs, concentrators, switches, bridges, etc... to this interface when edge port type (portfast) is enabled, can cause temporary bridging loops. Use with CAUTION.

Edge Port Type (Portfast) will be configured in 9 interfaces due to the range command but will only have effect when the interfaces are in a non-trunking mode.

## 2.11 Enable switch ports

The following example enables a range of ports. If preferred, enable individual ports as needed.

```
switch(config-if-range)#shutdown
switch(config-if-range)#no shutdown
switch (config-if-range)#exit
switch(config)#exit
```

## 2.12 Save configuration

```
switch# copy running-config startup-config
```

## 2.13 Reboot switch

```
switch# reload
```

## 2.14 Configure additional switch

Repeat the steps in sections 2.1 through 2.123 to configure the second switch.

### 3 Configure Data Center Bridging (DCB) (optional)

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

---

**Note:** This section assumes a new switch that has a default startup configuration file. Always back up the startup configuration file prior to making any configuration changes. This section also assumes that the selected ports are already in 10g-4x breakout mode as defined in section 2.4.

---



---

**Note:** This section enables Data Center Bridging for implementing a converged network (LAN and SAN traffic sharing the same switch fabric). Hosts connecting to PS Series iSCSI storage must have a supported converged network adapter (CNA).

---

#### 3.1 Enable DCB

```
switch# configure
switch(config)# lldp tlv-select dcbxp
switch(config)# copy running-config startup-config
```

#### 3.2 Enable VLAN

The following example uses VLAN 100 for SAN storage and VLAN 200 for other traffic. Any valid VLAN (between 2-4094) may be substituted.

```
switch(config)# vlan 100,200
switch(config-vlan)# exit
```

#### 3.3 Configure the vPC domain

```
switch(config)#feature lacp
switch(config)#feature vpc
switch(config)#vpc domain 1
switch(config-vpc-domain)#peer-keepalive destination peer IP address
-----:: Management VRF will be used as the default VRF ::-----
```

---

**Note:** For the *peer IP address*, use the management IP address of the partner switch.

---

```
switch(config-vpc-domain)#exit
```

#### 3.4 Configure port channel

---

**Note:** VLANs are used to separate iSCSI traffic (100) and non-iSCSI traffic (200 — default traffic class).

---

```
switch(config)# interface port-channel 1
switch(config-if)# switchport mode trunk
switch(config-if)# switchport trunk allowed vlan 100,200
switch(config-if)# spanning-tree port type network
switch(config-if)# vpc peer-link
```

Please note that spanning tree port type is changed to "network" port type on vPC peer-link. This will enable spanning tree Bridge Assurance on vPC peer-link provided the STP Bridge Assurance (which is enabled by default) is not disabled.

```
switch(config-if)# exit
```

```
switch(config)# interface ethernet 1/12 , ethernet 2/12  
switch(config-if-range)# switchport mode trunk  
switch(config-if-range)# switchport trunk allowed vlan 100,200  
switch(config-if-range)# channel-group 1 mode active  
switch(config-if-range)# shutdown  
switch(config-if-range)# no shutdown  
switch(config-if-range)# exit
```

```
switch(config)# interface port-channel 1  
switch(config-if)# priority-flow-control mode auto  
switch(config-if)# shutdown  
switch(config-if)# no shutdown  
switch(config-if)# exit
```

## 3.5 Configure portfast on edge ports

```
switch(config)#interface ethernet 1/1/1-4 , eth1/2/1-4 , eth1/3/1-4 , eth1/4/1-4  
switch(config-if-range)#spanning-tree port type edge
```

Warning: edge port type (portfast) should only be enabled on ports connected to a single host. Connecting hubs, concentrators, switches, bridges, etc... to this interface when edge port type (portfast) is enabled, can cause temporary bridging loops. Use with CAUTION.

Edge Port Type (Portfast) will be configured in 48 interfaces due to the range command but will only have effect when the interfaces are in a non-trunking mode.

