

Dell PowerStore

Networking Guide for PowerStore T Models

Version 3.x

Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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As part of an improvement effort, revisions of the software and hardware are periodically released. Some functions that are described in this document are not supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information about product features. Contact your service provider if a product does not function properly or does not function as described in this document.

Where to get help

Support, product, and licensing information can be obtained as follows:

- **Product information**

For product and feature documentation or release notes, go to the PowerStore Documentation page at <https://www.dell.com/powerstoredocs>.

- **Troubleshooting**

For information about products, software updates, licensing, and service, go to <https://www.dell.com/support> and locate the appropriate product support page.

- **Technical support**

For technical support and service requests, go to <https://www.dell.com/support> and locate the **Service Requests** page. To open a service request, you must have a valid support agreement. Contact your Sales Representative for details about obtaining a valid support agreement or to answer any questions about your account.

Overview

This chapter includes the following information.

Topics:


- [PowerStore T model appliance overview](#)
- [PowerStore T model initial deployment and storage network configuration](#)
- [Supported switches](#)

PowerStore T model appliance overview

Supports block (Storage Area Network (SAN)), file (Network Attached Storage (NAS)), and Virtual Volume (vVol) workloads with the software stack deployed directly on the bare metal of the system.

PowerStore T model numbers:

- 500
- 1000
- 1200
- 3000
- 3200
- 5000
- 5200
- 7000
- 9000
- 9200

 **NOTE:** Hypervisor deployments are not supported on this model. Hypervisor deployments are supported on PowerStore X model appliances.

Supporting documentation

In addition to reading through this document, you should also read through the following guides, prior to configuring your switches and networks:

- *PowerStore Quick Start Guide*
- *PowerStore Planning Guide*
- *PowerStore Hardware Information Guide*
- *Hardware Information Guide for PowerStore 1000, 1200, 3000, 3200, 5000, 5200, 7000, 9000, and 9200*
- *Hardware Information Guide for PowerStore 500T Model*
- *Installation and Service Guide for PowerStore 1000, 1200, 3000, 3200, 5000, 5200, 7000, 9000, and 9200*
- *Installation and Service Guide for PowerStore 500T Model*

PowerStore T model initial deployment and storage network configuration

Once you have installed the PowerStore T model hardware, the Management switch and network must be configured as part of initial deployment.

Once the PowerStore T model appliance has been deployed, you have the option of adding storage services.

Table 1. PowerStore T model deployment options

Deployment option	Protocols and services	Switch requirements	Refer to
Initial deployment (Required)	Fibre Channel (FC) connectivity	At least one Management switch	Part 1: PowerStore T model Initial Deployment
Add storage services (Optional)	<div>Block-optimized which includes Fibre Channel (FC) connectivity with the option of adding:<ul style="list-style-type: none">• iSCSI host connectivity• NVMe/TCP host connectivity• Replication and Block Import• Clustering</div> <div>Unified which includes Fibre Channel connectivity, Block-optimized options with the option of adding:<ul style="list-style-type: none">• Network Attached Storage• File Mobility (required for File Replication and File Import)</div>	At least one management switch and two Top-of-Rack (ToR) switches	Part 2: PowerStore T model Add Storage Services

Supported switches

The planning, and requirements sections of this guide can be used to prepare to deploy PowerStore appliance with any supported switch. The configuration steps provided in this guide, however, are specific steps for deploying PowerStore with Dell PowerSwitch Series S4148-ON switches.

If you will not be deploying PowerStore with the S4148-ON switches, see the *PowerStore Simple Support Matrix* available at <https://www.dell.com/powerstoredocs> for details.

Initial Deployment

This part contains information to complete your initial deployment of PowerStore T model.

Topics:

- [Initial deployment of PowerStore T model overview](#)
- [Prepare to configure the Management switch and networks](#)
- [Switch and network requirements for initial deployment](#)
- [Configuring Dell PowerSwitch Series for Initial Deployment](#)
- [Discovering PowerStore Appliances](#)
- [Initial configuration of the PowerStore T model appliance](#)

Initial deployment of PowerStore T model overview

Topics:

- [Initial deployment of PowerStore T model](#)

Initial deployment of PowerStore T model

Initial deployment of PowerStore T model requires you to configure the Management switch and network.

Once the Management switch is configured and connected to the PowerStore T model nodes, you will discover the PowerStore T model appliance and configure the networks in the PowerStore Manager **Initial Configuration Wizard**.

After you have completed initial deployment, PowerStore T model will be configured to support Fibre Channel Connectivity.

If you want to support services such as iSCSI or NVMe/TCP host connectivity, replication, import, clustering or Network Attached Storage (NAS) you will need to perform additional configuration steps as described in [Part 2: Add Storage Services](#).

Prepare to configure the Management switch and networks

This chapter includes the following information.

Topics:

- [Reserve network resources for initial deployment](#)
- [Complete the required fields in the Initial Configuration Worksheet](#)

Reserve network resources for initial deployment

Work with your network administrator to complete the following two worksheets to reserve the necessary resources for initial deployment of the PowerStore T model appliance.

For details about the requirements and network resources you will be using to deploy a PowerStore T model appliance see [Switch and network requirements for initial deployment](#).

If you will be configuring Top-of-Rack (ToR) switches for additional protocols and services after initial deployment, you may also want to reserve the necessary resources to configure the ToR switches now. See [Storage Network Preparation Worksheet](#).

Once completed, the *Management Network Preparation Worksheet* will have a list of the resources required to configure the Management switch for initial deployment of your PowerStore T model appliance.

Table 2. Management Network Preparation Worksheet

Step	Step details	Notes
1.	Print this table to record the reserved resources.	
2.	Print out the Initial Configuration Worksheet to record the additional network resources you will need to create networks in PowerStore T model the first time you create a cluster.	
3.	Record the Management switch ports to connect to:	
	Node A management 1GbE port to	
	Node B management 1GbE port to	
4.	Optionally, record the port on the Management switch to use for remote discovery.	
5.	Record the VLAN ID that will be used on the Management switch for:	
	Management and Remote Discovery (same when untagged)	
6.	Reserve and record the IP addresses necessary to configure the switch below:	
	Management IP address for Management switch	
	Default gateway	
	NTP server	
7.	Work with your network administrator to determine the management upstream connections and record:	
	The port on the Management switch connected to Management upstream A	
	The port on the Management switch connected Management to upstream B	

Table 2. Management Network Preparation Worksheet (continued)

Step	Step details	Notes
	The port channel ID for the Management switch.	
8.	Once you have completed the steps above, you have the necessary information to configure the switches. Continue to work with your network administrator to complete the <i>Initial Configuration Worksheet</i> below to ensure that: <ul style="list-style-type: none"> Your network configuration on the switch aligns with the network configuration that will be done in PowerStore T model. You reserve the necessary network resources to complete initial configuration of PowerStore T model and the PowerStore T model networks. 	
9.	Determine if you will use a direct connection or a remote connection to discover your PowerStore. Once you have successfully discovered your PowerStore, you will be guided through the Initial Configuration Wizard to create your first PowerStore cluster.	

For a sample of a completed *Management Network Preparation Worksheet* for Dell PowerSwitch Series see, [Example of completed Management Network Preparation Worksheet](#).

Complete the required fields in the Initial Configuration Worksheet

Once completed the *Initial Configuration Worksheet*, will have a list of the resources required to run through PowerStore T model **Initial Configuration Wizard** which must be completed before you can access the PowerStore Manager user interface.

The **Initial Configuration Wizard** is automatically launched after you have discovered PowerStore T model. You cannot go through initial configuration of PowerStore T model without the following information.

Table 3. Initial Configuration Worksheet (blank)

Initial Login Information			
Use the following default user credentials when you log in to the PowerStore Manager for the first time.			
You must enter a new admin password to complete initial configuration of the PowerStore T model cluster.			
Default Username	Admin		
Default Password	Password123#	New Admin Password	
Cluster Details			
For resource management, efficiency, and availability purposes, appliances act as a single component that is called a cluster.			
Cluster Name			
Storage Configuration	Unified		
Select either: Unified (Default Block and File Storage) or Block Optimized	Block Optimized		
Appliance Service Tags		Single Drive Failure or Double Drive Failure	
Enter the service tag. The service tag appears on the black tag on the front of the base enclosure. When the systems arrive identify the base enclosures that you want to configure as a cluster and record their service tags.		Single Drive Failure or Double Drive Failure	
Drive Failure Tolerance Level		Single Drive Failure or Double Drive Failure	
Next to each appliance select the drive failure tolerance level you want to set. The drive failure tolerance level indicates the number of concurrent		Single Drive Failure or Double Drive Failure	

Table 3. Initial Configuration Worksheet (blank) (continued)



<p>drive failures the appliance can sustain without causing a data unavailable or data loss event. The single drive fault tolerance level meets availability requirements for all drive types and capacity points. But the double drive failure tolerance can provide higher resiliency and protection.</p> <p>Ensure that there are at least the following number of SSD drives in the enclosure:</p> <ul style="list-style-type: none"> At least 6 for single drive failure tolerance 7 for double drive failure tolerance <p> NOTE: Once set, the drive failure tolerance level for an appliance cannot be changed.</p>			<p>Double Drive Failure</p> <p>Single Drive Failure or Double Drive Failure</p>
<p>Management Network</p> <p>Your cluster requires a dedicated set of IP addresses for the cluster and Management network.</p> <p>The Management network Connects the cluster to services such as DNS and NTP. The IP Addresses in the management network are used to address the cluster, appliances, controllers, and internal hosts.</p>			
<p>Cluster IP Address</p> <p>(1 IP address for each PowerStore cluster)</p> <p>This address is used to manage the cluster.</p>			
<p>VLAN (Optional, defaults to untagged)</p>	<p>Netmask/Prefix Length</p>	<p>Gateway</p>	<p>IP Addresses</p> <p>3 IPs for each PowerStore T model appliance</p> <p>Optionally: 3 IPs for the File Mobility Network. For details, see Appendix 1: File Mobility.</p>
			<p>Required for Management Network</p> <p>Optional for File Mobility Network</p>
<p>Infrastructure Services</p> <p>Record IP addresses for your DNS and NTP servers. It is recommended that you specify at least two addresses for DNS and NTP servers each.</p>			
<p>DNS Server</p>			
<p>NTP Server</p>			
<p>Out-of-Band Management Switch (Management switch) information</p> <p>You can provide read-only credentials for the switches.</p>		<p>Management switch 1</p>	<p>Management switch 2</p>
<p>Protocol (SSH/SNMP)</p>			
<p>IP Address</p>			
<p>Port</p>			
<p>User Credentials/Community String</p>			
<p>vCenter Information (Optional)</p> <p>Record your existing vCenter administrator login credentials. The initial configuration workflow automatically creates a data center and ESXi cluster, and associates them with your cluster.</p> <p> NOTE: Ensure that the vCenter Server is accessible on the network.</p>			

Table 3. Initial Configuration Worksheet (blank) (continued)

vCenter Server IP Address/Host Name	
vCenter Administrator Username	
vCenter Administrator Password	
PowerStore T model appliance Admin Credentials	
Enter the PowerStore T model appliance administrator credentials for vCenter to access the PowerStore T model appliance.	
Admin Username	
Password This is the user-defined password that is provided after initial login to the PowerStore T model appliance.	

For a sample of a completed *Initial Configuration Worksheet* for Dell PowerSwitch Series see, [Get your completed Initial Configuration Worksheet](#).

If you plan to add services, in addition to Fibre Channel connectivity, to your PowerStore T model appliance, you may want to reserve your Storage network IP addresses now, but it is optional. You will add the Storage networks after you have completed your initial configuration of PowerStore T model. For details see [Add Storage Services](#).

Switch and network requirements for initial deployment

This chapter includes the following information.

Topics:

- [Management switch connectivity](#)
- [Types of networks required for initial deployment](#)
- [VLAN options during initial deployment](#)
- [IP requirements for initial deployment](#)

Management switch connectivity

Deployment with at least one out-of-band management switch is required for all PowerStore T model deployments.

Node to Management switch connectivity requirements

The Management switch must be connected through the 1 GbE management port on each of the appliance base enclosure nodes as demonstrated in the following diagrams.

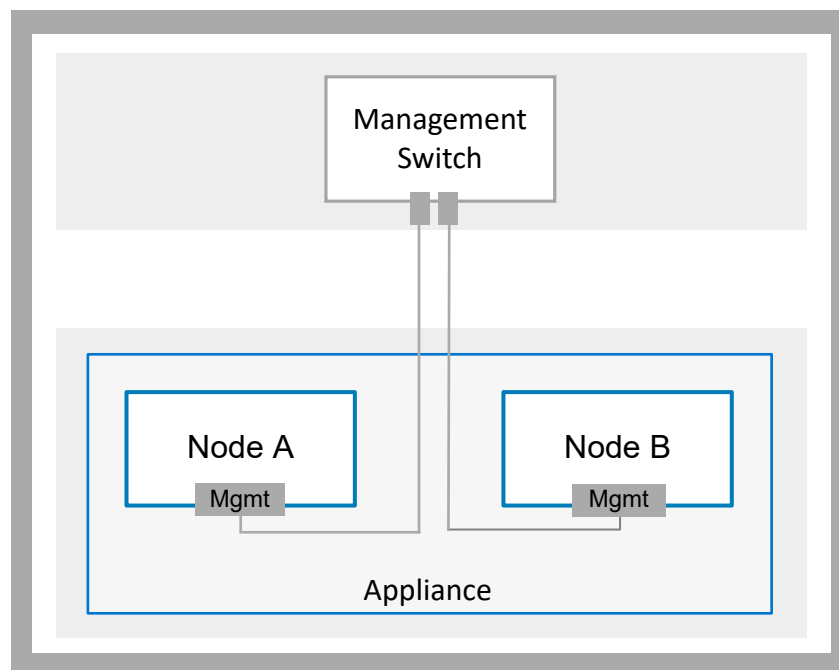


Figure 1. Management switch network topology

NOTE: For remote discovery of PowerStore T model, the Management switch ports must support untagged native VLAN traffic.

The following diagram shows where the management ports are located on the PowerStore T model base enclosure nodes.

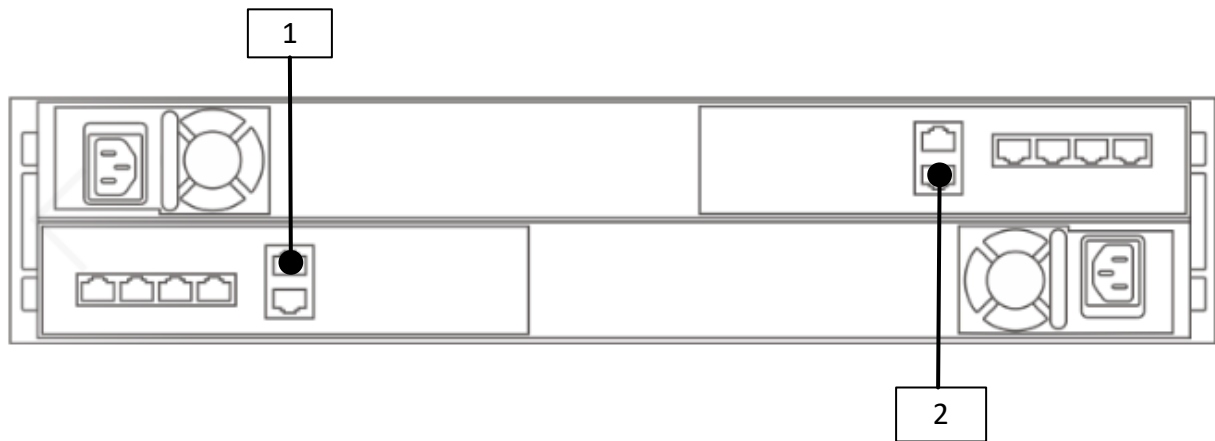


Figure 2. PowerStore T model base enclosure node management ports

Identifier	Description
1	Node A Management Port
2	Node B Management Port

Management switch with upstream connections

The following image shows an example of a management switch that connects to two Management upstream switches.

NOTE: The following diagram is an example of connectivity to the management upstream switches. Work with your network administrator to configure connectivity to the management upstream switches.

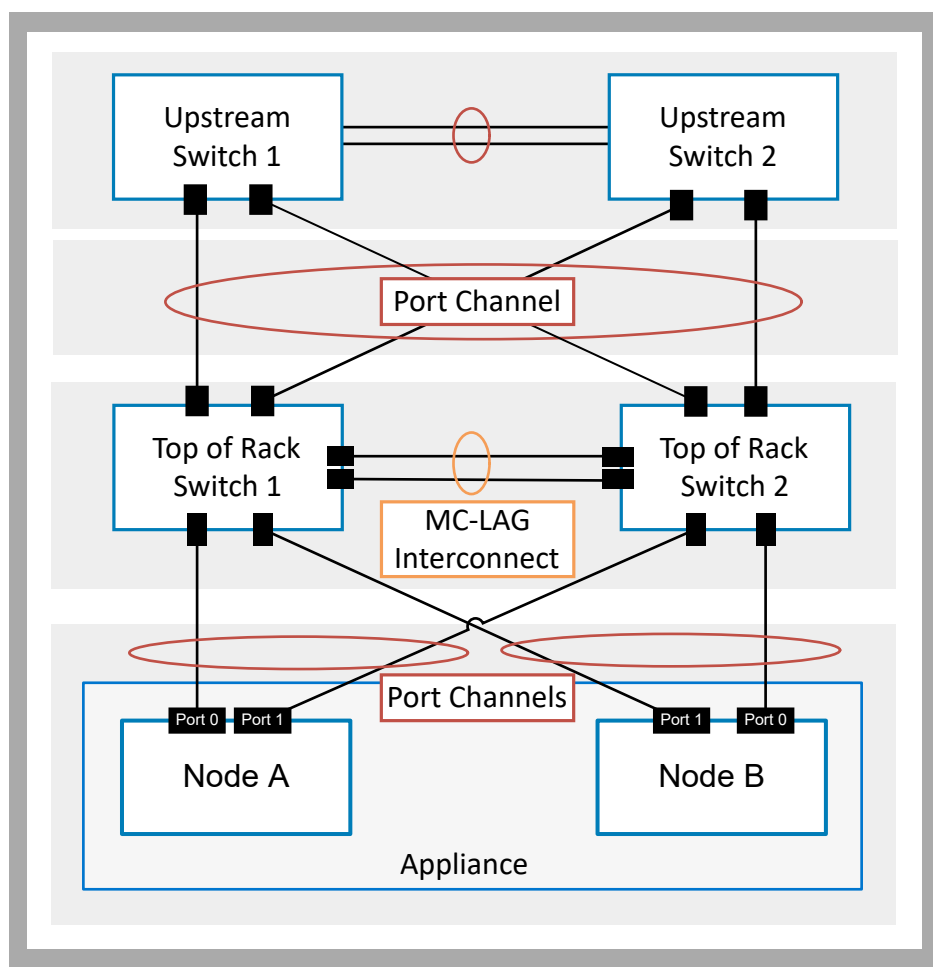


Figure 3. Management switch connectivity to the upstream switches

Types of networks required for initial deployment

PowerStore T model requires all networks to be unique. It is highly recommended to deploy PowerStore T model with multiple and unique VLANs to separate the traffic. However, if only one VLAN is available, you have the option to deploy PowerStore T model with a single VLAN and multiple unique subnets as demonstrated below.

