



Dell Networking N4000 Series and Dell PowerConnect 8100 Series

Switch Configuration Guide for EqualLogic SANs

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Revisions

Date	Description
February 2013	Initial release
February 2014	Updated branding to include N4000 series
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1 Introduction

This document illustrates how to configure Dell™ Networking 4000 Series and Dell PowerConnect 8100 switches for use with EqualLogic™ PS Series storage using Dell best practices. The recommended configuration uses link aggregation groups (LAGs) for inter-switch connections. Optional steps are provided in Section 3 to enable Data Center Bridging (DCB).

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 in this Switch Configuration Guide.

For more information on EqualLogic SAN design recommendations, see the EqualLogic Configuration Guide at: <http://en.community.dell.com/dell-groups/dtcmmedia/m/mediagallery/19852516/download.aspx>.

1.1 Audience

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

1.2 Switch details

The table below provides an overview of the switch configuration.

Table 1 Switch specifications

Dell Networking N4000 Series or Dell PowerConnect 8100	
Switch vendor	Dell
Switch model	Dell Networking N4032, N4032F, N4064, N4064F Dell PowerConnect 8132, 8132F, 8164, 8164F
Switch firmware	6.0.1.3 and later

The latest firmware updates and documentation can be found at: support.dell.com.



1.3 Cabling diagram

The cabling diagram shown below represents the Dell recommend method for deploying your servers and EqualLogic arrays.