### 3.5.1 Configure VLANs for iSCSI

Repeat this step for each individual interface connected to the host and array controller ports, or specify a range of ports to configure.

---

**Note:** One VLAN is for iSCSI traffic, and the second VLAN is for other traffic classes.

---

```
switch(config-if-range)# switchport mode trunk  
switch(config-if-range)# switchport trunk allowed vlan 100,200  
switch(config-if-range)#exit
```

## 3.6 Configure the Nexus policy engine

The following subsections configure iSCSI traffic for Class of Service (CoS) 4 and Quality of Service (QoS) group 4.

### 3.6.1 Define a QoS map for iSCSI

```
switch(config)# class-map type qos match-all class-iscsi  
switch(config-cmap-qos)# match protocol iscsi  
switch(config-cmap-qos)# match cos 4  
switch(config-cmap-qos)# exit
```

### 3.6.2 Define a QoS policy map for iSCSI

```
switch(config)# policy-map type qos iscsi-in-policy  
switch(config-pmap-qos)# class class-iscsi  
switch(config-pmap-c-qos)# set qos-group 4  
switch(config-pmap-c-qos)# exit  
switch((config-pmap-qos)# exit
```

### 3.6.3 Define a queuing class-map

```
switch(config)# class-map type queuing class-iscsi  
switch(config-cmap-que)# match qos-group 4  
switch(config-cmap-que)# exit
```

### 3.6.4 Define a network QoS class map

```
switch(config)# class-map type network-qos class-iscsi  
switch(config-cmap-nq)# match qos-group 4  
switch(config-cmap-nq)# exit
```

### 3.6.5 Define a queuing policy-map

```
Switch(config)# policy-map type queuing iscsi-in-policy  
switch(config-pmap-que)# class type queuing class-default  
switch(config-pmap-c-que)# bandwidth percent 50  
switch(config-pmap-c-que)# class type queuing class-fcoe  
switch(config-pmap-c-que)# bandwidth percent 0  
switch(config-pmap-c-que)# class type queuing class-iscsi  
switch(config-pmap-c-que)# bandwidth percent 50  
switch(config-pmap-c-que)# exit  
switch(config-pmap-que)# exit
```

### 3.6.6 Define a no-drop policy map and enable jumbo frames

```
switch(config)# policy-map type network-qos iscsi-nq-policy  
switch(config-pmap-nq)# class type network-qos class-iscsi  
switch(config-pmap-nq-c)# set cos 4  
switch(config-pmap-nq-c)# mtu 9216  
switch(config-pmap-nq-c)# pause no-drop  
switch(config-pmap-nq-c)# exit
```

---

**Note:** The following steps are recommended and enable jumbo MTU for the default class (non-iSCSI traffic).

---

```
switch(config-pmap-nq) #class type network-qos class-default
switch(config-pmap-nq-c) #mtu 9216
switch(config-pmap-nq-c) # exit
switch(config-pmap-nq) # exit
```

### 3.7 Apply the Nexus policies

```
switch(config) # system qos
switch(config-sys-qos) # service-policy type qos input iscsi-in-policy
switch(config-sys-qos) # service-policy type queuing input iscsi-in-policy
switch(config-sys-qos) # service-policy type queuing output iscsi-in-policy
switch(config-sys-qos) # service-policy type network-qos iscsi-nq-policy
switch(config-sys-qos) # exit
```

### 3.8 Enable ports

```
switch(config) #interface ethernet 1/1/1-4 , eth1/2/1-4 , eth1/3/1-4 , eth1/4/1-4
switch(config) #shutdown
switch(config) #no shutdown
```

### 3.9 Save configuration

```
switch#copy running-config startup-config
```

### 3.10 Reboot switch

```
switch#reload
```

### 3.11 Configure additional switch

Repeat the commands from sections 3.1 through 3.10 to configure the second switch.

## A Technical support and resources

[Dell.com/support](http://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 Dell EMC publications:

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