The following networks must be configured on the Management switch for initial deployment.

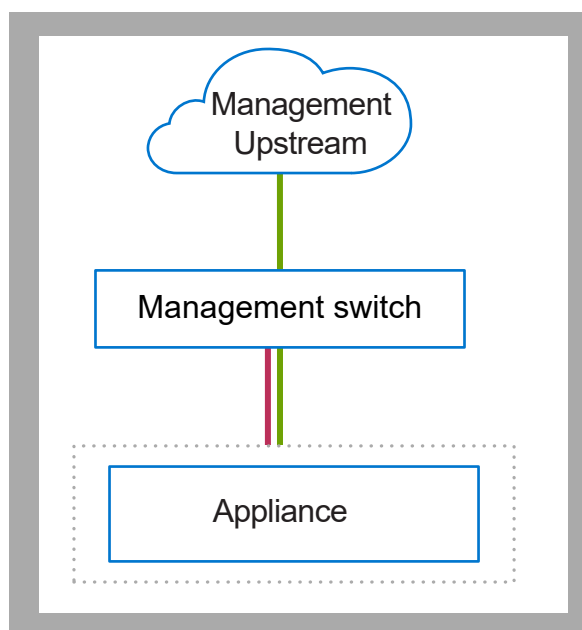





Figure 4. PowerStore T model logical network traffic

All traffic is transported through the Dedicated 1 GbE Management port on the base enclosure node.


Ensure that your PowerStore T model is able to communicate through the subnets shown above. Consult your network vendor documents to ensure all traffic is being routed properly for all networks that PowerStore T model is utilizing.

Table 4. PowerStore T model networks

Subnet	Description
	Management network traffic which provides access to: <ul style="list-style-type: none"> • Infrastructure services such as DNS, NTP, and SMTP. • PowerStore REST API, PowerStore Manager, and PowerStore CLI • SupportAssist • VASA provider
	Remote discovery network is generated automatically by the system and is broadcasted as untagged traffic over the management port. This network is used by the Discovery Tool that is running on a workstation. <p> NOTE: Remote discovery is optional. You can also discover the PowerStore appliance using a direct connection. For details see: Discovering PowerStore appliances.</p>

VLAN options during initial deployment

The following diagrams show examples of the different VLAN options for initial deployment of PowerStore T model.

 **NOTE:** This document provides examples for configuring the Management network with untagged VLANs.

Untagged Management VLAN

When the management VLAN is untagged, remote discovery and management of PowerStore T model runs over the native VLAN.

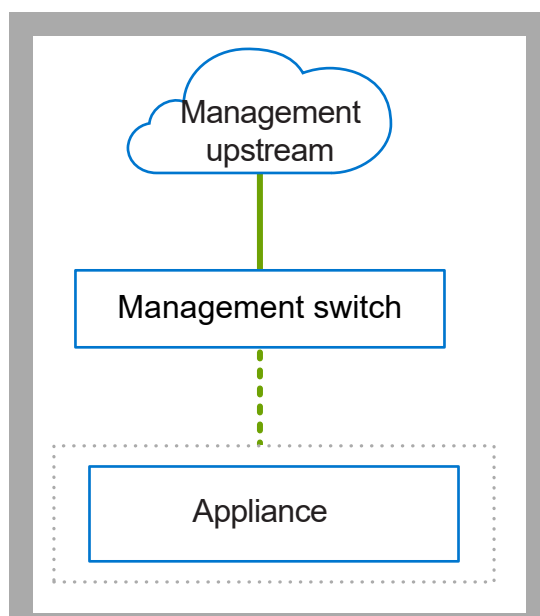






Figure 5. PowerStore T model networks with the Management VLAN untagged

Identifier	Description	Sample VLAN ID	Subnet
	Remote Discovery	100	169.254.x.x/16
	PowerStore T model management	100	y.y.y/24
	Untagged Traffic	N/A	N/A
	Tagged traffic	N/A	N/A

Tagged Management VLAN

When the management VLAN is tagged, remote discovery of PowerStore T model runs over the native VLAN and the management traffic runs over the tagged VLAN.

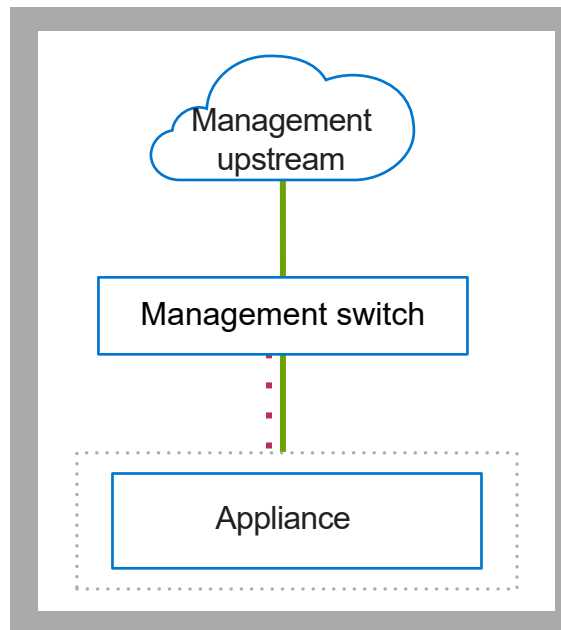






Figure 6. PowerStore T model networks with the Management VLAN tagged

Identifier	Description	Sample VLAN ID	Subnet
	PowerStore T model management	100	y.y.y/24
	Remote Discovery	101	169.254.x.x/16
	Untagged Traffic	N/A	N/A
	Tagged traffic	N/A	N/A

IP requirements for initial deployment

You will need IP addresses to configure the networks in PowerStore through the Initial Configuration Wizard (ICW) which runs automatically after you discover PowerStore.

Management network IP address requirements

You will need to reserve a total of 4 IP addresses for the management network:

- 3 IP addresses per appliance assigned as follows:
 - 1 to Node A
 - 1 to Node B
 - 1 to the appliance
- 1 IP per cluster

You can choose to assign either IPv4 or IPv6 addresses to the management network. You cannot assign different IP versions to the same network, for example, all 4 IPs assigned to the management network must all be either IPv4 or IPv6.

For details see the [Initial Configuration Worksheet](#).

NOTE: It is recommended that you reserve extra IP addresses to accommodate adding more appliances in the future.

Storage networks

There are no IP requirements for the Storage network during initial deployment. However, you will need IP address for the Storage networks if you are adding them later in PowerStore Manager, REST API, or CLI. See [Add Storage Services](#).

Configuring Dell PowerSwitch Series for Initial Deployment

This chapter includes the following information.

Topics:

- [Configuring with Dell PowerSwitch Series S4148 switches overview](#)
- [Install the Management switch into the PowerStore T model cabinet](#)
- [Get your completed Management Network Preparation Worksheet](#)
- [Steps to configure the Management switch for initial deployment](#)
- [Validate the configuration on the Management switch](#)
- [Network Validation Tool for PowerStore](#)

Configuring with Dell PowerSwitch Series S4148 switches overview

This section describes the steps to deploy PowerStore T model with a single cluster consisting of one appliance with a single base enclosure connected to a Dell PowerSwitch Series S4148 Management switch.

If you will not be deploying PowerStore with the S4148-ON switches, see the *PowerStore Simple Support Matrix* available at <https://www.dell.com/powerstoredocs> for details.

If you are configuring PowerStore T model with third-party switches, please refer to the switch proprietary documentation for commands and specific details.

Install the Management switch into the PowerStore T model cabinet

For instructions to install a Dell PowerSwitch S4148F-ON switch as the Management switch, see the *Dell PowerSwitch S4100-On Series Installation Guide* at: https://www.dell.com/support/manuals/networking-s4148f-on/s4100f_t_u_on_install_pub/two-post-flush-mount-installation?guid=guid-fcad010b-678e-43d6-b533-d967550969dd.

If you are deploying a PowerStore T model appliance with another Dell switch, or a third-party switch, see the switch proprietary documentation for commands and specific details to install the switch into the cabinet.

Get your completed Management Network Preparation Worksheet

You should have worked with your network administrator to complete the Management Network Preparation Worksheet.

The *Management Network Preparation Worksheet* below has been completed with the network resources used in the configuration examples provided in this document.

If you are not configuring your networks with the same resources demonstrated in this guide, you can complete a new *Management Network Preparation Worksheet* with the resources used in your environment. To access a blank worksheet see [Management Network Preparation Worksheet](#).

Table 5. Management Network Preparation Worksheet (completed)

Step	Step details	Notes
1.	Print this table to record the reserved resources.	
2.	Print out the <i>Initial Configuration Worksheet</i> to record the additional network resources you will need to create networks in PowerStore T model the first time you create a cluster.	
3.	Record the Management switch ports to connect to:	
	Node A management 1GbE port to	Management switch port 2
	Node B management 1GbE port to	Management switch port 53
4.	Optionally, record the port on the Management switch to use for remote discovery.	Management switch port 1
5.	Record the VLAN IDs that will be used on the Management switch:	
	Management and Remote Discovery (same when untagged)	100
6.	Reserve and record the IP addresses necessary to configure the switch below:	
	Management IP address for Management switch	100.0.100.50/24
	Default gateway	100.0.100.1
	NTP server	100.0.100.200
7.	Work with your network administrator to determine the management upstream connections and record:	
	The port on the Management switch connected to Management upstream A	Management switch port 25
	The port on the Management switch connected Management to upstream B	Management switch port 26
	The port channel ID for the Management switch.	port channel 10
8.	Once you have completed steps above, you have the necessary information to configure the switches. Continue to work with your network administrator to complete the <i>Initial Configuration Worksheet</i> now to ensure that: <ul style="list-style-type: none"> Your network configuration on the switch aligns with the network configuration that will be done in PowerStore T model. You reserve the necessary network resources to complete initial configuration of the PowerStore T model appliance. 	
9.	Determine if you will use a direct connection or a remote connection to discover your PowerStore. Once you have successfully discovered your PowerStore, you will be guided through the Initial Configuration Wizard to create your first PowerStore cluster.	

Steps to configure the Management switch for initial deployment

Initial deployment requires a minimum of one Management switch.

This document describes the steps to deploy PowerStore T model with a single cluster consisting of one appliance with a single base enclosure connected to a Dell PowerSwitch Series S4148 Management switch.

Steps to configure the Management switch include:

1. [Establish a terminal session to the Management switch.](#)
2. [Validate the switch version and licensing.](#)
3. [Configure the Management switch.](#)
4. [If you have not done so already, cable the Management switch to the base enclosure nodes.](#)

Once you have configured and cabled the Management switch to the base enclosure nodes, validate the configuration before discovering the PowerStore T model appliance. For validation options see: [Validate the Management switch configuration.](#)

Establish a terminal session to the switch

Perform the following steps to establish a terminal session to the serial console port on the Dell PowerSwitch Series S4148 switch.

These steps are specific to establishing connections to Dell PowerSwitch S4148-ON switches.

For console serial port cable requirements, and further details refer to the *Dell PowerSwitch S4100-ON Series Installation Guide* located at: <https://www.dell.com/support/home/us/en/04/product-support/product/networking-s4148f-on/docs>.

You must establish a terminal session to each of the switches to configure the switches for deployment.

- 1. Power on the switch.
- 2. Use a serial cable to connect a computer to the serial console port, which is the top port located on the PSU-side of the PowerSwitch.



Identifier	Description
1	Serial Port
2	Management Port

- 3. Open a terminal emulator program, such as PuTTY, on the computer.
- 4. Configure the serial connection in the terminal emulator program using the following settings.

Table 6. Serial connection settings

Setting	Value
Speed(baud)	115200 (9600 for micro-USB port)
Data bits	8
Stop bits	1
Parity	None
Flow control	None

- 5. Connect to the switch using the terminal emulator program.
- 6. Enter the switch log in credentials. Default username and password are:
 - Username: **admin**
 - Password: **admin**
- 7. Enter global configuration mode.

```
configure terminal
```

- 8. It is recommended that you change the password after logging into the switch for the first time. Use the following command to change the switch password.

```
username admin password <NEW_PASSWORD> role sysadmin
```

Validate the switch version and licensing

Before you configure the switch and networks, check the switch operating system version and licensing.

If you are required to upgrade your switch OS, or reinstall the switch license see the *OS10 Enterprise Edition User Guide* for details.

1. [Establish a terminal connection to the switch](#) and hit the **Enter** key after you have connected.
2. Run the command `show version` to display the OS version. Dell recommends upgrading to the latest release available on [Dell Digital Locker \(www.dell.com/support/software/\)](http://www.dell.com/support/software/).


```
OS10# show version
Dell Networking OS10-Enterprise
Copyright (c) 1999-2018 by Dell Inc. All Rights Reserved.
OS Version: 10.5.x.x
Build Version: 10.5.x.x.x
Build Time: 2018-09-26T17:20:01-0700
System Type: S4148F-ON
Architecture: x86_64
Up Time: 2 weeks 04:34:35
```

3. Verify that the license was installed on the switches.

Run the command `show license status` to display the license installation. The `License Type:` field should indicate PERPETUAL. If an evaluation license is installed, licenses purchased from Dell Technologies are available for download on [Dell Digital Locker \(www.dell.com/support/software/\)](http://www.dell.com/support/software/).

```
OS10# show license status

System Information
-----
Vendor Name : Dell
Product Name : S4148F-ON
Hardware Version: A00
Platform Name : x86_64-dellemc_s4100_c2538-r0
PPID : CN00Y2VTCEs008200038
Service Tag : D8MSG02
License Details
-----
Software : OS10-Enterprise
Version : 10.5.x.x
License Type : PERPETUAL
License Duration: Unlimited
License Status : Active
License location: /mnt/license/D8MSG02.lic
-----
```

 **NOTE:** If OS10EE was factory installed, a perpetual license is already installed on the switch.

4. Repeat the steps for each switch.

Configure the Management switch

If you are deploying PowerStore T model perform the following steps to configure the out-of-band (OOB) management switch settings.

Each Management switch must have the following ports available to connect to PowerStore T model:

- 2 ports for connectivity to the Management Uplink switch.
- 2 ports to connect to PowerStore T model.
- Optional, 1 port for remote discovery.

1. [Establish a terminal connection to the switch](#).
2. Enter global configuration mode.

```
configure terminal
```

3. Configure a hostname for the switch.

```
hostname powerStoreMgmtSwitch
```

4. Create a management VLAN.

```
interface vlan 100
description managementNetwork
no shutdown
exit
```

5. If performing remote discovery, optionally configure an ethernet interface on the switch for the remote discovery workstation.

```
interface ethernet 1/1/1
description discoveryWorkstation
switchport access vlan 100
no shutdown
exit
```

6. Configure the management IP address for the switch.

i NOTE: The following command sample assumes that automatic IP assignment through Dynamic Host Configuration Protocol (DHCP) is enabled on the switch. If automatic IP assignment through DHCP is not enabled, then you do not need to include `no ip address dhcp` in the commands below.

```
interface mgmt 1/1/1
no shutdown
no ip address dhcp
ip address 100.0.100.50/24
exit
```

7. Configure the management route (default gateway) for the switch.

```
management route 0.0.0.0/0 100.0.100.1
exit
```

8. Configure an NTP server for the switch.

```
ntp server 100.0.100.200
exit
```

9. Configure ethernet ports on the switch that will connect to the PowerStore T model management ports.

```
interface ethernet 1/1/2
description "PowerStoreNodeA_MgmtPort"
no shutdown
switchport mode access
switchport access vlan 100
exit

interface ethernet 1/1/53
description "PowerStoreNodeB_MgmtPort"
no shutdown
switchport mode access
switchport access vlan 100
exit
```

10. If you will be configuring a File Mobility network, you can perform the switch configuration steps described in [Configure the File Mobility network on the Management switch](#) now, or after you have completed initial cluster configuration.

11. Create the port-channel for the uplinks.

```
interface ethernet 1/1/26
description Uplink_Ports
no shutdown
channel-group 10 mode active
```

```
no switchport
flowcontrol receive off
flowcontrol transmit off
exit
```

Table 7. Code sample for configuring the Management switch

```
interface port-channel 10
description Uplink
no shutdown
switchport mode trunk
switchport access vlan 1
switchport trunk allowed vlan 100
exit

interface ethernet 1/1/25
description Uplink_Ports
no shutdown
channel-group 10 mode active
no switchport
flowcontrol receive off
flowcontrol transmit off
exit

interface ethernet 1/1/26
description Uplink_Ports
no shutdown
channel-group 10 mode active
no switchport
flowcontrol receive off
flowcontrol transmit off
exit
```

Cable the Management switch

Cable the Management switch to the appliance base enclosure nodes and the management uplink.

Examples in this guide demonstrate deploying the PowerStore T model appliance with Dell PowerSwitch S4148-ON switches.

Cable the management ports on the nodes to the Management switch

The Management switch is connected through the 1 GbE management port on each of the appliance base enclosure nodes.

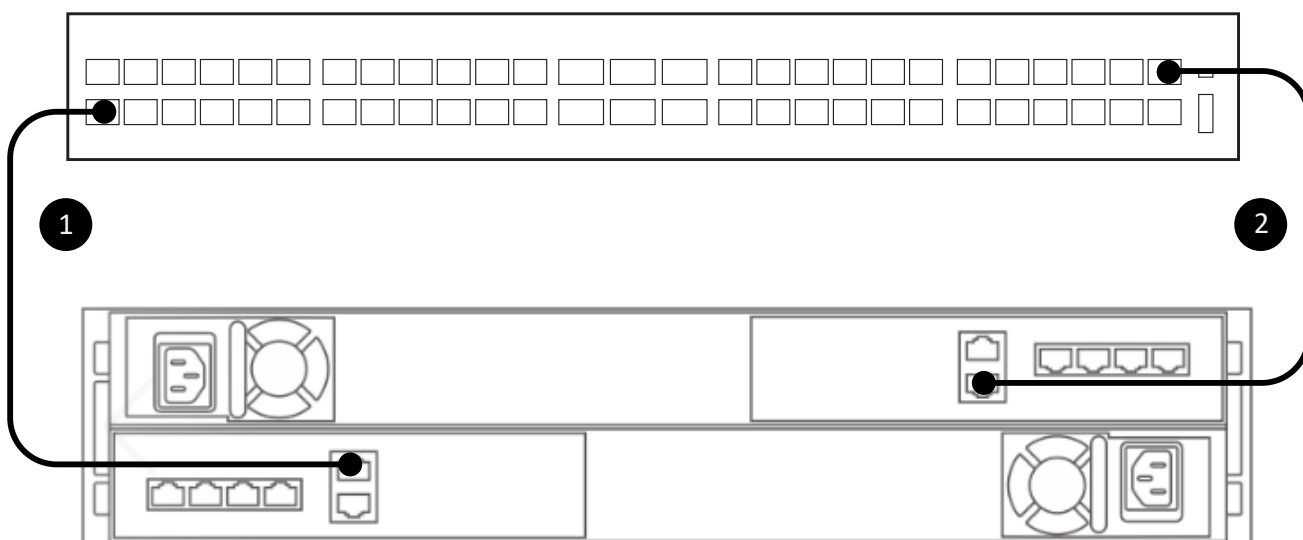


Figure 7. Base enclosure appliance connection to the Management switch

Table 8. Steps to connect to the base enclosure nodes to the Management switch

1.	Connect the management 1GbE port of the bottom node (A) to port 2 of the Management switch.
2.	Connect the management 1GbE port of the top node (B) to port 53 of the Management switch.