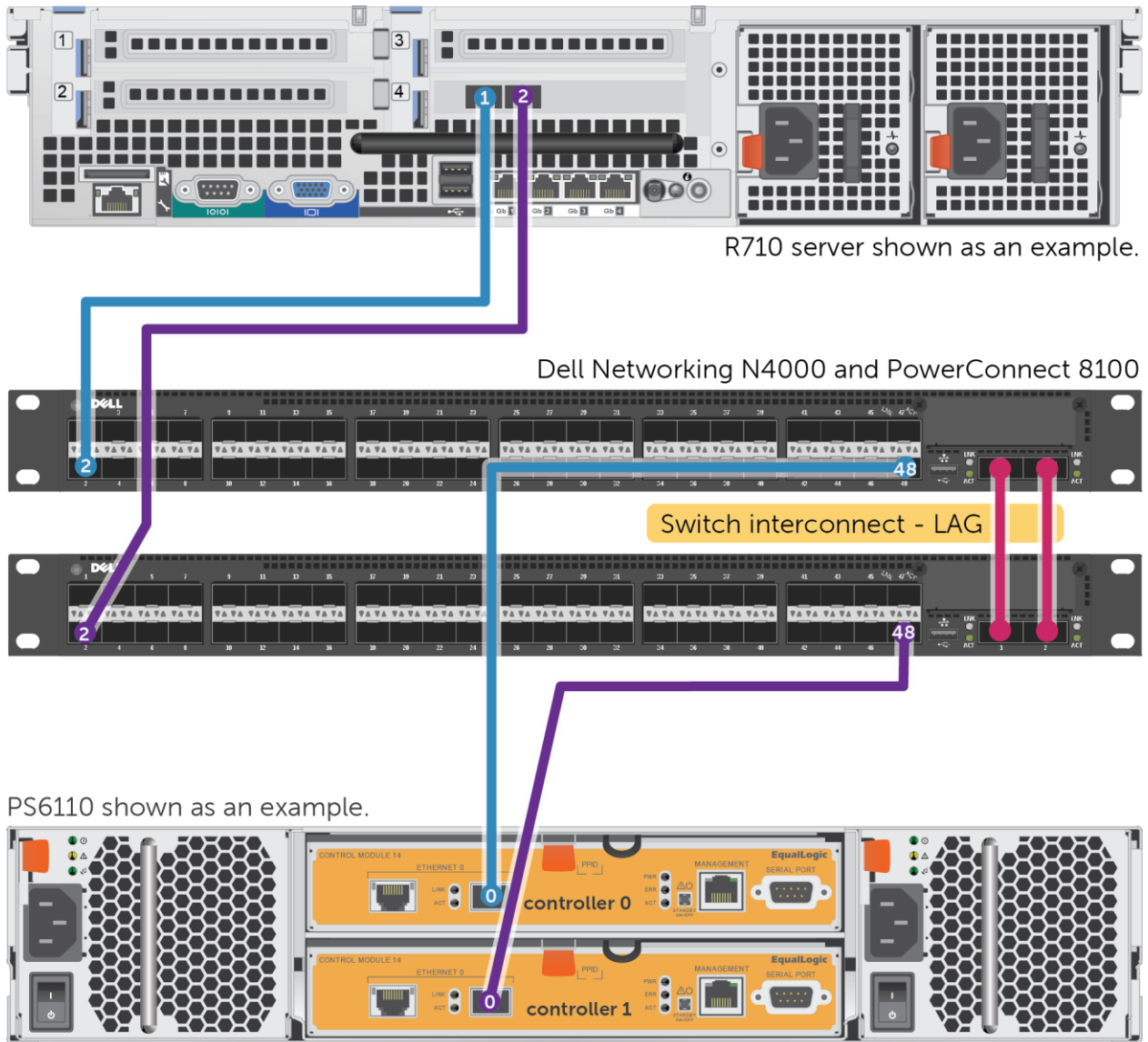


Figure 1 Cabling diagram

Note: Dell Networking N4064, N4064F and PowerConnect 8164, 8164F switches have two built-in QSFP ports. For the Dell Networking N4032/N4032F and PowerConnect 8132/8132F switches, an optional QSFP uplink module must be installed.



2 Dell recommended switch configuration

These steps show how to configure two Dell PowerConnect 8100 Series or Dell Networking N4000 Series switches with a Link Aggregation Group (LAG). The switches are interconnected using two 40 GbE Quad Small Form-factor Pluggable (QSFP) uplink ports, and the LAG is configured for Dynamic Link Aggregation Control Protocol (LACP).

Dell recommends using QSFP (40 Gb) uplink module ports to create a Link Aggregation Group (LAG) between switches. This option can provide the highest switch interconnect bandwidth as well as the best availability.

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 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 9600,N,8,1 and no flow control.
5. Connect the (QSFP) LAG cables between the switches. See this configuration in Figure 1.

2.2 Delete startup configuration

Note: All configuration settings will be deleted

```
console>enable
```

```
console#reload
```

```
Are you sure you want to reload the stack? (y/n) y
```

Note: The switch will reboot.

Follow the prompts shown below when the Main Menu is displayed during the bootup process.

```
Dell Networking Boot Options
```

```
=====
```

```
Select a menu option within 3 seconds or the Operational Code will start automatically...
```

```
1 - Start Operational Code
```

```
2 - Display Boot Menu
```

```
Select (1, 2) # 2
```



Boot Main Menu

=====

- 1 - Start Operational Code
- 2 - Select Baud Rate
- 3 - Retrieve Logs
- 4 - Load New Operational Code
- 5 - Display Operational Code Details
- 9 - Reboot
- 10 - Restore Configuration to Factory Defaults
- 11 - Activate Backup Image
- 12 - Start Password Recovery

Enter choice number **10**.

Are sure you want to Erase Current Configuration? (Y/N): Y

Erasing Current Configuration...done.