Cable the Management switch to the management uplink

The Management switch must also be cabled to the management uplink. Work with your network administrator to configure connectivity to the management upstream switches.

NOTE: The following diagram is an example of connectivity to the management upstream switches.

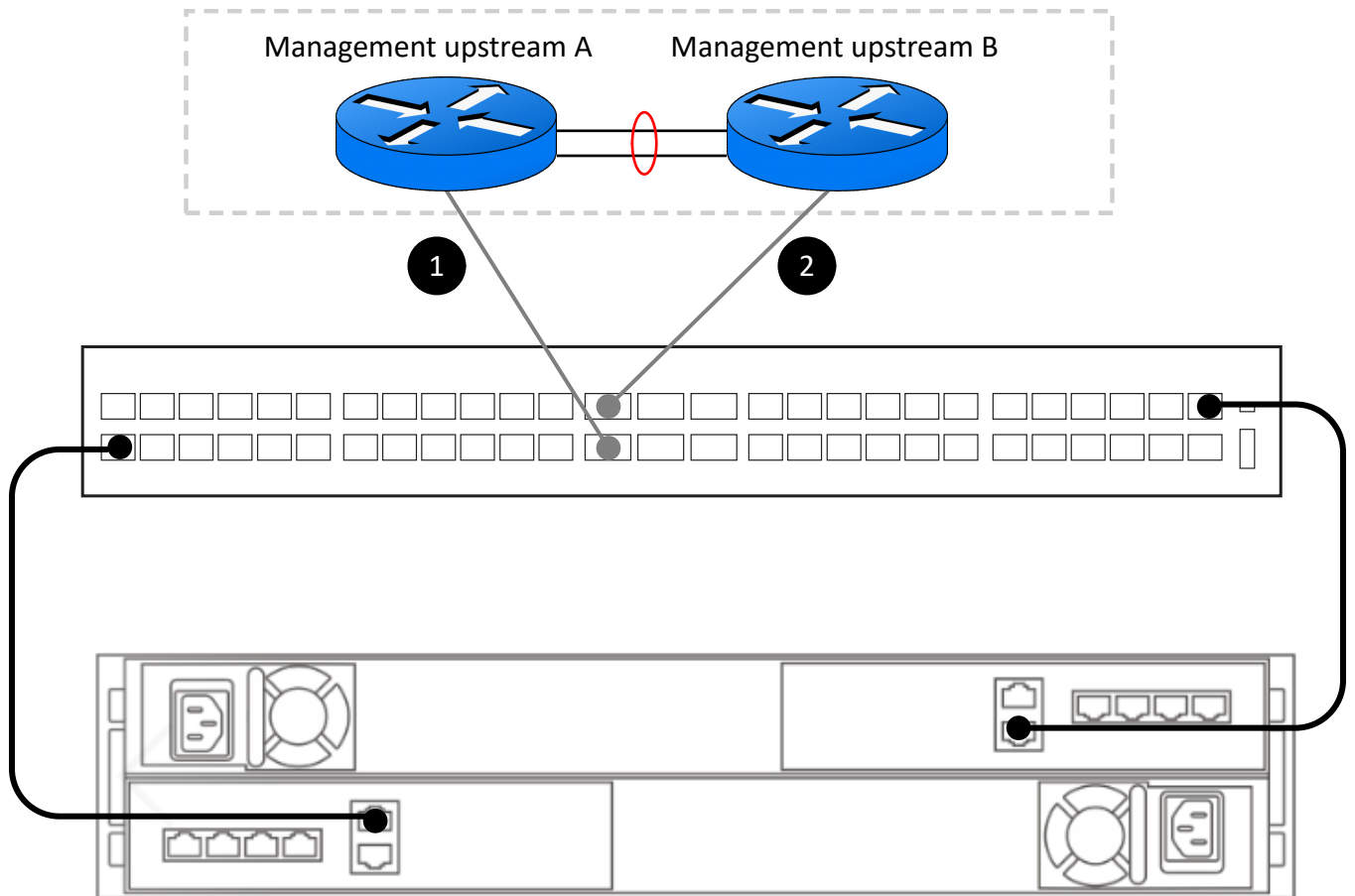


Figure 8. Management switch connection to management upstream switches

Table 9. Steps to connect to the Management switch to the management upstream

1.	Connect Management switch port 25 to the Management Upstream A.
2.	Connect Management switch port 26 to the Management Upstream B.

Validate the configuration on the Management switch

After you have configured the Management switch, and cabled the switches to your PowerStore T model nodes, validate the switch configuration prior to discovering PowerStore T model.

1. [Establish a terminal session to the switch.](#)
2. Validate the interface status.

```
show interface status | grep up
```

Port	Description	Status	Speed	Duplex	Mode	Vlan	Tagged-Vlans
Eth 1/1/1	discoveryWork..	up	1000M	full	A	100	-
Eth 1/1/2	PowerStoreNod..	up	1000M	full	A	100	-
Eth 1/1/25	Uplink_Ports	up	100G	full	-	-	-
Eth 1/1/26	Uplink_Ports	up	100G	full	-	-	-
Eth 1/1/53	PowerStoreNod..	up	1000M	full	A	100	-

3. Validate the port channel configuration.

```
show port-channel summary
```

```
Flags:  D - Down      I - member up but inactive    P - member up and active
        U - Up (port-channel)    F - Fallback Activated
```

Group	Port-Channel	Type	Protocol	Member Ports
10	port-channel10	(U)	Eth	DYNAMIC 1/1/25(P) 1/1/26(P)

4. Validate the VLAN configuration

```
show vlan
```

```
Codes: * - Default VLAN, M - Management VLAN, R - Remote Port Mirroring VLANs
Q: A - Access (Untagged), T - Tagged
  NUM      Status      Description      Q Ports
   1      Active
Eth1/1/3-1/1/24,1/1/29-1/1/52,1/1/54      A
                                     A Po10
                                     T Po10
   100     Active     managementNetwork      A Eth1/1/1-1/1/2,1/1/53
```

5. Validate the link layer discovery protocol (LLDP) configuration

```
show lldp neighbors
```

Loc PortID	Rem Host Name	Rem Port Id	Rem Chassis Id
ethernet1/1/1	Not Advertised	a0:36:9f:d4:fb:2e	
a0:36:9f:d4:fb:2e			
ethernet1/1/2	Dell PowerStore	00:60:16:9d:02:5c	cyc-coreos
ethernet1/1/25	MGMT-01	ethernet1/1/31	
68:4f:64:68:c7:1d			
ethernet1/1/26	MGMT-02	ethernet1/1/31	
68:4f:64:58:9f:a5			
ethernet1/1/53	Dell PowerStore	00:60:16:9e:e6:2c	cyc-coreos
mgmt1/1/1	MGMT-01	ethernet1/1/41	
68:4f:64:68:c7:1d			

6. Review the running configuration for the oob switch.

```
show running-configuration
```

For an example of the running configuration output see [Running configuration of PowerSwitch Series used in PowerStore T model deployments](#).

Network Validation Tool for PowerStore

Optionally, you can run the Network Validation Tool (NVT) for PowerStore after configuring your switches, and discovering PowerStore.

The NVT is available for download from the Dell Technologies Solutions page at: <https://central.dell.com/central/home>.

You must have an online support account to download the NVT. You can create an account from <https://www.dell.com/support>.

Once you have downloaded the NVT, see the *Network Validation Tool for PowerStore UserGuide.pdf*, which is downloaded in the zip file with the NVT.

Once you have validated the networks are configured accurately for PowerStore, you can continue to discover PowerStore, and then run through the **Initial Configuration Wizard** which is automatically launched after PowerStore discovery.

Discovering PowerStore Appliances

This appendix contains the following information.

Topics:

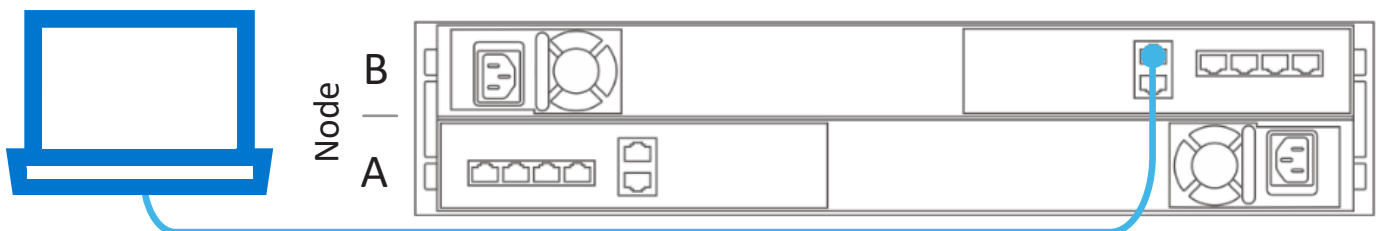
- [Discovery with a direct connection](#)
- [Discovery with a remote connection](#)

Discovery with a direct connection

This is the recommended procedure and requires that you are physically present in the location where the base enclosure is installed.

- (Optional) Download and run the Network Validation Tool (NVT) to validate that your networks are correctly configured. The NVT is available for download from the Dell Technologies Solutions page at: <https://central.dell.com/central/home>.
 - Ensure that your workstation's Network adapter is configured as follows:
 - Connected directly to the PowerStore service port on Node B.
 - Configured with a static IP address on the service LAN port (128.221.1.0/24) with no gateway address defined (128.221.1.249; 255.255.255.0; no gateway)
 - Able to ping the IP address of Node B's service LAN port (128.221.1.251)
1. Connect your workstation or laptop to the service port on Node B of the enclosure.

NOTE: The procedure in this section only applies if you are physically present within the datacenter. If you do not have access to the base enclosure, skip these steps. You must download and run the PowerStore Discovery Utility on a remote system or virtual machine to discover your system. For more information, see [Discovery with remote connection](#).



2. In a web browser, go to <https://128.221.1.251>
3. Log on to PowerStore Manager and begin the initial configuration process using the following default credentials:
 - Username: admin
 - Default password: Password123#

Discovery with a remote connection

If you do not have access to the base enclosure, deploy a workstation or virtual machine on the same network as the PowerStore system and use the PowerStore Discovery Utility to discover and create a cluster.

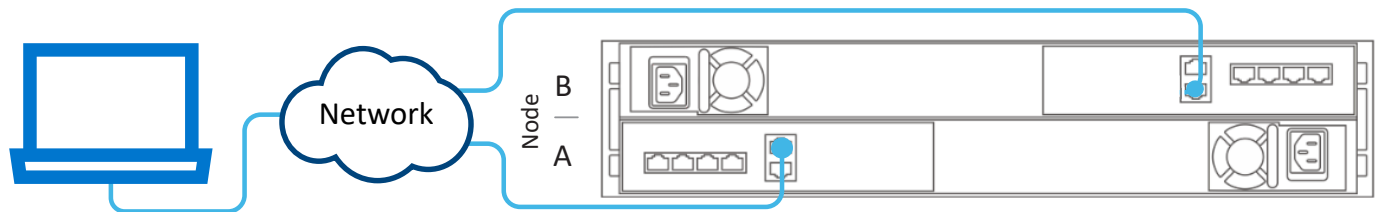


Figure 9. PowerStore T model remote discovery connectivity

There are two methods of discovery for you to choose from:

- Remote discovery using Discovery Tool
- Remote discovery with a static IP address

Remote discovery using Discovery Tool


You can discover PowerStore using Discovery Tool, which advertises a 169.254.xx/16 IP address.

- Download the PowerStore Discovery Utility from the Drivers & Downloads Tab on the PowerStore Product Support Page at <https://dell.com/support>.
 - (Optional) Download and run the Network Validation Tool (NVT) for PowerStore to validate that your networks are correctly configured. The NVT is available for download from the Dell Technologies Solutions page at: <https://central.dell.com/central/home>.
 - Temporarily disable your firewall. If that is not possible, add port 5353 and the Discovery Utility to the exclusion list of any firewall and antivirus software running on the workstation. Refer to your antivirus and firewall documentation for more information.
 - NOTE:** If your workstation or VM is running Windows 10, and you use Windows Defender Antivirus, ensure that you also disable Real-time protection. In the **Windows Security** app, go to **Virus & threat protection**.
 - Disable any other security applications, such as antivirus software.
 - Ensure that your workstation or virtual machine is connected directly to the same switch that the base enclosure is cabled to or is on the same VLAN as the native/untagged network of the PowerStore management network connection:
 - Create a second network adapter that uses the same native/untagged network as the PowerStore management network connection.
 - Verify whether there is an IP address starting with 169.254.x.x/16 subnet setup available that you can use as the IP address of the second network adapter. If such an IP address is not available, set the IP address of the second network adapter to 169.254.1.2 with netmask 255.255.0.0 and no gateway address defined. This address cannot be overwritten by any other address ranges (whether you use DHCP or static IP addresses).
 - NOTE:** To avoid duplicate IP addresses, ensure that there is only one laptop or virtual machine in the same native/untagged network with the 169.254.x.x IP address you set up.
 - If you had the Discovery Utility already running, ensure that you exit and restart the Discovery Utility after temporarily disabling the firewall or antivirus services.
1. From your workstation or virtual machine, launch the PowerStore Discovery Utility.
 2. Select the unconfigured base enclosure for which you want to create a cluster.
 3. Log on to PowerStore Manager and begin the initial configuration process using the following default credentials:
 - Username: admin
 - Default password: Password123#

Remote discovery with a static IP address

You can discover PowerStore systems remotely using a static IP.

Review the following before discovering with one of the static IP addresses reserved for PowerStore discovery.

- (Optional) Download and run the Network Validation Tool (NVT) for PowerStore to validate that your networks are correctly configured. The NVT is available for download from the Dell Technologies Solutions page at: <https://central.dell.com/central/home>.
 - Ensure that your workstation or virtual machine is connected directly to the same switch that the base enclosure is cabled to or is on the same VLAN as the native/untagged network of the PowerStore management network connection:
 - Create a second network adapter that uses the same native/untagged network as the PowerStore management network connection.
 - Verify whether there is an IP address starting with 169.254.0.x/16 subnet setup available that you can use as the IP address of the second network adapter. If such an IP address is not available, set the IP address of the second network adapter to 169.254.1.2 with netmask 255.255.0.0 and no gateway address defined. This address cannot be overwritten by any other address ranges (whether you use DHCP or static IP addresses).
-  **NOTE:** To avoid duplicate IP addresses, ensure that there is only one laptop or virtual machine in the same native/untagged network with the 169.254.x.x IP address you set up.
1. From your workstation or virtual machine, open a Web browser, and enter any one of the IP addresses reserved for PowerStore discovery.
 - <http://169.254.0.10>
 - <http://169.254.0.20>
 - <http://169.254.0.30>
 - <http://169.254.0.40>
 - <http://169.254.0.50>
 2. Log on to PowerStore Manager and begin the initial configuration process using the following default credentials:
 - Username: admin
 - Default password: Password123#

Initial configuration of the PowerStore T model appliance

This chapter includes the following information.

Topics:

- [Initial Configuration Wizard](#)
- [Get your completed Initial Configuration Worksheet](#)

Initial Configuration Wizard

Once you have discovered the PowerStore T model appliance, you are redirected to the **Initial Configuration Wizard** (ICW) to configure the networks on the PowerStore T model appliance.

The **Initial Configuration Wizard** (ICW) prompts you to enter the necessary network information for initial configuration of your PowerStore T model appliance.

Refer to your [completed Initial Configuration Worksheet](#) while running through the ICW. The **Initial Configuration Worksheet** should have been completed with all the information you will need to complete initial deployment of the PowerStore T model appliance.

Note the following while you are running through the **ICW**.

Table 10. Prepare to run through the Initial Configuration Wizard (ICW)

Fields	Description
Login credentials	You will use the default username and password the first time you log into PowerStore. However, you must change the admin password before you can continue through the Initial Configuration Wizard (ICW). Be sure to note down the new admin password you have entered for the cluster in the completed Initial Configuration Worksheet . A sample of this password has not been provided for you.
Cluster Details	Select: <ul style="list-style-type: none"> • Block-optimized for Fibre Channel only deployments with the option of adding services after initial configuration such as iSCSI or NVMe/TCP host connectivity, Replication, Block import, and Clustering. • Unified is the default selection. With a Unified deployment you have the option of adding any of the Block-optimized options, Network Attached Storage (NAS) services, and File Mobility. If you do not select Unified now, you will need to contact your service provider before you can add NAS services in the future.
Management network	Tagging the Native VLAN requires that the physical switch is configured to accept the tagged VLAN ID. If no VLAN ID is specified during initial configuration of a cluster, the network traffic will be sent as untagged. When the traffic is untagged, the physical switch will apply the Native VLAN to the traffic. If you want to use the native VLAN for any of your PowerStore networks, do not check the Use VLAN Tagging field in the PowerStore Initial Configuration Wizard . When the network traffic is not tagged (based on the 802.1q standard) the network takes on the native VLAN. The traffic on that network is passed as untagged in PowerStore, and the Native VLAN is applied to the untagged traffic through the switch.
vCenter Information	PowerStore clusters use a specific implementation of virtualization concepts that are based in a VMware vSphere framework. PowerStore appliances are designed to be integrated with VMware vSphere. These integrations include: <ul style="list-style-type: none"> • vCenter Server • Virtual machines

Table 10. Prepare to run through the Initial Configuration Wizard (ICW) (continued)

Fields	Description
	<ul style="list-style-type: none"> • Virtual volumes • Protocol Endpoints • VASA provider • Storage containers • Storage Policy Based Management <p>For details see PowerStore Virtualization Infrastructure Guide.</p>

Get your completed Initial Configuration Worksheet

You should have worked with your network administrator to complete the Initial Configuration Worksheet.

The following worksheet has been completed with the resources that are configured on the Dell PowerSwitch Series S4148-ON Top-of-Rack switches. If you are configuring your environment with alternative network resources, complete the blank worksheet available in this guide at [Initial Configuration Worksheet \(blank\)](#).

Also, be sure to note down the admin password that you define for the cluster in the completed **Initial Configuration Worksheet** below. A sample of a user-defined password is not provided for you.

Table 11. Initial Configuration Worksheet (completed)

Initial Login Information Use the following default user credentials when you log in to the PowerStore Manager for the first time. You must enter a new admin password to complete the initial configuration of a PowerStore Manager cluster.			
Default Username	Admin		
Default Password	Password123#	New Admin Password	
Cluster Details For resource management, efficiency, and availability purposes, appliances act as a single component that is called a cluster.			
Cluster Name	PowerStoreTCluster		
Storage Configuration Select either: Unified (Default Block and File Storage) or Block Optimized	Unified If you are deploying into a single VLAN, ensure that you configure a unique subnet for each type of network.		
	Block Optimized		
Appliance Service Tags Enter the service tag. The service tag appears on the black tag on the front of the base enclosure. When the systems arrive identify the base enclosures that you want to configure as a cluster and record their service tags. Drive Failure Tolerance Level Next to each appliance select the drive failure tolerance level you want to set. The drive failure tolerance level indicates the number of concurrent drive failures the appliance can sustain without causing a data unavailable or data loss event. The single drive fault tolerance level meets availability requirements for all drive types and capacity points. But the double drive failure tolerance can provide higher resiliency and protection.	CNR42W2	Single Drive Failure or Double Drive Failure	
	N/A	Single Drive Failure or Double Drive Failure	
	N/A	Single Drive Failure or Double Drive Failure	
	N/A	Single Drive Failure or Double Drive Failure	

Table 11. Initial Configuration Worksheet (completed) (continued)



<p>Ensure that there are at least the following number of SSD drives in the enclosure:</p> <ul style="list-style-type: none"> At least 6 for single drive failure tolerance 7 for double drive failure tolerance <p> NOTE: Once set, the drive failure tolerance level for an appliance cannot be changed.</p>					
<p>Management Network</p> <p>Your cluster requires a dedicated set of IP addresses for the cluster and Management network.</p> <p>The Management network Connects the cluster to services such as DNS and NTP. The IP Addresses in the management network are used to address the cluster, appliances, controllers, and internal hosts.</p>					
<p>Cluster IP Address</p> <p>(1 IP address for each PowerStore cluster)</p> <p>This address is used to manage the cluster.</p>			<p>192.168.1.10</p>		
<p>VLAN ID(Optional, defaults to untagged)</p>		<p>Netmask/Prefix Length</p>		<p>Gateway</p>	
				<p>IP Addresses</p> <p>Required: 3 IPs for each PowerStore T model appliance</p> <p>Optionally: 3 IPs for the File Mobility Network. For details, see Appendix 1: File Mobility.</p>	
<p>Untagged</p>		<p>255.255.255.0/24</p>		<p>192.168.1.1</p>	
				<p>Required for Managment Network192.168.1.11-13</p>	
				<p>Optional for File Mobility Network192.168.1.14-16</p>	
<p>Infrastructure Services</p> <p>Record IP addresses for your DNS and NTP servers. It is recommended that you specify at least two addresses for DNS and NTP servers each.</p>					
<p>DNS Server</p>			<p>100.0.100.200</p>		<p>100.0.100.201</p>
<p>NTP Server</p>			<p>100.0.100.200</p>		<p>100.0.100.201</p>
<p>Out-of-Band Management Switch (Management switch) information</p> <p>You can provide read-only credentials for the switches.</p>			<p>MngmtSwitch</p>		<p>N/A</p>
<p>Protocol (SSH/SNMP)</p>			<p>SSH</p>		<p>N/A</p>
<p>IP Address</p>			<p>100.0.100.50</p>		<p>N/A</p>
<p>Port</p>			<p>22</p>		<p>N/A</p>
<p>SSH Username</p>			<p>admin</p>		<p>N/A</p>
<p>Switch Password</p>			<p>Password123!</p>		<p>N/A</p>
<p>vCenter Information (Optional)</p> <p>Record your existing vCenter administrator login credentials. The initial configuration workflow automatically creates a data center and ESXi cluster, and associates them with your cluster.</p> <p> NOTE: Ensure that the vCenter Server is accessible on the network.</p>					
<p>vCenter Server IP Address/Host Name</p>			<p>N/A</p>		

Table 11. Initial Configuration Worksheet (completed) (continued)

vCenter Administrator Username	N/A
vCenter Administrator Password	N/A
PowerStore T model appliance Admin Credentials Enter the PowerStore T model appliance administrator credentials for vCenter to access the PowerStore T model appliance.	
Admin Username	N/A
Password This is the user-defined password that is provided after initial login to the PowerStore T model appliance.	N/A

Add Storage Services

This part contains information to prepare the switches, and to configure Dell PowerSwitch Series for PowerStore T model and additional protocol and services.

Topics:

- [Storage services overview](#)
- [Prepare to configure the switches and networks for Storage services](#)
- [Switch requirements for deployments with storage services](#)
- [Network requirements for deployments with storage services](#)
- [Configuring PowerStore T model with Dell PowerSwitch Series S4148 Top-of-Rack switches](#)
- [Cable Dell PowerSwitch Series ToR switches for Storage services](#)
- [Validate PowerSwitch Series configuration with ToR switches](#)
- [Configure Storage networks in PowerStore Manager](#)

Storage services overview

This chapter contains the following information

Topics:

- [Storage Services](#)

Storage Services

PowerStore T model appliances are configured for Fibre Channel after initial deployment. You have the option to add storage services after initial deployment.

Storage services include the following protocols and services.

Table 12. Storage service descriptions

Network	Description
Cluster	<p>The Cluster network is used:</p> <ul style="list-style-type: none"> • To manage internal communication such as to the cluster database, and between appliances within a cluster. The intra-cluster management network is encrypted with IPSEC. • For intra-cluster data mobility traffic such as storage migration between appliances. • To enable file services on an Unified appliance, communication will be routed within the appliance PowerStore T model rather than the ToR switch.
NVMe/TCP	NVMe/TCP storage network (block) traffic including PowerStore T model target portals for front-end traffic.
iSCSI	iSCSI storage network (block) traffic including PowerStore T model target portals for front-end traffic.
Replication and Block Import	Used for PowerStore T model target portals for front-end traffic for both file and block storage and external data mobility traffic for block storage.
Network Attached Storage	<p>Network attached storage (NAS):</p> <ul style="list-style-type: none"> • Front-end access such as NFS, SMB, and FTP • Active Directory (AD) for the NAS services • External data mobility traffic for file storage <p>NAS services are optional. NAS services are only available with Unified deployments. To enable a Unified deployment, select the Unified mode when in the PowerStore T model Initial Configuration Wizard.</p> <p>A NAS network can be extended with a Fail Safe Network (FSN). An FSN extends link failover into the network by providing switch-level redundancy when the Top-of-Rack switches are not configured with an MC-LAG interconnect.</p> <p>An FSN can be configured on a port, a link aggregation or any combination of the two.</p>
File Import	<p>Used with the File Mobility network to import File storage from remote systems.</p> <p>The File Import network requires that the:</p> <ul style="list-style-type: none"> • PowerStore T model is deployed to support NAS services. • File Mobility network is configured on the Management switch. For details about the File Mobility network and how to configure it, see Appendix 1: File Mobility.

Prepare to configure the switches and networks for Storage services

This chapter includes the following information.

Topics:

- [Switch resources for Storage services worksheet](#)
- [Network configuration worksheet for Storage services](#)

Switch resources for Storage services worksheet

Work with your network administrator to complete the *Switch Resources for Storage services Worksheet* and reserve the necessary resources to configure the two Top-of-Rack (ToR) switches required for Storage services.

For a sample of a *Switch Resources for Storage services Worksheet* completed for Dell PowerSwitch Series see, [Completed example of Switch resources for Storage services worksheet](#).

NOTE: This section assumes you have completed initial deployment, and your Management switch and network have been successfully configured.

Additionally, you may want to work with your network administrator to complete the [Network configuration worksheet for Storage services](#) at the same time, to reserve the necessary resources to create the Storage networks in PowerStore Manager.

Table 13. Switch resources for Storage services worksheet (blank)

Step	Details	Notes
1.	Print this table to record the reserved resources.	
2.	Reserve and record the IP addresses necessary to configure the ToR switches below:	
	Management IP address for ToR Switch 1	
	Management IP address for ToR Switch 2	
	Default gateway	
	NTP server	
3.	As a best practice it is recommended to add a spanning tree protocol to the ToR switches. Record the spanning tree protocols to set on each switch.	
	Spanning tree protocol for ToR Switch 1	
	Spanning tree protocol for ToR Switch 2	
4.	Choose which layer 2 interconnect you will configure between the switches:	
	Highly Recommended: Direct interconnect using Multi-chassis Link Aggregation Group (MC-LAG) Continue to step 5.	
	Direct Interconnect not using MC-LAG Continue to step 6.	
	No direct interconnect between the switches	

Table 13. Switch resources for Storage services worksheet (blank) (continued)



Step	Details	Notes
	Continue to step 6.	
5.	If you will be using MC-LAG, record the ports you will use to connect the switches together. ToR Switch 1 to ToR Switch 2 port pair 1	
	ToR Switch 1 to ToR Switch 2 port pair 2	
	Enter the port channel ID used for connectivity between the ToR switches and the uplinks. Only a single port channel ID is required for MC-LAG (VLT).	
	If using MC-LAG, enter the Domain ID.	
	If using uplinks for Layer 2 connectivity between the switches, continue to step 6.	
	If using VLT for the Layer 2 interconnect, record the:	
	VLT MAC address to use for both switch 1 and switch 2. Use the same VLT MAC address for switch 1 and switch 2.  NOTE: You cannot use all zeros (00:00:00:00:00) for the VLT MAC address.	
	VLT priority for ToR Switch 1	
	VLT priority for ToR Switch 2	
	MTU setting for Jumbo Frames  NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	
6.	If configuring the ToR switches with a direct Interconnect not using MC-LAG, or without a direct connection between the ToR switches, record the ports on the ToR switches that will be used to connect to the uplinks.	
	Uplink A to ToR Switch 1	
	Uplink B to ToR Switch 1	
	Uplink A to ToR Switch 2	
	Uplink B to ToR Switch 2	
	Record the uplink port channel IDs required for L2 Uplinks without MC-LAG. L2 Uplinks without MC-LAG connectivity requires two port channel IDs.	
	1. Port channel ID for L2 Uplinks without MC-LAG	
	2. Port channel ID for L2 Uplinks without MC-LAG	
7.	Reserve the network resources required to configure the networks and the ports to connect from the PowerStore T model appliance nodes to the Top-of-Rack (ToR) switch ports for each Storage network you are configuring. You can put multiple storage networks on the same ports, or you can connect each storage network through different ports. When cabling from the node ports to the ToR switch ports, corresponding ports on Node A and Node B should connect to opposite switches.	

Table 13. Switch resources for Storage services worksheet (blank) (continued)

Step	Details	Notes	
	<p>i NOTE: Ports 0 and 1 of the 4-port card are reserved for the cluster network with all PowerStore T model appliances. If deploying a PowerStore 500T model appliance ports 2 and 3 of the 4-port card are reserved for connectivity to the 24 Drive 2.5 Inch NVMe (ENS24) expansion enclosures.</p>		
	iSCSI connectivity	Network Name	
		VLAN ID	
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port	ToR Switch Switch port
		Node B Port	ToR Switch Switch port
	NVMe/TCP host connectivity	Network Name	
		VLAN ID	
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port	ToR Switch Switch port
		Node B Port	ToR Switch Switch port
	Replication and Import i NOTE: Replication and Import networks cannot be separated and must run over the same ports.	Network Name	
		VLAN ID	
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port	ToR Switch Switch port
		Node B Port	ToR Switch Switch port
	Network Attached Storage (NAS) Must be configured in an LACP bond. It is recommended that you configure the bond with one port from different I/O modules. When configuring an LACP bond: <ul style="list-style-type: none"> The PowerStore T model appliance node ports cabled for LACP must be the same speed. LACP can be configured using 2 or 4 ports on each node, however the same number of ports must be configured for LACP on both nodes. 	Network Name	
		VLAN ID	
		Record the LACP (port channel) ID for the node connections:	
		Node A	
		Node B	
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port	ToR Switch Switch port
		Node A Port	ToR Switch Switch port
		Node B	ToR Switch

Table 13. Switch resources for Storage services worksheet (blank) (continued)



Step	Details	Notes	
		Port	Switch port
		Node B Port	ToR Switch Switch port
		MTU setting for Jumbo Frames  NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	
		If extending the with a Fail Safe Network , record the following:	
		VLAN ID	
		Record the LACP (port channel) ID, or the port number for the node connections:	
		Node A	
		Node B	
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port	ToR Switch Switch port
		Node A Port	ToR Switch Switch port
		Node B	ToR Switch Switch port
		Node B Port	ToR Switch Switch port
		MTU setting for Jumbo Frames  NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	
	<p>File Import</p> <p>Must be configured in an LACP bond.</p> <p>File Import can use the same bond used for the NAS network, but it cannot use the bond dedicated to the Cluster network.</p> <p>When configuring an LACP bond:</p>	Network Name	
		VLAN ID	
		Record the LACP (port channel) ID for the node connections:	
		Node A	
		Node B	

Table 13. Switch resources for Storage services worksheet (blank) (continued)

Step	Details	Notes	
	<ul style="list-style-type: none"> The PowerStore T model appliance node ports cabled for LACP must be the same speed. LACP can be configured using 2 or 4 ports on each node, however the same number of ports must be configured for LACP on both nodes. 	Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port	ToR Switch Switch port
		Node A Port	ToR Switch Switch port
		Node B Port	ToR Switch Switch port
		From Node B Port	To ToR Switch Switch port
		MTU setting for Jumbo Frames i NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	N/A
	<p>Cluster</p> <p>When cabling the nodes for the cluster network:</p> <ul style="list-style-type: none"> Ports 0 and 1 of the 4-port card are reserved for clustering Ports 0 and 1 on the 4-port card on the same node must connect to opposite switches Port 0 on the 4-port card on Node A and Port 0 on the 4-port card on Node B must connect to opposite switches Port 1 on the 4-port card on Node A and Port 1 on the 4-port card on Node B must connect to opposite switches 	Network Name	
		VLAN ID	
		Record the LACP (port channel) ID for the node connections:	
		Node A	
		Node B	
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port 0 of the 4-port card	ToR Switch Switch port
		Node A Port 1 of the 4-port card	ToR Switch Switch port
		Node B Port 0 of the 4-port card	ToR Switch Switch port
		Node B Port 1 of the 4-port card	ToR Switch Switch port
		MTU setting for Jumbo Frames i NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	

Network configuration worksheet for Storage services

You will need to reserve the following resources to create Storage networks in PowerStore Manager.

Work with your network administrator to complete the following Network configuration worksheets for each Storage network you are creating in PowerStore Manager.

Table 14. Network configuration worksheet for additional Block-optimized storage services (blank)

Resource	iSCSI	NVMe/TCP	Replication and Block Import
Storage Network Name			
(Optional) VLAN ID For better security and performance, it is recommended that you specify a unique VLAN ID for each type of network. If you are deploying into a single VLAN, ensure that you configure a unique subnet for the Management and each Storage network. Use the same VLAN IDs that were used to configure your Storage networks on the switch.			
Netmask/Prefix Length			
Gateway			
Storage Network IP addresses You must reserve a minimum 2 IP addresses for each Storage network you are adding. (1 IP address per node.)			
(Optional) Global Storage Discovery IP It is recommended that you choose to create this IP address. It is used as the single highly available floating IP address for hosts to easily discover storage from your cluster.			
Map Storage for Appliance/ Network Interface Include the Node ports, or port channel on which the networks are configured.			

Table 15. Network configuration worksheet for NAS storage service (blank)

Resource	NAS
Network Name	
(Optional) VLAN ID For better security and performance, it is recommended that you specify a unique VLAN ID for each type of network. If you are deploying into a single VLAN, ensure that you configure a unique subnet for the Management, Storage, and NAS networks.	

Table 15. Network configuration worksheet for NAS storage service (blank) (continued)


Resource	NAS
Use the same VLAN IDs that were used to configure your storage networks on the switch.	
Netmask/Prefix Length	
Gateway	
Network IP addresses You must reserve a minimum of 1 IP address for NAS Server production. Optionally, you can reserve additional IP addresses for NAS Server backups.	
Map Storage for Appliance/Network Interface Include the Node ports, or port channel on which the networks are configured.	
If configuring a Fail Safe Network, record the following information  NOTE: You only need to define the port or link aggregation for Node A. The same port or link aggregation will automatically be created on Node B.	
Primary port or Link Aggregation to include in the FSN.	
Secondary port or Link Aggregation to include in the FSN.	

Table 16. Network configuration worksheet for File Import (blank)

Resource	File Import
(Optional) VLAN ID	
Netmask/Prefix Length	
Gateway	
Network IP addresses A minimum of 1 IP address is required for each active file import session. However, a File Import interface can be reused for File Import when no other session is currently using it.	
(Optional) Global Storage Discovery IP It is recommended that you choose to create this IP address. It is used as the single highly available floating IP address for hosts to easily discover storage from your cluster.	
Map Storage for Appliance/Network Interface Include the Node ports, or port channel on which the networks are configured.	

Switch requirements for deployments with storage services

This chapter contains the following information.

Topics:

- [Top-of-Rack \(ToR\) switch connectivity options and requirements](#)
- [Top-of-Rack \(ToR\) switch to ToR switch \(L2\) connectivity options](#)

Top-of-Rack (ToR) switch connectivity options and requirements


In addition to the Management switch configured during your initial deployment of the PowerStore T model appliance, you must add two ToR switches to route the storage services traffic.

Top-of-Rack (ToR) switch to ToR switch (L2) connectivity options

Use one of the following options to connect the two ToR switches.

Table 17. Connectivity options for ToR switches

ToR to ToR connectivity	Description
Direct interconnect using Multi-chassis Link Aggregation (MC-LAG)	Dell highly recommends using MC-LAG for connectivity between the ToR switches. When the ToR switches are interconnected with MC-LAG the two ports used on the PowerStore appliance 4-port card, or I/O module (system bond) can be configured in an active/active state.
Direct interconnect not using MC-LAG	If MC-LAG is not used to interconnect the ToR switches, you can create a port channel between the ToR switches. When the ToR switches are connected using a Port Channel the two ports used on the PowerStore appliance 4-port card, or I/O module (system bond) reverts into an active/passive state.
No direct interconnect between the switches	If the ToR switches cannot be interconnected then use highly reliable Layer 2 (L2) uplinks. When using highly reliable L2 uplinks, the two ports used on the PowerStore appliance 4-port card, or I/O module (system bond) reverts into an active/passive state.

 **NOTE:** For more information about PowerStore system bonds refer to the *Dell PowerStore: Clustering and High Availability* white paper.

Direct interconnect using Multi-chassis Link Aggregation (MC-LAG)

It is highly recommended that you deploy PowerStore with an MC-LAG interconnect between the two ToR switches.

MC-LAG is a switch interconnection technology that joins a number of independent Top-of-Rack (ToR) switches into a single virtual chassis. MC-LAG allows the link aggregation (LAG) port groups to span multiple chassis, enabling better resilience of the LAG connection. Additionally, MC-LAG enables traffic going from switch to switch using the full bandwidth of the available connection, without using spanning tree protocol (STP), which would disable some links to prevent loops.

MC-LAG is a general name for the technology, however certain vendors use their own proprietary terminology to define MC-LAG connectivity.

Table 18. Vendor specific MC-LAG technology

Vendor	Proprietary MC-LAG technology
Dell	Virtual Link Trunking (VLT)
Cisco	Virtual PortChannel (vPC)
Brocade	Multi-Chassis Trunking (MCT)

NOTE: Refer to your vendor's documentation to determine their technology for MC-LAG.