Boot Main Menu

=====

- 1 - Start Operational Code
- 2 - Select Baud Rate
- 3 - Retrieve Logs
- 4 - Load New Operational Code
- 5 - Display Operational Code Details
- 9 - Reboot
- 10 - Restore Configuration to Factory Defaults
- 11 - Activate Backup Image
- 12 - Start Password Recovery

Enter choice number **9** and the system will reboot. Wait for the following prompt:



Would you like to run the setup wizard (you must answer this question within 60 seconds)? [Y/N] **N**

2.3 Disable DCB

Note: If you plan to configure DCB (using Section 3) skip this section. For non-DCB environments, DCB must be manually disabled using the following steps:

```
console>enable  
console#configure  
console(config)#no dcb enable  
console(config)#exit
```

2.4 Configure out of band (OOB) management port

```
console>enable  
console>#configure  
console(config)#interface out-of-band  
console(config-if)#ip address ipaddress mask gateway  
console(config-if)#exit
```

2.5 Http and Telnet authentication

```
console>enable  
console#config  
console(config)#line telnet  
console(config-telnet)#login authentication default  
console(config-telnet)#exit  
console(config)#ip http authentication local
```

2.6 Configure login credentials

```
console(config)#username admin password yourpassword privilege 15  
console(config)#enable password yourpassword
```



```
console(config)#exit
```

2.7 Enable iSCSI optimization feature

This feature, enabled by default, is activated when EqualLogic arrays are detected. It automatically performs the following:

- Configures jumbo frames to 9216 on all ports.
- Disables unicast storm.
- Enables spanning tree portfast on ports connected to EqualLogic arrays.
- Configures flow control on all ports.

Note: Spanning tree portfast must be manually configured for host facing ports. Refer to Section 2.8.

```
console#configure
```

```
console(config)#iscsi enable
```

Enabling iSCSI Optimization will enable Flow Control which may cause all the interfaces to temporarily go down.

```
Are you sure you want to continue? (y/n) y
```

```
console(config)#exit
```

2.8 Configure flow control (optional)

Note: If iSCSI optimization is enabled, flow control is automatically configured on all switch ports upon detection of an EqualLogic Array. If you plan to enable DCB (using Section 3), you may skip this section.

```
console#configure
```

```
console(config)#flowcontrol receive on
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

```
Are you sure you want to continue? (y/n) y
```

```
console(config)#exit
```

2.9 Configure Jumbo MTU for all ports

```
console(config)#system jumbo mtu 9216
```

```
console(config)# exit
```



2.10 Configure spanning tree portfast on edge ports

Note: If iSCSI optimization is enabled, spanning tree portfast is automatically configured on ports connected to EqualLogic arrays. These manual steps must be performed on switch ports connected to hosts servers.

```
console#configure

console(config)#interface range tengigabitethernet all

console(config-if)#spanning-tree portfast

console(config-if)#exit
```

2.11 Configure QSFP ports for LAG

These commands assign 40Gb QSFP ports to the Port Channel.

```
console(config)#interface range fortygigabitethernet 1/0/1-2
```

Note: Port numbering for the 40Gb QSFP ports may vary by switch model and module configuration. Confirm the correct port range for your configuration.

```
console(config-if)#no spanning-tree portfast

console(config-if)#channel-group 1 mode active

console(config-if)#exit
```

2.12 Save configuration

```
console#copy running-config startup-config
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

```
Are you sure you want to save? (y/n)y
```

2.13 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 you prefer to place ports in a non-default VLAN, refer to the documentation for your switch.



3 Configure Data Center Bridging (DCB) (Optional)

DCB is enabled by default. This section shows the steps required to configure DCB.

Note: You must complete the Dell recommended switch configuration steps in Sections 2.1 to 2.12 before configuring the switch for DCB mode.

3.1 Enable DCB

If DCB was previously disabled, it must be manually re-enabled.

```
console#configure  
console (config) #dcb enable
```

3.2 Create VLAN

```
console#configure  
console (conf) # vlan vlan-id
```

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

```
console (conf) #exit
```

3.3 Configure class of service, dot1p mapping, and traffic class

```
console (config) #iscsi cos enable  
console (config) #iscsi cos vpt 4  
console (config) #classofservice dot1p-mapping 4 4  
console (config) #classofservice traffic-class-group 4 1
```