When the ToR switches are interconnected with MC-LAG the two ports used on PowerStore appliance 4-port card, or I/O module (system bond) are able to be configured in an active/active state.

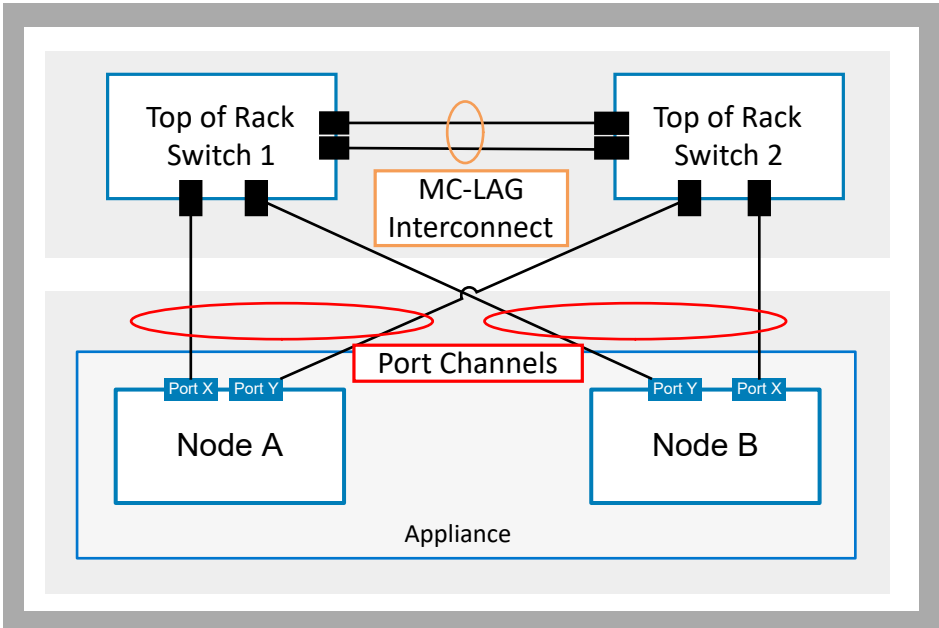


Figure 10. ToR switches with MC-LAG interconnect

- For MC-LAG connectivity it is recommended that:
- A minimum of two connection cables in parallel with a high speed reliable connection.
 - Use of high speed ports will reduce the network traffic congestion between the two switches.
 - Verify best practices for MC-LAG from your switch provider documentation.

MC-LAG interconnect with upstream links

Additionally, in an MC-LAG environment the two switches are treated as one logical switch. This allows you to add all the upstream links from both switches into a single port channel that will span the MC-LAG as demonstrated in the following diagram.

NOTE: Work with your network administrator if you will be connecting the ToR switches to upstream switches.

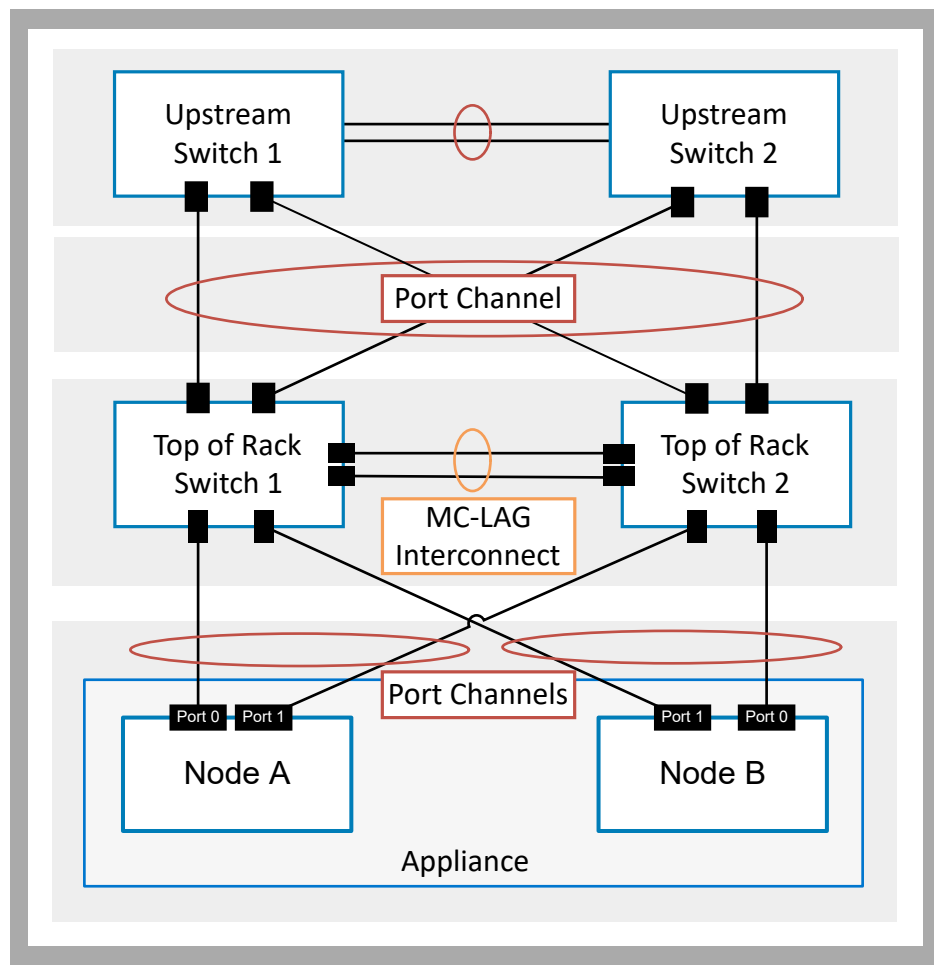


Figure 11. ToR switches with MC-LAG interconnect and upstream links

Direct interconnect not using MC-LAG

If MC-LAG is not used to interconnect the ToR switches, you can create a port channel between the ToR switches.

When the ToR switches are connected using a Port Channel the 1st 2-ports in the PowerStore appliance 4-port card (system bond) reverts into an active/passive state.

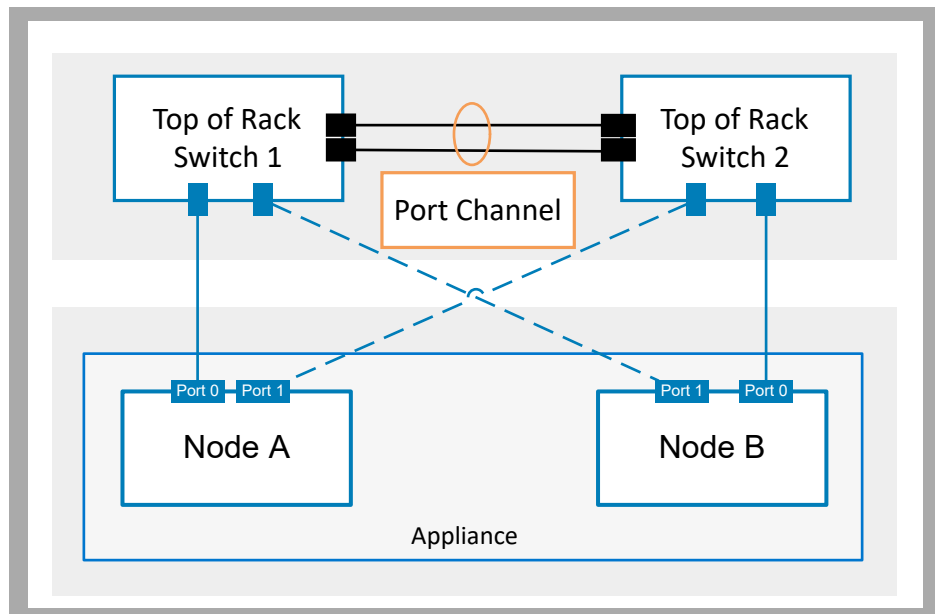


Figure 12. ToR switches direct interconnect not using MC-LAG

No direct interconnect between the switches

If the ToR switches cannot be interconnected directly then use highly reliable Layer 2 (L2) upstream links.

ToR switch connectivity through the upstream links require redundant, high speed connections.

Using L2 (Ethernet level) upstream links without an MC-LAG connection to connect the ToR switches is an acceptable alternative to a direct interconnect for PowerStore deployments.

When using highly reliable upstream links for ToR switch interconnectivity, the 1st 2-ports in the PowerStore appliance 4-port card (system bond) reverts into an active/passive state.

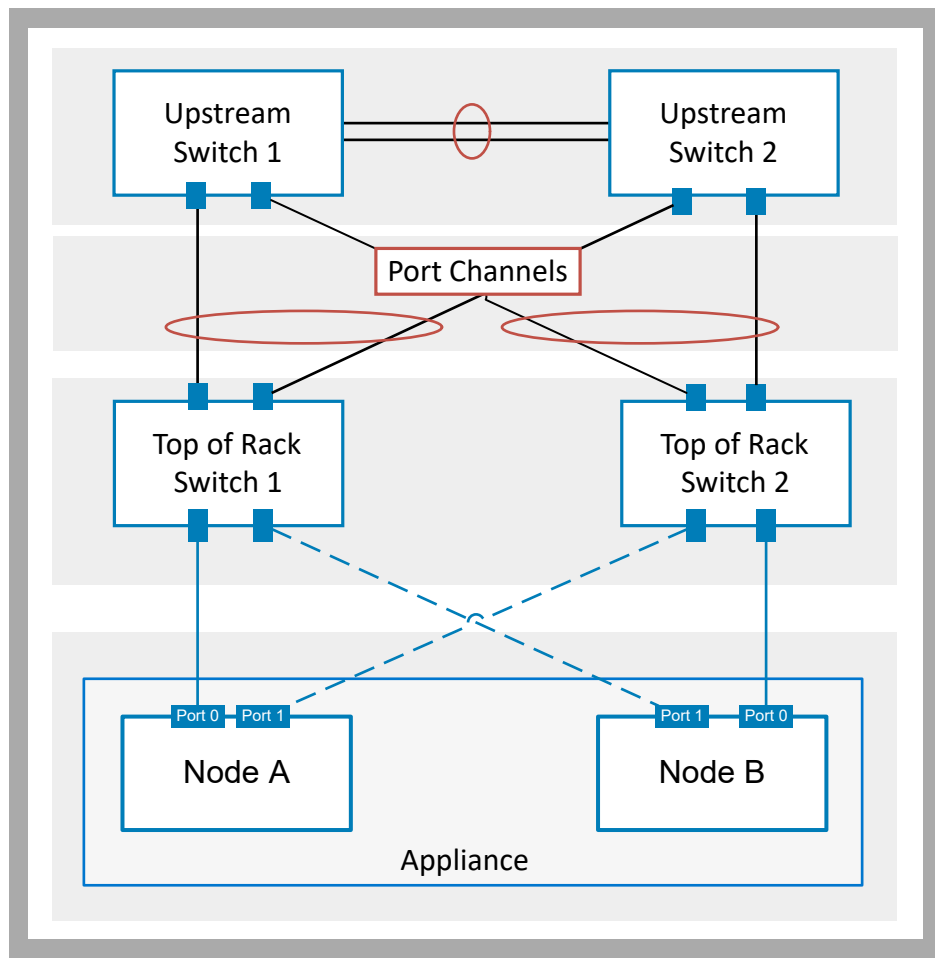


Figure 13. ToR switches with no direct interconnect

Network requirements for deployments with storage services

This chapter contains the following information.

Topics:

- [Storage services network traffic](#)
- [Link Aggregation Control Protocol requirements](#)
- [VLAN requirements for Storage networks](#)
- [Storage network IP address requirements for adding storage services](#)

Storage services network traffic

All of the storage services traffic is routed from PowerStore T model appliance node ports through the two Top-of-Rack (ToR) switches.

PowerStore T model requires that all storage service networks are unique. It is recommended that each storage network be configured on a dedicated port meeting the port requirements demonstrated in the following example.

NOTE: It is important to note for PowerStore 500T model appliances ports 2 and 3 on the 4-port card are reserved for connectivity to the expansion enclosures.

PowerStore T model network connectivity for optional Block-optimized networks

The following networks can be configured for the Block-optimized deployment options which require the Top-of-Rack switches.

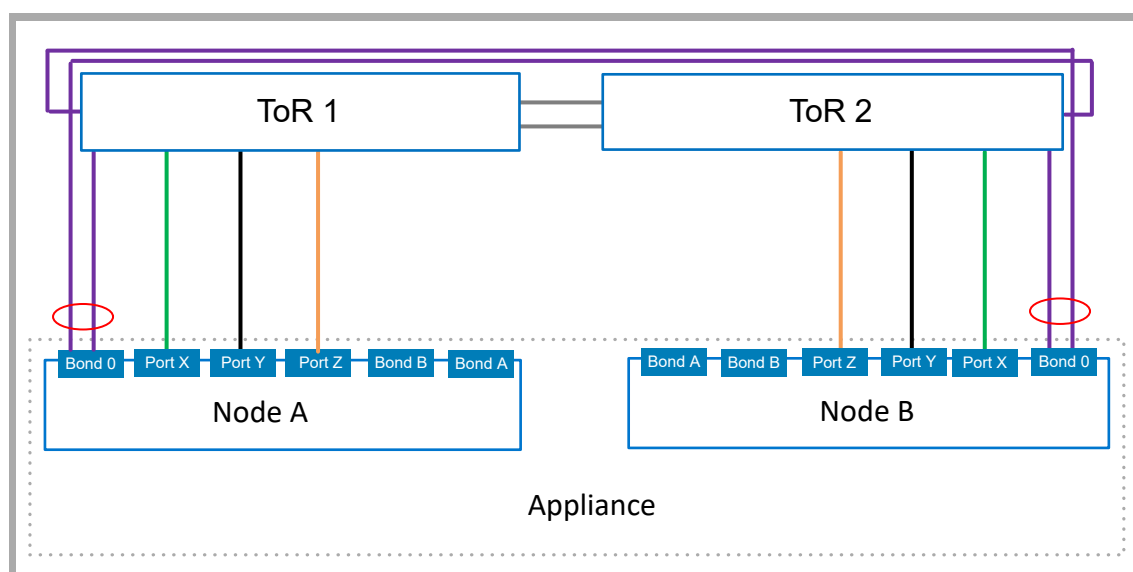






Figure 14. PowerStore T model network connectivity for optional Block-optimized networks

Identifier	Network	Requirements
	iSCSI	Can be cabled through any port on the 4-port card or I/O module.
	Replication and Import	Can be cabled through any port on the 4-port card or I/O module.
	NVMe/TCP	Can be cabled through any port on the 4-port card or I/O module.
	Cluster	Must be cabled through the first 2 ports of the 4-port card in an LACP Bond (0). Bond 0 is reserved only for the Cluster network.

PowerStore T model network connectivity with additional Unified (File) networks

Deploying PowerStore T model clusters in Unified mode allows you to configure Network Attached Storage (NAS) for file services.

PowerStore T model connectivity with a Network Attached Storage (NAS) network

Network attached storage (NAS) provides:

- Front-end access such as NFS, SMB, and FTP
- Active Directory (AD) for the NAS services
- External data mobility traffic for file storage

NAS can be configured with additional features, which require some network configuration.

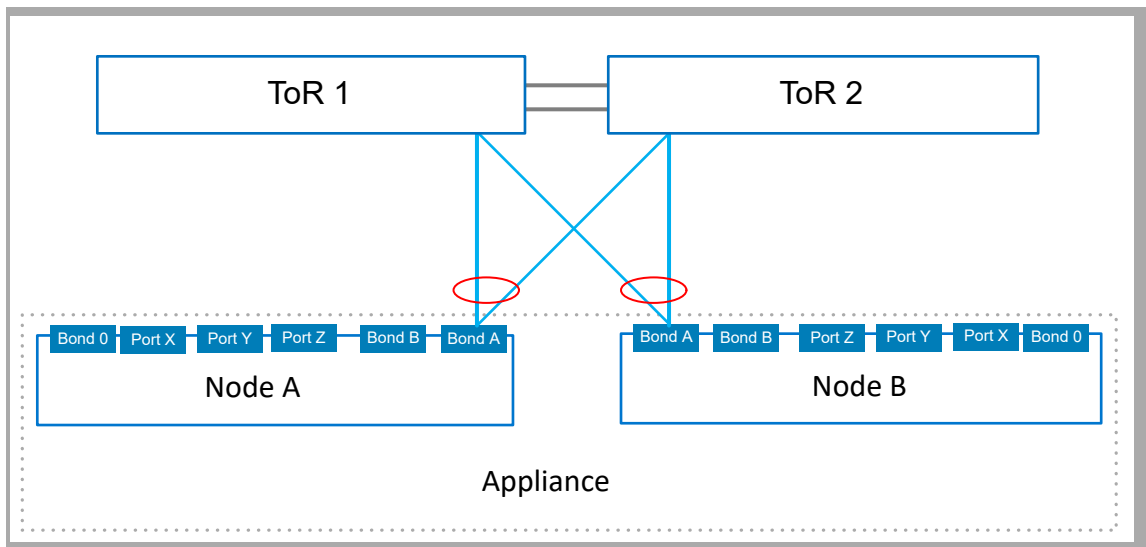




Figure 15. PowerStore T model connectivity for a NAS network

Identifier	Network	Requirements
	NAS	The NAS network must always be configured in an LACP bond.  NOTE: The LACP bond can be configured with 2 or 4 ports on each node.

PowerStore T model connectivity when the NAS network is extended with a Fail Safe Network (FSN)

PowerStore T model provides the Fail Safe Network (FSN) feature for NAS configurations. The FSN feature provides a backup network for high availability when the Top-of-Rack switches have not been configured with MC-LAG.

An FSN enables the ability to configure an environment with:

- Explicit links designated as primary (active) and secondary (standby)
- Primary and secondary links which can have:
 - Different speeds and duplex settings
 - Ports from different IO modules
 - More ports on the primary side than on the secondary side of the FSN

In this example the primary and secondary networks are both configured in LACP bonds.

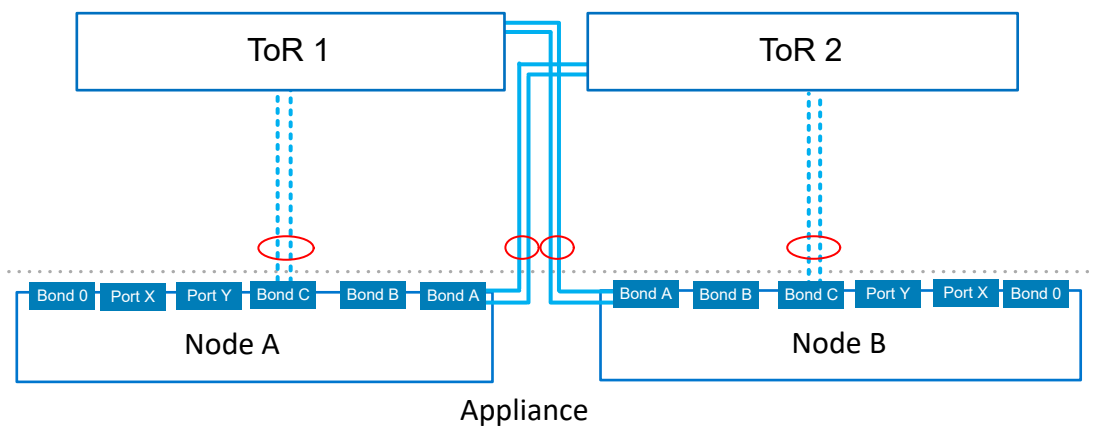


Figure 16. NAS network extended with a Fail Safe Network

Identifier	Network	Requirements
	Primary	The primary network is the active network and can be configured on a single port, an LACP bond, or a combination of both. NOTE: The LACP bond can be configured with 2 or 4 ports on each node.
	Secondary	The secondary network is the standby network and can be configured on a single port, an LACP bond, or a combination of both.

PowerStore T model connectivity with NAS and File Import networks

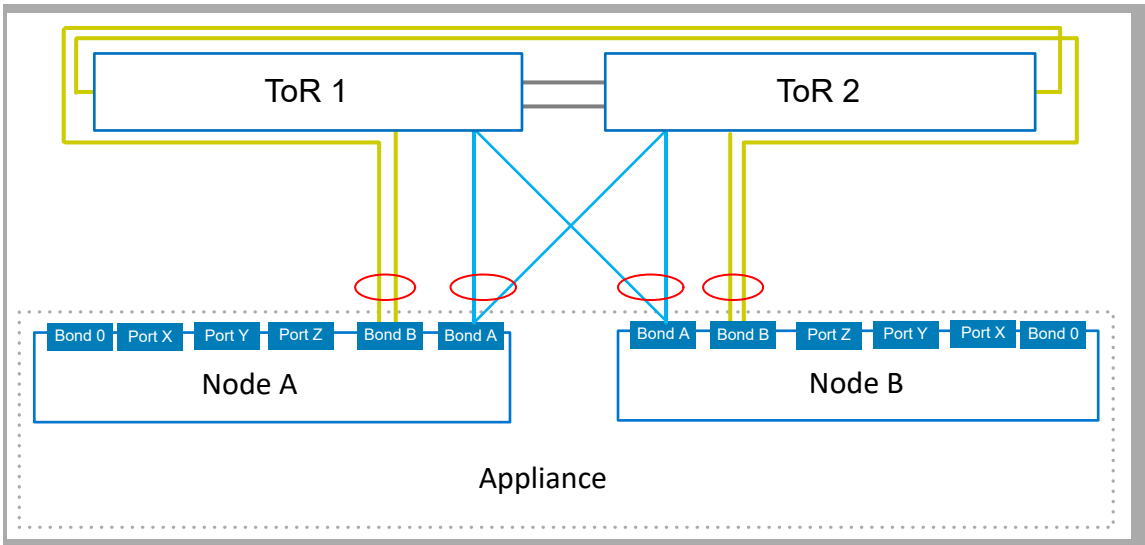




Figure 17. PowerStore T model network connectivity with additional Unified (File) networks

Identifier	Network	Requirements
	NAS Services	Must be configured in an LACP bond. It is recommended that you configure the bond with one port from different I/O modules.
	File Import	Must be configured in an LACP bond. The LACP bond can be shared with the NAS Services bond, but cannot be shared with the Cluster bond (Bond 0).

Link Aggregation Control Protocol requirements

The NAS, File Import, and Cluster networks must be configured in an LACP bond.

Ports 0 and 1 on the PowerStore T model appliance node are reserved for the Cluster network. The LACP bond is automatically aggregated in PowerStore Manager which appears as **BaseEnclosure-NodeA-Bond0**, and **BaseEnclosure-NodeB-Bond0** on the PowerStore Manager ports page.

When configuring the LACP bond for NAS or File Import networks on the switch:

- The PowerStore T model appliance node ports cabled for LACP must be the same speed.
- LACP can be configured using 2 or 4 ports on each node, however the same number of ports must be configured for LACP on both nodes.
- After you discover your PowerStore T model appliance you must aggregate the links in PowerStore Manager, on the **Hardware > appliance > Ports** page. See [Create NAS networks in PowerStore Manager](#) for details.

VLAN requirements for Storage networks

PowerStore T model appliance storage networks can be configured over different ports, VLANs, or subnets.

PowerStore T model requires all networks to be unique. It is highly recommended to deploy PowerStore T model with multiple and unique VLANs to separate the traffic. However, if only one VLAN is available, you have the option to deploy PowerStore T model with a single VLAN and multiple unique subnets.

VLAN requirements

You can add up to 32 Storage networks with a maximum of 8 storage networks per interface.

For better security and performance, it is recommended that you specify a unique VLAN ID for each type of network.

If you are deploying into a single VLAN, ensure that you configure a unique subnet for each of the Storage networks.

When configuring the networks in PowerStore Manager be sure to use the same VLAN IDs that were used to configure your networks on the switch.

Cluster network VLAN requirements

The Cluster network communication occurs on the Native VLAN.

- For multi-appliance cluster configurations, ensure the Cluster network has routing on the native VLAN such that the first 2 ports of the 4-port card can communicate to other appliances on the network.
- IPv6 communication is required for internal communication between PowerStore T model appliances in a cluster and requires that IPv6 be enabled on the ToR switches through the native VLAN.

Storage network IP address requirements for adding storage services

It is required that you reserve a minimum of 2 IP address per PowerStore T model appliance per Storage network. It is also recommended that you reserve another IP address per storage network for Global Storage Discovery.

Table 19. IP address assignments for Storage networks

IP Address per	Assigned to	Number of IP Addresses required
Appliance	Node A	1
	Node B	1
Cluster	Global Storage Discovery IP Address (Optional)	1

You can choose to assign either IPv4 or IPv6 addresses to the storage networks. You cannot assign different IP versions to the same network.

 **NOTE:** It is recommended that you reserve extra IP addresses to accommodate adding more appliances in the future.

Configuring PowerStore T model with Dell PowerSwitch Series S4148 Top-of-Rack switches

This chapter includes the following information.

Topics:

- [Sample configuration](#)
- [Install the Top-of-Rack switches into the PowerStore T model cabinet](#)
- [Configure Dell PowerSwitch Series for Storage services](#)

Sample configuration

This document describes the steps to deploy PowerStore T model with a single cluster consisting of one appliance with a single base enclosure.

Hardware

The sample deployment used in this document demonstrates configuring the PowerStore T model appliance with:

- A single Dell PowerSwitch Series S4148 Management switch
 - NOTE:** The following configuration sections assume that you have completed initial deployment of the PowerStore T model appliance and the Management switch and networks are successfully configured.
- Two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches with added I/O modules and a Virtual Link Trunk (VLT) connection between the switches.
 - NOTE:** If you are configuring a PowerStore T model appliance with different Dell switches or third-party switches, please refer to the switch proprietary documentation for commands and specific details. See the *PowerStore Third-party Switch Simple Support Matrix* for the list of supported switches, which is available from <https://www.dell.com/powerstoredocs>.
- PowerStore 500T model appliance with a 4-port card and two I/O modules.

Networks

The sample used in this guide demonstrates the following network connectivity between the PowerStore T model nodes and ToR switches.

- NOTE:** The following sample configuration does not include deployment with a Fail Safe Network. For a sample deployment with a Fail Safe Network see [Sample deployment with a Fail Safe Network](#)

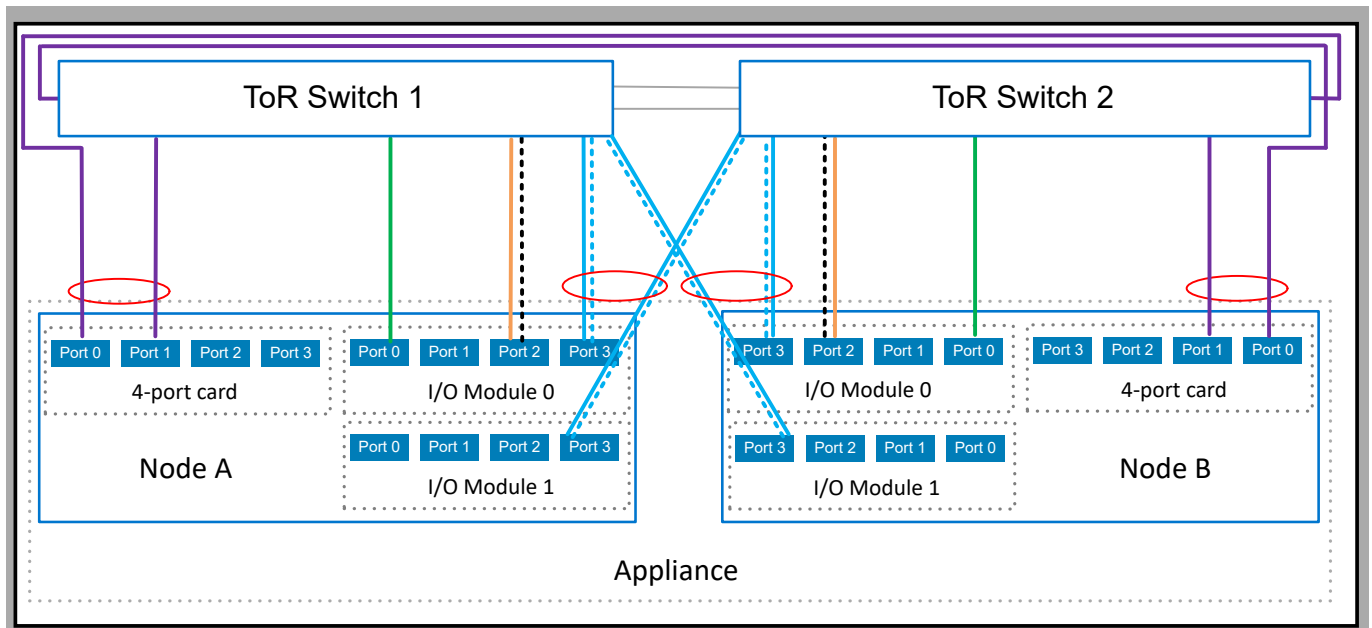








Figure 18. Sample network connectivity

Identifier	Network	Node Ports	Description
	iSCSI	Port 2 on I/O Module 0	Shared port with Replication and Block Import network. Separated by VLANs.
	NVMe/TCP	Port 0 on I/O Module 0	Dedicated port.
	Replication and Block Import	Port 2 on I/O Module 0	Shared port with iSCSI network. Separated by VLANs.
	NAS	Port 3 on I/O Module 0 and I/O Module 1	Configured into an LACP bond. NOTE: The LACP bond can be configured with 2 or 4 ports on each node. The LACP bond in this example is configured with 2 ports on each node.
	File Import	Port 3 on I/O Module 0 and I/O Module 1	Shares LACP bond with NAS network. NOTE: This sample reuses the NAS network for File Import.
	Cluster	Ports 0 and 1 on the 4-port card	Configured into Bond 0.

Install the Top-of-Rack switches into the PowerStore T model cabinet

Refer to the following documents to install Dell PowerSwitch Series S4148, and S5200F model switches into the PowerStore T model cabinet.

For instructions to install a Dell PowerSwitch S4148F-ON switch as the Top-of-Rack (ToR) switches, see the *Dell PowerSwitch S4100-On Series Installation Guide* at: https://www.dell.com/support/manuals/networking-s4148f-on/s4100f_t_u_on_install_pub/two-post-flush-mount-installation?guid=guid-fcad010b-678e-43d6-b533-d967550969dd.

If you are deploying a PowerStore T model appliance with other Dell switches, or third-party switches, see the switch proprietary documentation for commands and specific details to install the switches into the cabinet.

Configure Dell PowerSwitch Series for Storage services

At a minimum you will need to configure one out-of-band (OOB) management switch, and two Top-of-Rack (ToR) switches for PowerStore T model to support iSCSI or NVMe/TCP host connectivity, replication, import, clustering or Network Attached Storage (NAS).

NOTE: This section assume that you have completed initial deployment of the PowerStore T model appliance and the Management switch and networks are successfully configured.

As recommended, the following steps describe how to configure the two ToR switches with Virtual Link Trunking (VLT) layer 2 (L2) interconnect between the two ToR switches. For steps to configure PowerStore T model deployments without a VLT interconnect, see: [Configuring PowerStore T model without VLTi](#).

NOTE: Virtual Link Trunking (VLT) is specific to Dell PowerSwitch connectivity. The industry term is also referred to as Multi-chassis Link Aggregation Group (MC-LAG)

1. [Get the completed Switch resources for storage services worksheet.](#)
2. [Establish a terminal session to the switch.](#)
3. [Validate the switch version and licensing.](#)
4. [Configure the general settings on the ToR switches.](#)
5. [Configure Virtual Link Trunking interconnect.](#)
6. [Configure the uplink ports on the ToR switches.](#)
7. Configure the networks on the ToR switches:
 - [iSCSI network](#)
 - [NVMe/TCP network](#)
 - [Replication and Block Import network](#)
 - [NAS network](#)
 - [Cluster network](#)
8. If you have not done so already, cable the switches as described in [Cable the Dell PowerSwitch Series for deployments with ToR switches.](#)

Once you have configured and cabled the ToR switches to the base enclosure nodes, validate the configuration. For validation options see: [Validate switch configuration](#).

Get the completed Switch resources for Storage services worksheet

Prior to configuring PowerStore T model, you should have worked with your network administrator to reserve network resources, and complete the *Switch resources for Storage services worksheet*.

The following *Switch resources for Storage services worksheet* has been completed with the network resources used in the configuration steps provided in this document. You can use this worksheet exactly as it is if you are deploying your PowerStore T model networks with Dell PowerSwitches Series S4148 switches.

If you are not configuring your switches and networks with the resources used in this guide, you can complete a new *Switch resources for Storage services worksheet* with the information relevant to your environment. To download a blank worksheet see [Switch resources for Storage services worksheet \(blank\)](#).

Table 20. Switch resources for Storage services worksheet (completed)

Step	Details	Notes
1.	Print this table to record the reserved resources.	
2	Reserve and record the IP addresses necessary to configure the ToR switches below:	
	Management IP address for ToR Switch 1	100.0.100.10/24
	Management IP address for ToR Switch 2	100.0.100.11/24
	Default gateway	100.0.100.1

Table 20. Switch resources for Storage services worksheet (completed) (continued)



Step	Details	Notes
	NTP server	100.0.100.200
3.	As a best practice it is recommended to add a spanning tree protocol to the ToR switches. Record the spanning tree protocols to set on each switch.	
	Spanning tree protocol for ToR Switch 1	40960
	Spanning tree protocol for ToR Switch 2	45056
4.	Choose which layer 2 interconnect you will configure between the switches:	
	Highly Recommended: Direct interconnect using Multi-chassis Link Aggregation Group (MC-LAG) Continue to step 5.	Yes
	Direct Interconnect not using MC-LAG Continue to step 6.	N/A
	No direct interconnect between the switches Continue to step 6.	N/A
5.	If you will be using MC-LAG, record the ports you will use to connect the switches together. ToR Switch 1 to ToR Switch 2 port pair 1	25 to 25
	ToR Switch 1 to ToR Switch 2 port pair 2	26 to 26
	Enter the port channel ID used for connectivity between the ToR switches and the uplinks. Only a single port channel ID is required for MC-LAG (VLT).	port channel 50
	If using MC-LAG, enter the Domain ID.	VLT domain ID 1
	If using uplinks for Layer 2 connectivity between the switches, continue to step 6.	N/A
	If using VLT for the Layer 2 interconnect, record the:	
	VLT MAC address to use for both switch 1 and switch 2. Use the same VLT MAC address for switch 1 and switch 2.  NOTE: You cannot use all zeros (00:00:00:00:00) for the VLT MAC address.	00:00:00:00:00:01
	VLT priority for ToR Switch 1	1
	VLT priority for ToR Switch 2	8192
	MTU setting for Jumbo Frames  NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	9216
6.	If configuring the ToR switches with a direct Interconnect not using MC-LAG, or without a direct connection between the ToR switches, record the ports on the ToR switches that will be used to connect to the uplinks.	
	Uplink A to ToR Switch 1	port 29

Table 20. Switch resources for Storage services worksheet (completed) (continued)



Step	Details	Notes	
	Uplink B to ToR Switch 1	port 30	
	Uplink A to ToR Switch 2	port 29	
	Uplink B to ToR Switch 2	port 30	
	Record the uplink port channel IDs required for L2 Uplinks without MC-LAG. L2 Uplinks without MC-LAG connectivity requires two port channel IDs.		
	1. Port channel ID for L2 Uplinks without MC-LAG	N/A	
	2. Port channel ID for L2 Uplinks without MC-LAG	N/A	
7.	<p>Reserve the network resources required to configure the networks and the ports to connect from the PowerStore T model appliance nodes to the Top-of-Rack (ToR) switch ports for each Storage network you are configuring.</p> <p>You can put multiple storage networks on the same ports, or you can connect each storage network through different ports.</p> <p>When cabling from the node ports to the ToR switch ports, corresponding ports on Node A and Node B should connect to opposite switches.</p> <p> NOTE: Ports 0 and 1 of the 4-port card are reserved for the cluster network with all PowerStore T model appliances. If deploying a PowerStore 500T model appliance ports 2 and 3 of the 4-port card are reserved for connectivity to the 24 Drive 2.5 Inch NVMe (ENS24) expansion enclosures.</p>		
iSCSI connectivity		Network Name	iSCSI_Network
		VLAN ID	200
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port 2 on I/O Module 0	ToR Switch 1 Switch port 7
		Node B Port 2 on I/O Module 0	ToR Switch 2 Switch port 48
NVMe/TCP host connectivity		Network Name	NVMe_Network
		VLAN ID	300
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port 0 on I/O Module 0	ToR Switch 1 Switch port 5
		Node B Port 0 on I/O Module 0	ToR Switch 2 Switch port 50
Replication and Import  NOTE: Replication and Import networks cannot be separated and must run over the same ports.		Network Name	RepBlockImport_Network
		VLAN ID	400
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port 2 on I/O Module 0	ToR Switch 1 Switch port 7
		Node B Port 2 on I/O Module 0	ToR Switch2 Switch port 48

Table 20. Switch resources for Storage services worksheet (completed) (continued)

Step	Details	Notes	
	<p>Network Attached Storage (NAS)</p> <p>Must be configured in an LACP bond.</p> <p>It is recommended that you configure the bond with one port from different I/O modules.</p> <p>When configuring an LACP bond:</p> <ul style="list-style-type: none"> The PowerStore T model appliance node ports cabled for LACP must be the same speed. LACP can be configured using 2 or 4 ports on each node, however the same number of ports must be configured for LACP on both nodes. 	Network Name	NAS_Network
		VLAN ID	500
		Record the LACP (port channel) ID for the node connections:	
		Node A	port channel 10
		Node B	port channel 20
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port 3 on I/O Module 0	ToR Switch 1 Switch port 8
		Node A Port 3 on I/O Module 1	ToR Switch 2 Switch port 8
		Node B Port 3 on I/O Module 0	ToR Switch 2 Switch port 47
		Node B Port 3 on I/O Module 1	ToR Switch 1 Switch port 47
		MTU setting for Jumbo Frames	9216
		<i>i</i> NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	
		If extending the with a Fail Safe Network , record the following:	
		VLAN ID	N/A
		Record the LACP (port channel) ID, or the port number for the node connections:	
		Node A	N/A
		Node B	N/A
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port N/A	ToR Switch N/A Switch port N/A
		Node A Port N/A	ToR Switch N/A Switch port N/A
		Node B N/A	ToR Switch N/A Switch port N/A
		Node B Port N/A	ToR Switch Switch port N/A

Table 20. Switch resources for Storage services worksheet (completed) (continued)



Step	Details	Notes	
	<p>File Import</p> <p>Must be configured in an LACP bond.</p> <p>File Import can use the same bond used for the NAS network, but it cannot use the bond dedicated to the Cluster network.</p> <p>When configuring an LACP bond:</p> <ul style="list-style-type: none"> The PowerStore T model appliance node ports cabled for LACP must be the same speed. LACP can be configured using 2 or 4 ports on each node, however the same number of ports must be configured for LACP on both nodes. 	MTU setting for Jumbo Frames	N/A
		 NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	
		Network Name	N/A
		VLAN ID	N/A
		Record the LACP (port channel) ID for the node connections:	
		Node A	N/A
		Node B	N/A
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port N/A	ToR Switch N/A Switch port N/A
		Node A Port N/A	ToR Switch N/A Switch port N/A
		Node B Port N/A	ToR Switch N/A Switch port N/A
		From Node B Port N/A	To ToR Switch N/A Switch port N/A
		MTU setting for Jumbo Frames	N/A
		 NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	
		Cluster	
		Network Name	Cluster_Network
		VLAN ID	1
		Record the LACP (port channel) ID for the node connections:	
		Node A	port channel 30
		Node B	port channel 40
		Record which appliance node port	To cable to the ToR switch number and port:
		Node A Port 0 of the 4-port card	ToR Switch 1 Switch port 1
		Node A	ToR Switch 2

Table 20. Switch resources for Storage services worksheet (completed) (continued)

Step	Details	Notes	
		Port 1 of the 4-port card	Switch port 1
		Node B Port 0 of the 4-port card	ToR Switch 1 Switch port 54
		Node B Port 1 of the 4-port card	ToR Switch 2 Switch port 54
		MTU setting for Jumbo Frames i NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	9216

Establish a terminal session to the switch

Perform the following steps to establish a terminal session to the serial console port on the Dell PowerSwitch Series S4148 switch.