3.4 Configure Priority flow control on switch ports and port channel

```
console (config) #interface range tengigabitethernet all  
console (config-if) #datacenter-bridging  
console (config-if-dcb) #priority-flow-control mode on  
console (config-if-dcb) #priority-flow-control priority 4 no-drop  
console (config-if-dcb) #exit  
console (config-if) #switchport mode trunk
```



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

```
console(config)#interface range fortygigabitethernet 1/0/1-2
```

Note: Port numbering for the 40Gb QSFP ports may vary by switch model and module configuration. Confirm the correct port range for your configuration.

```
console(config-if)#datacenter-bridging
```

```
console(config-if-dcb)#priority-flow-control mode on
```

```
console(config-if-dcb)#priority-flow-control priority 4 no-drop
```

```
console(config-if-dcb)#exit
```

```
console(config-if)#switchport mode trunk
```

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

```
console(config)#interface port-channel 1
```

```
console(config-if-Po1)#switchport mode trunk
```

```
console(config-if-Po1)#exit
```

3.5 Configure ETS values

```
console(config)#traffic-class-group weight 50 50 0
```

Note: This command uses an example of 50% non-iSCSI traffic (first parameter) and 50% iSCSI traffic (second parameter). The sum of the bandwidth-percentages must be equal to 100.

```
console(config)#exit
```

3.6 Save configuration

```
console# copy running-config startup-config
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

```
Are you sure you want to save? (y/n)y
```



3.7 Configure additional switches

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



4 Reverting 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, then use the following procedure to unconfigure DCB and enable standard flow control.

Note: This is a disruptive operation that requires down time. 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 and the DCB policies

```
console#configure
```

```
console(config)#no dcb enable
```

```
console(config)# no traffic-class-group weight
```

```
console(config)#no classofservice dot1p-mapping
```

```
console(config)#no classofservice traffic-class-group
```

```
console(config)#no iscsi cos
```

```
console(config)#interface range tengigabitethernet all
```

```
console(config-if)#datacenter-bridging
```

```
console(config-if-dcb)#no priority-flow-control mode
```

```
console(config-if-dcb)#no priority-flow-control priority
```

```
console(config-if-dcb)#exit
```

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

```
console(config)#interface range fortygigabitethernet all
```

```
console(config-if)#datacenter-bridging
```

```
console(config-if-dcb)#no priority-flow-control mode
```

```
console(config-if-dcb)#no priority-flow-control priority
```

```
console(config-if-dcb)#exit
```

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



4.2 Revert to default VLAN ID on switch and arrays

Once DCB is disabled on the switch, the EqualLogic 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 EqualLogic 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, then any ports connected to the arrays must be configured as “untagged”.

Use the steps below to configure the native VLAN on the switch.

```
console#configure
console(config)#interface range tengigabitethernet all
console(config-if)#no switchport mode
console(config-if)#exit
console(config)#interface range fortygigabitethernet all
console(config-if)#no switchport mode
console(config-if)#exit
console(config)#interface port-channel 1
console(config-if)#no switchport mode
console(config-if)#exit
console(config)#no vlan vlan-id
console(config)#exit
```

4.3 Save configuration

```
console# copy running-config startup-config
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

```
Are you sure you want to save? (y/n)y
```

4.4 Configure additional switch

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



Additional resources

[Support.dell.com](http://support.dell.com) is focused on meeting your needs with proven services and support.

DellTechCenter.com is an IT Community where you can connect with Dell Customers and Dell employees for the purpose of sharing knowledge, best practices, and information about Dell products and your installations.

Referenced or recommended Dell publications:

- Dell EqualLogic Configuration Guide:
<http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/19852516/download.aspx>
- Dell EqualLogic Compatibility Matrix:
<http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/19856862/download.aspx>

For EqualLogic best practices white papers, reference architectures, and sizing guidelines for enterprise applications and SANs, refer to Storage Infrastructure and Solutions Team Publications at:

- <http://dell.to/sM4hJT>