These steps are specific to establishing connections to Dell PowerSwitch S4148-ON switches.

For console serial port cable requirements, and further details refer to the *Dell PowerSwitch S4100-ON Series Installation Guide* located at: <https://www.dell.com/support/home/us/en/04/product-support/product/networking-s4148f-on/docs>.

You must establish a terminal session to each of the switches to configure the switches for deployment.

1. Power on the switch.
2. Use a serial cable to connect a computer to the serial console port, which is the top port located on the PSU-side of the PowerSwitch.



Identifier	Description
1	Serial Port
2	Management Port

3. Open a terminal emulator program, such as PuTTY, on the computer.
4. Configure the serial connection in the terminal emulator program using the following settings.

Table 21. Serial connection settings

Setting	Value
Speed(baud)	115200 (9600 for micro-USB port)
Data bits	8

Table 21. Serial connection settings (continued)

Setting	Value
Stop bits	1
Parity	None
Flow control	None

5. Connect to the switch using the terminal emulator program.
6. Enter the switch log in credentials. Default username and password are:
 - Username: **admin**
 - Password: **admin**
7. Enter global configuration mode.

```
configure terminal
```

8. It is recommended that you change the password after logging into the switch for the first time. Use the following command to change the switch password.

```
username admin password <NEW_PASSWORD> role sysadmin
```

Validate the switch version and licensing

Before you configure the switch and networks, check the switch operating system version and licensing.

If you are required to upgrade your switch OS, or reinstall the switch license see the *OS10 Enterprise Edition User Guide* for details.

1. [Establish a terminal connection to the switch](#) and hit the **Enter** key after you have connected.
2. Run the command `show version` to display the OS version. Dell recommends upgrading to the latest release available on [Dell Digital Locker \(www.dell.com/support/software/\)](http://www.dell.com/support/software/).

```
OS10# show version
Dell Networking OS10-Enterprise
Copyright (c) 1999-2018 by Dell Inc. All Rights Reserved.
OS Version: 10.5.x.x
Build Version: 10.5.x.x.x
Build Time: 2018-09-26T17:20:01-0700
System Type: S4148F-ON
Architecture: x86_64
Up Time: 2 weeks 04:34:35
```

3. Verify that the license was installed on the switches.
Run the command `show license status` to display the license installation. The `License Type:` field should indicate PERPETUAL. If an evaluation license is installed, licenses purchased from Dell Technologies are available for download on [Dell Digital Locker \(www.dell.com/support/software/\)](http://www.dell.com/support/software/).

```
OS10# show license status

System Information
-----
Vendor Name : Dell
Product Name : S4148F-ON
Hardware Version: A00
Platform Name : x86_64-dellemc_s4100_c2538-r0
PPID : CN00Y2VTCEs008200038
Service Tag : D8MSG02
License Details
-----
Software : OS10-Enterprise
Version : 10.5.x.x
License Type : PERPETUAL
```

```
License Duration: Unlimited
License Status : Active
License location: /mnt/license/D8MSG02.lic
-----
```

NOTE: If OS10EE was factory installed, a perpetual license is already installed on the switch.

4. Repeat the steps for each switch.

Configure general settings on the Top-of-Rack (ToR) switches

Perform the following steps to configure general settings on the two ToR switches.

In OS10EE, LLDP (Link Layer Discovery Protocol) is enabled globally on each interface by default. You can use LLDP for troubleshooting and validation. It is recommended that you enable all of the optional TLVs (type, length, value) in the LLDPDU (Link Layer Discovery Protocol Data Units) on the switches.

1. Establish a terminal connection to the first ToR switch (Switch1).
2. Enter global configuration mode.

```
configure terminal
```

3. Configure a hostname for the switch.

```
hostname Switch1
```

4. If not already set, configure the management IP address for the switch.

If the management IP address has already been configured for the switch, continue to step 6.

NOTE: The following command sample assumes that automatic IP assignment through Dynamic Host Configuration Protocol (DHCP) is enabled on the switch. If automatic IP assignment through DHCP is not enabled, then you do not need to include `no ip address dhcp` in the commands below.

```
interface mgmt 1/1/1
no shutdown
no ip address dhcp
ip address 100.0.100.10/24
exit
```

NOTE: Be sure to use a different IP address when configuring switch 2. This document uses 100.0.100.11/24 for switch 2 in the example below.

5. Optionally, configure the management route (default gateway) for the switch.

```
management route 0.0.0.0/0 100.0.100.1
```

6. Configure an NTP server for the switch.

```
ntp server 100.0.100.200
```

7. Enable the Rapid Spanning Tree Protocol (RSTP) on the switch.

```
spanning-tree mode rstp
```

8. Configure the spanning tree priority on the switch.

```
spanning-tree rstp priority 40960
```

Note the following when selecting spanning-tree rstp priority values:

- It is important that you work with your network administrator to determine which value to use to avoid conflicts with other switches in your network.

- Different rstp priority values should be used when configuring switch 1 and switch 2.
- 0 priority is typically reserved for the root bridge.

9. Repeat the above steps for the second switch (Switch2).

Switch1	Switch2
<pre> configure terminal hostname Switch1 interface mgmt 1/1/1 no shutdown no ip address dhcp ip address 100.0.100.10/24 exit management route 0.0.0.0/0 100.0.100.1 ntp server 100.0.100.200 spanning-tree mode rstp spanning-tree rstp priority 40960 exit </pre>	<pre> configure terminal hostname Switch2 interface mgmt 1/1/1 no shutdown no ip address dhcp ip address 100.0.100.11/24 exit management route 0.0.0.0/0 100.0.100.1 ntp server 100.0.100.200 spanning-tree mode rstp spanning-tree rstp priority 45056 exit </pre>

Configure Virtual Link Trunking interconnect

Perform the following steps if you have chosen to implement VLT for your Layer 2 interconnectivity between the two Top of the Rack (ToR) PowerSwitch Series.

Work with a network administrator to implement VLTi. VLTi should not be configured without a networking specialist.

You can cable the switches together prior to configuring connectivity between the switches or you can cable the switches after configuring the type of connectivity. Refer to [Cable the Top-of-Rack \(ToR\) Switches together](#) for details.

VLTi is required to configure Link Aggregation Control Protocol between the PowerStore nodes.

1. [Establish a terminal connection](#) to the first ToR switch (Switch1).
2. Enter global configuration mode.

```
configure terminal
```

3. Disable L2 mode on the 100 GbE ports that will be used for VLTi on switch 1.

```

interface range ethernet 1/1/25-1/1/26
description VLTi
no switchport
mtu 9216
exit

```

4. Create new VLTi domain and select 100 GbE ports as discovery interfaces.

```

vlt-domain 1
discovery-interface ethernet 1/1/25-1/1/26

```

- vlt-domain, and port numbers should be the same on both switches.
- Ports 25 and 26 are both 100 GbE ports on the Dell S4148-ON PowerSwitch Series. Other switches may have different port numbers assigned to the 100 GbE ports.

5. Specify the management IP of the other ToR switch as VLT backup (required for heartbeat).
 - For switch1, use the switch2 IP address for the backup destination.

- For switch2, use the switch1 IP address for the backup destination.

```
backup destination 100.0.100.11
```

6. Enable peer-routing to prepare to configure your uplinks. Peer routing enables or disables L3 routing to peers.

NOTE: Steps to configure uplinks to the customer networks are not described in this guide.

```
peer-routing
```

7. Set the priority of the switch.

```
primary-priority 1
```

Valid priority values range from 1 to 65535. The switch with the lower priority setting will take precedence of the switch with the higher priority value. Do not set the same priority value to the two ToR switches.

8. Enter a VLT MAC address to avoid conflicts on the network.

NOTE: You cannot use all zeros (00:00:00:00:00) for the VLT MAC address.

```
vlt-mac 00:00:00:00:00:01
```

Use the same VLT MAC address when configuring switch 2.

9. Repeat above steps for the second switch.

While doing so, reverse the switch IP address in step 5 as demonstrated in the code sample below.

Table 22. Code sample of VLTi configuration steps

Switch 1	Switch 2
<pre>configure terminal interface range ethernet 1/1/25-1/1/26 description vlti no switchport mtu 9216 exit vlt-domain 1 discovery-interface ethernet 1/1/25-1/1/26 backup destination 100.0.100.11 peer-routing primary-priority 1 vlt-mac 00:00:00:00:00:01</pre>	<pre>configure terminal interface range ethernet 1/1/25-1/1/26 description vlti no switchport mtu 9216 exit vlt-domain 1 discovery-interface ethernet 1/1/25-1/1/26 backup destination 100.0.100.10 peer-routing primary-priority 8192 vlt-mac 00:00:00:00:00:01</pre>

Configure the uplink ports on the Top-of-Rack (ToR) switches

1. Establish a terminal connection to the first ToR switch (Switch1).
2. Enter global configuration mode.

```
configure terminal
```

3. Configure the port-channel for the uplinks.

```
interface port-channel 50
description Uplink
no shutdown
switchport mode trunk
switchport access vlan 1
vlt-port-channel 50
mtu 9216
exit
```

- Configure the uplink ports on the switch.

NOTE: For iSCSI or NVMe/TCP best practices, it is recommended to disable flow control as demonstrated below.

```
interface ethernet 1/1/29
description Uplink_Ports
no shutdown
channel-group 50 mode active
no switchport
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit

interface ethernet 1/1/30
description Uplink_Ports
no shutdown
channel-group 50 mode active
no switchport
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

- Commit the configuration to the NVRAM.

```
copy running-configuration startup-configuration
```

- Repeat steps 1 - 5 on the second ToR switch (Switch2).

Table 23. Code sample for configuring ToR switch uplink ports

Switch 1	Switch 2
<pre>configure terminal interface port-channel 50 description Uplink no shutdown switchport mode trunk switchport access vlan 1 vlt-port-channel 50 mtu 9216 exit interface ethernet 1/1/29 description Uplink_Ports no shutdown channel-group 50 mode active no switchport flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/30 description Uplink_Ports no shutdown channel-group 50 mode active no switchport flowcontrol receive off flowcontrol transmit off mtu 9216 exit copy running-configuration startup-configuration</pre>	<pre>configure terminal interface port-channel 50 description Uplink no shutdown switchport mode trunk switchport access vlan 1 vlt-port-channel 50 mtu 9216 exit interface ethernet 1/1/29 description Uplink_Ports no shutdown channel-group 50 mode active no switchport flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/30 description Uplink_Ports no shutdown channel-group 50 mode active no switchport flowcontrol receive off flowcontrol transmit off mtu 9216 exit copy running-configuration startup-configuration</pre>

Configure the iSCSI network on the ToR switches

The following steps use the resources from the example used in this document. If you did not use the same resources, see your completed [Network Preparation Worksheet for Storage services](#).

- 1. [Establish a terminal connection](#) to the first ToR switch (Switch1).
- 2. Enter global configuration mode.

```
configure terminal
```

- 3. Create the iSCSI VLAN.

```
interface vlan 200
description iSCSI_Network
no shutdown
exit
```

- 4. Configure iSCSI VLAN for Node A ports

```
interface ethernet 1/1/7
description NodeA_IO_0_port_2
no shutdown
switchport mode trunk
switchport trunk allowed vlan 200
mtu 9216
exit
```

- 5. Configure the iSCSI VLAN on the uplinks

```
interface port-channel 50
switchport trunk allowed vlan 200
exit
```

- 6. Repeat steps 3 - 5 for each iSCSI network you are creating.
- 7. Repeat steps 1 - 6 on the second ToR switch (Switch2) as demonstrated below.


 **NOTE:** Be sure to use the correct ethernet ports when configuring the second ToR switch (Switch2)

Table 24. Code sample for configuring ToR switches for iSCSI network

Switch 1	Switch 2
<pre>configure terminal interface vlan 200 description iSCSI_Network no shutdown exit interface ethernet 1/1/7 description NodeA_IO_0_port_2 no shutdown switchport mode trunk switchport trunk allowed vlan 200 mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 200 exit</pre>	<pre>configure terminal interface vlan 200 description iSCSI_Network no shutdown exit interface ethernet 1/1/48 description NodeB_IO_0_port_2 no shutdown switchport mode trunk switchport trunk allowed vlan 200 mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 200 exit</pre>

Configure NVMe/TCP network on the ToR switches

The following steps use the resources from the example used in this document. If you did not use the same resources, see your completed [Network Preparation Worksheet for Storage services](#).

- 1. Establish a terminal connection to the first ToR switch (Switch1).
- 2. Enter global configuration mode.

```
configure terminal
```

- 3. Create the NVMe/TCP VLAN.

```
interface vlan 300
description NVMe_Network
no shutdown
exit
```

- 4. Configure NVMe/TCP VLAN for Node A ports

```
interface ethernet 1/1/5
description NodeA_IO_0_port_0
no shutdown
switchport mode trunk
switchport trunk allowed vlan 300
mtu 9216
exit
```

- 5. Configure the NVMe/TCP VLAN on the uplinks

```
interface port-channel 50
switchport trunk allowed vlan 300
exit
```

- 6. Repeat steps 3 - 5 for each NVMe/TCP network you are creating.
- 7. Repeat steps 1 - 6 on the second ToR switch (Switch2) as demonstrated below.


 **NOTE:** Be sure to use the correct ethernet ports when configuring the second ToR switch (Switch2)

Table 25. Code sample for configuring ToR switches for NVMe/TCP networks

Switch 1	Switch 2
<pre>configure terminal interface vlan 300 description NVMe_Network no shutdown exit interface ethernet 1/1/5 description NodeA_IO_0_port_0 no shutdown switchport mode trunk switchport trunk allowed vlan 300 mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 300 exit</pre>	<pre>configure terminal interface vlan 300 description NVMe_Network no shutdown exit interface ethernet 1/1/50 description NodeB_IO_0_port_0 no shutdown switchport mode trunk switchport trunk allowed vlan 300 mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 300 exit</pre>

Configure the Replication and Block Import network on the ToR switches

The following steps use the resources from the example used in this document. If you did not use the same resources, see your completed [Network Preparation Worksheet for Storage services](#).

- 1. Establish a terminal connection to the first ToR switch (Switch1).
- 2. Enter global configuration mode.

```
configure terminal
```

- 3. Create the Replication and Block Import VLAN.

```
interface vlan 400
description RepBlockImport_Network
no shutdown
exit
```

- 4. Configure Replication and Block Import VLAN for Node A ports

```
interface ethernet 1/1/2
switchport trunk allowed vlan 400
exit
```

- 5. Configure the Replication and Block Import VLAN on the uplinks

```
interface port-channel 50
switchport trunk allowed vlan 400
exit
```

- 6. Repeat steps 1 - 5 on the second ToR switch (Switch2) as demonstrated below.

 **NOTE:** Be sure to use the correct ethernet ports when configuring the second ToR switch (Switch2)

Table 26. Code sample for configuring ToR switches for the Replication and Block Import network

Switch 1	Switch 2
<pre>configure terminal interface vlan 400 description RepBlockImport_Network no shutdown exit interface ethernet 1/1/7 switchport trunk allowed vlan 400 exit interface port-channel 50 switchport trunk allowed vlan 400 exit</pre>	<pre>configure terminal interface vlan 400 description RepBlockImport_Network no shutdown exit interface ethernet 1/1/48 switchport trunk allowed vlan 400 exit interface port-channel 50 switchport trunk allowed vlan 400 exit</pre>

Configure NAS networks on the ToR switches

Configuring LACP is required for deployments with Network Attached Storage (NAS). Two ports are aggregated in an LACP bond. The ports run in an active/active mode if LACP is configured. If LACP is not set, the ports run in active/passive mode.

Network Attached Storage is only supported with Unified deployments.

- 1. Establish a terminal connection to the first ToR switch (Switch1).

2. Enter global configuration mode.

```
configure terminal
```

3. Create the NAS VLAN.

```
interface vlan 500
description NAS_Network
no shutdown
exit
```

4. Create the LACP port-channel for Node A ports.

```
interface port-channel 10
description NodeA_NAS_LACP_port_channel
vlt-port-channel 10
switchport trunk allowed vlan 500
switchport mode trunk
spanning-tree port type edge
mtu 9216
exit
```

5. Create LACP port-channel for Node B ports.

```
interface port-channel 20
description NodeB_NAS_LACP_port_channel
vlt-port-channel 20
switchport trunk allowed vlan 500
switchport mode trunk
spanning-tree port type edge
mtu 9216
exit
```

6. Move Node A facing port to the first port-channel group, and enable active LACP mode.

```
interface ethernet 1/1/8
description NodeA_IO_0_port_3
no shutdown
channel-group 10 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

7. Move Node B facing port to the second port-channel group, and enable active LACP mode.

```
interface ethernet 1/1/47
description NodeB_IO_1_port_3
no shutdown
channel-group 20 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

8. Configure NAS VLAN for Uplink

```
interface port-channel 50
switchport trunk allowed vlan 500
exit
```

9. Commit configuration changes to nvram.

```
copy running-configuration startup-configuration
```

10. Repeat steps 1 - 9 on the second ToR switch (Switch2) as demonstrated below.


 **NOTE:** Be sure to use the correct ethernet ports when configuring the second ToR switch (Switch2)

Table 27. Code sample for configuration NAS networks on the ToR switches

Switch 1	Switch 2
<pre>configure terminal interface vlan 500 description NAS_Network no shutdown exit interface port-channel 10 description NodeA_NAS_LACP_port_channel vlt-port-channel 10 switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface port-channel 20 description NodeB_NAS_LACP_port_channel vlt-port-channel 20 switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface ethernet 1/1/8 no shutdown description NodeA_IO_0_port_3 channel-group 10 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/47 no shutdown description NodeB_IO_1_port_3 channel-group 20 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 500 exit copy running-configuration startup-configuration</pre>	<pre>configure terminal interface vlan 500 description NAS_Network no shutdown exit interface port-channel 10 description NodeA_NAS_LACP_port_channel vlt-port-channel 10 switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface port-channel 20 description NodeB_NAS_LACP_port_channel vlt-port-channel 20 switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface ethernet 1/1/8 description NodeA_IO_1_port_3 no shutdown channel-group 10 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/47 description NodeB_IO_0_port_3 no shutdown channel-group 20 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 500 exit copy running-configuration startup-configuration</pre>

Configure Cluster network on the Top-of-Rack switches

Configuring LACP is not required, but highly recommended. The first 2 ports of the 4-Port Card are aggregated in an LACP bond. The ports run in an active/active mode if LACP is configured. If LACP is not set, the ports run in active/passive mode.

LACP requires that a Virtual Link Trunking interconnect (VLTi) has been configured on the switches. See [Configure Virtual Link Trunking interconnect](#) for details.

1. [Establish a terminal connection](#) to the first ToR switch (Switch1).

2. Enter global configuration mode.

```
configure terminal
```

3. Configure the Native VLAN 1 for the Cluster.

```
interface vlan 1
description Cluster_Network
no shutdown
exit
```

4. Create the LACP port-channel for Node A ports.

```
interface port-channel 30
description NodeA_Cluster_LACP_port_channel
vlt-port-channel 30
switchport mode trunk
switchport access vlan 1
spanning-tree port type edge
mtu 9216
exit
```

5. Create LACP port-channel for Node B ports.

```
interface port-channel 40
description NodeB_Cluster_LACP_port_channel
vlt-port-channel 40
switchport mode trunk
switchport access vlan 1
spanning-tree port type edge
mtu 9216
exit
```

6. Move Node A facing port to the first port-channel group, and enable active LACP mode.

```
interface ethernet 1/1/1
description NodeA_4port_port_0
no shutdown
channel-group 30 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

7. Move Node B facing port to the second port-channel group, and enable active LACP mode.

```
interface ethernet 1/1/54
description NodeB_4port_port_1
no shutdown
channel-group 40 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

8. Configure Cluster VLAN for Uplink

```
interface port-channel 50
switchport trunk allowed vlan 1
exit
```

9. Commit configuration changes to nvram.

```
copy running-configuration startup-configuration
```

10. Repeat steps 1 - 9 on the second ToR switch (Switch2).

Table 28. Code sample for configuration Cluster network on the ToR switches

Switch 1	Switch 2
<pre> configure terminal interface vlan 1 description Cluster_Network no shutdown exit interface port-channel 30 description NodeA_Cluster_LACP_port_channel vlt-port-channel 30 switchport mode trunk switchport access vlan 1 spanning-tree port type edge mtu 9216 exit interface port-channel 40 description NodeB_Cluster_LACP_port_channel vlt-port-channel 40 switchport mode trunk switchport access vlan 1 spanning-tree port type edge mtu 9216 exit interface ethernet 1/1/1 description NodeA_4port_port_0 no shutdown channel-group 30 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/54 description NodeB_4port_port_1 no shutdown channel-group 40 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface port-channel 50 switchport access vlan 1 exit copy running-configuration startup- configuration </pre>	<pre> configure terminal interface vlan 1 description Cluster_Network no shutdown exit interface port-channel 30 description NodeA_Cluster_LACP_port_channel vlt-port-channel 30 switchport mode trunk switchport access vlan 1 spanning-tree port type edge mtu 9216 exit interface port-channel 40 description NodeB_Cluster_LACP_port_channel vlt-port-channel 40 switchport mode trunk switchport access vlan 1 spanning-tree port type edge mtu 9216 exit interface ethernet 1/1/1 description NodeA_4port_port_1 no shutdown channel-group 30 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/54 description NodeB_4port_port_0 no shutdown channel-group 40 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface port-channel 50 switchport access vlan 1 exit copy running-configuration startup- configuration </pre>

Cable Dell PowerSwitch Series ToR switches for Storage services

This chapter contains the following information.

Topics:

- Cable the ToR switches together
- Cable the Top-of-Rack switches to the core uplinks
- Cable the base enclosure to the ToR switches

Cable the ToR switches together

PowerStore dual switch deployments with VLT, requires that the two Top of Rack (ToR) switches are cabled together.

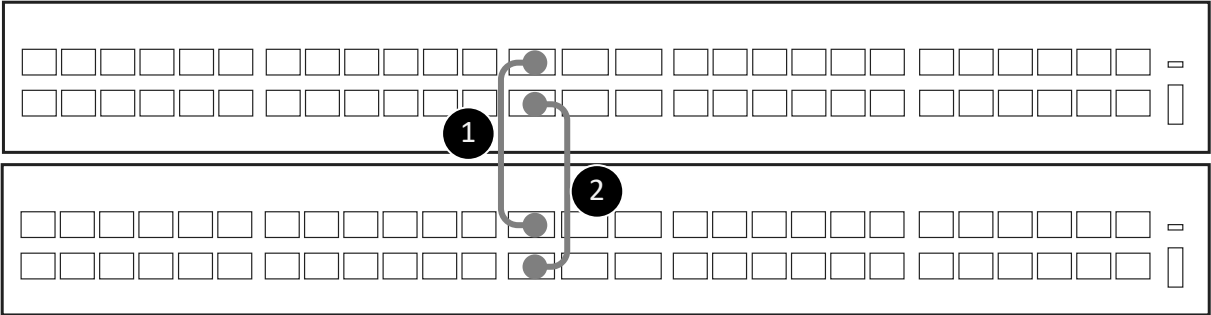


Figure 19. Switch-to-switch connectivity

Use two cables that support connectivity between the high speed ports, for example 100Gbps Direct Attached Cables (DAC).

Table 29. Available switch-to-switch ports

PowerSwitch	100 GbE Ports
S4148F-ON	25, 26, 29, and 30

It is recommended that you use the same port numbers for the pair on the top and bottom switch.

Table 30. Steps to connect the switches together

1.	Connect 100 GbE port 25 of the bottom switch (1) to 100 GbE port 25 of the top switch (2).
2.	Connect 100 GbE port 26 of the bottom switch (1) to 100 GbE port 26 of the top switch (2).

Cable the Top-of-Rack switches to the core uplinks

Cable the Dell PowerSwitch Series S4148-ON Top-of-Rack (ToR) switches to the core uplinks.

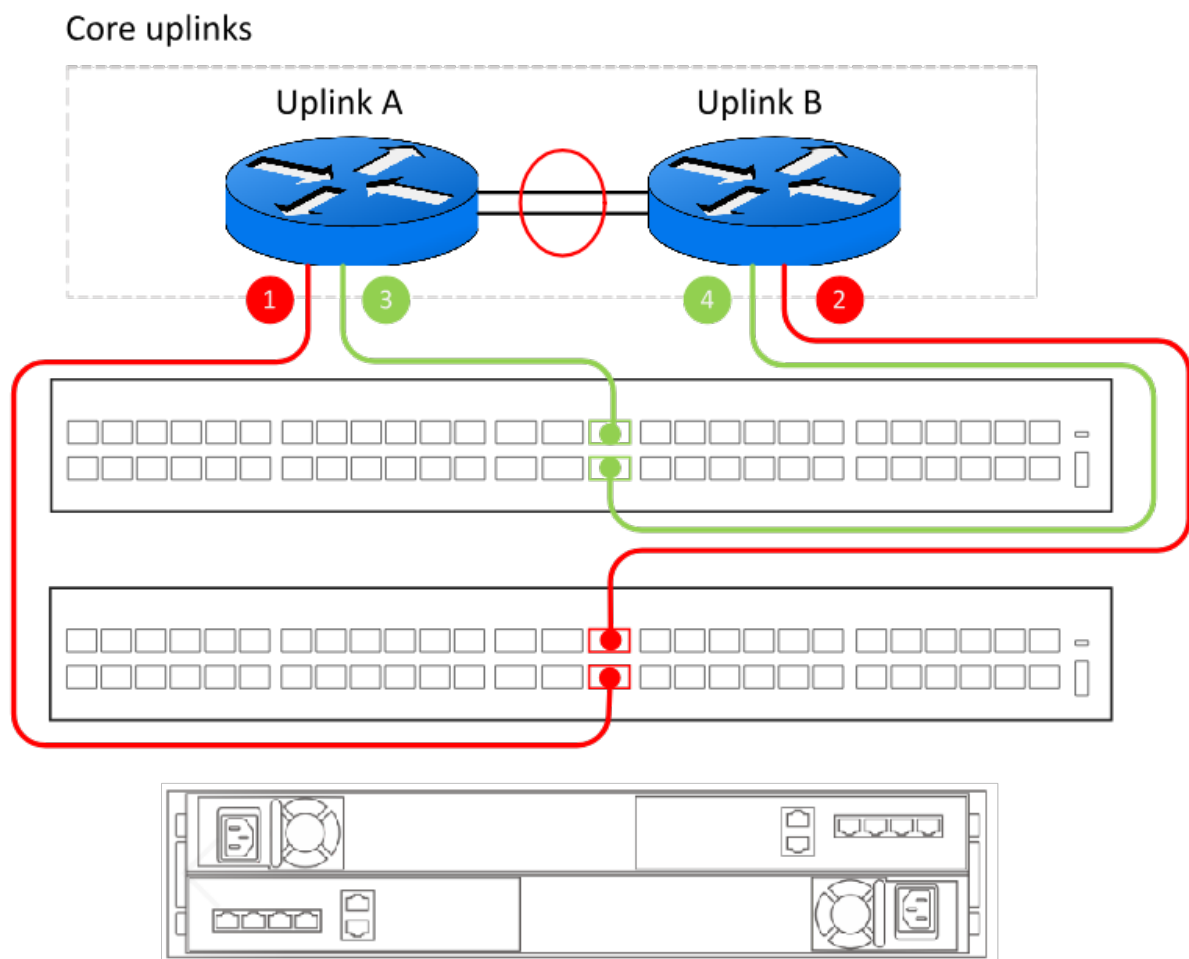


Figure 20. Dell PowerSwitch Series S4148-ON ToR switch connections to the core uplinks

Table 31. Steps to connect to the Dell PowerSwitch Series S4148-ON ToR switches to the core uplinks

1.	Connect port 30 of the bottom ToR switch to the core Uplink A.
2.	Connect port 29 of the bottom ToR switch to the core Uplink B.
3.	Connect port 29 of the top ToR switch to the core Uplink A.
4.	Connect port 30 of the top ToR switch to the core Uplink B.

NOTE: Work with your network administrator to determine the uplink ports to which the ToR switches will connect.

Cable the base enclosure to the ToR switches

Cable the node ports to the Top of Rack (ToR) switch ports for each Storage network.

Our sample configuration demonstrates configuring the following node to switch ports. If you have used different ports than demonstrated below, see the [Switch resources for Storage services worksheet](#), which you completed with your network administrator for the correct port mappings.

NOTE: Ports 0 and 1 of the 4-port card are reserved for the cluster network with all PowerStore T model appliances. If deploying a PowerStore 500T model appliance ports 2 and 3 of the 4-port card are reserved for connectivity to the 24 Drive 2.5 Inch NVMe (ENS24) expansion enclosures.

Table 32. Cable the switches

Network	Node	Node Port	Switch	Switch Port
iSCSI/Replication and Block Import	A	Port 2 on I/O Module 0	1	7
	B	Port 2 on I/O Module 0	2	48
NVMe/TCP	A	Port 0 on I/O Module 0	1	5
	B	Port 0 on I/O Module 0	2	50
Network Attached Storage (NAS) /File Import	A	Port 3 on I/O Module 0	1	8
		Port 3 on I/O Module 1	2	8
	B	Port 3 on I/O Module 0	2	47
		Port 3 on I/O Module 1	1	47
Cluster	A	Port 0 on the 4-port card	1	1
		Port 1 on the 4-port card	2	1
	B	Port 0 on the 4-port card	2	54
		Port 1 on the 4-port card	1	54

Cable the iSCSI and Replication and Import networks

Cable the nodes to the Top of Rack (ToR) switches for the iSCSI and Replication and Import networks.

Cable the node ports for the iSCSI and Replication and Import networks.

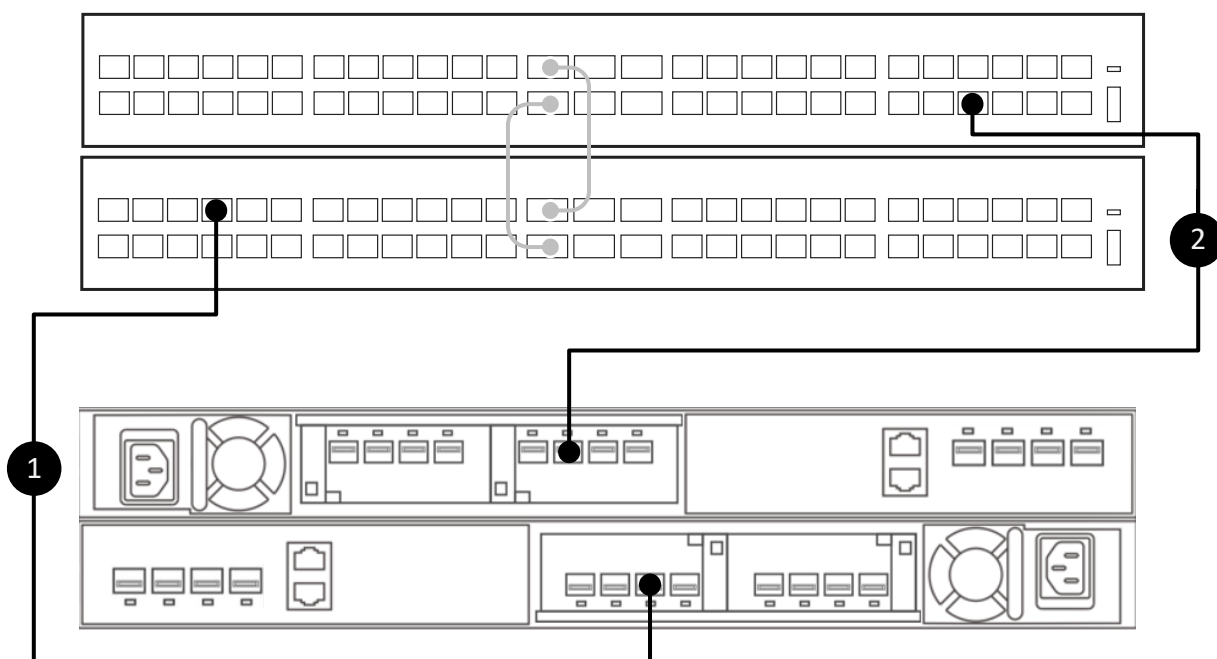


Figure 21. Connect node ports to the ToR switches for the iSCSI and Replication and Import networks

Table 33. Steps to cable to the switch for the iSCSI and Replication and Import networks

1.	Connect Port 2 on I/O Module 0 of the bottom Node A, to Port 7 of the bottom switch (Switch1).
2.	Connect Port 2 on I/O Module 0 of the top Node B, to Port 48 of the top switch (Switch2).

Cable the NVMe/TCP network

Cable the nodes to the Top of Rack (ToR) switches for the NVMe/TCP network.

Cable the node ports for the NVMe/TCP network.

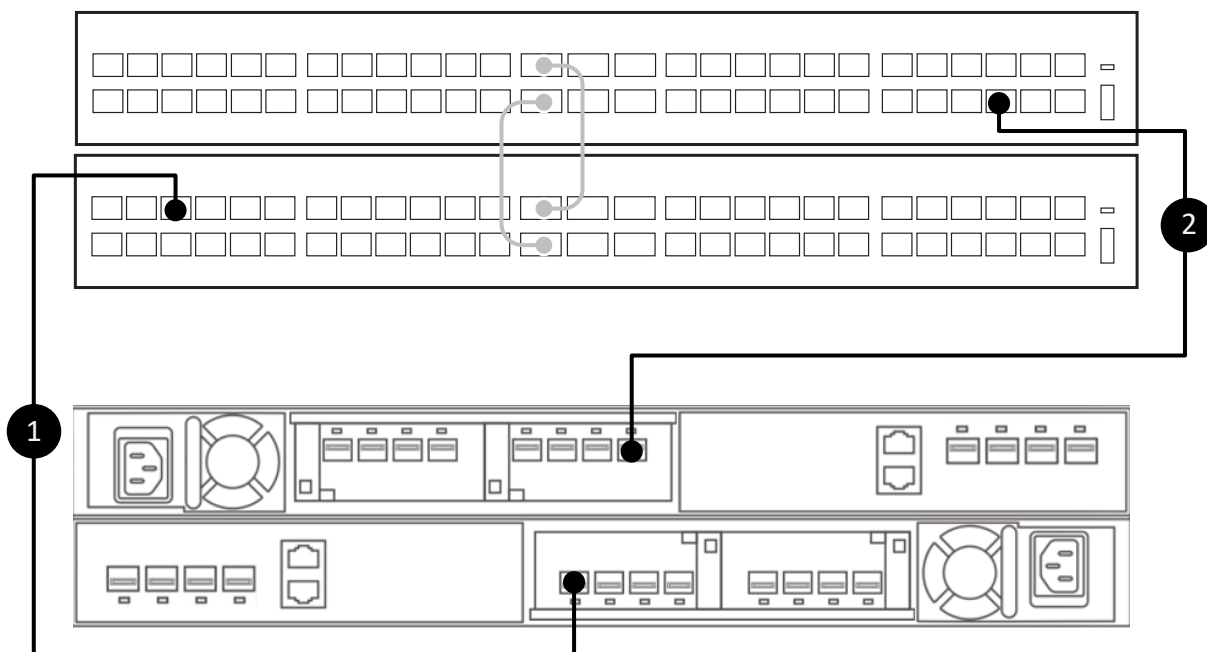


Figure 22. Connect node ports to the ToR switches for the NVMe/TCP network

Table 34. Steps to cable to the switch for the NVMe/TCP network

1.	Connect Port 0 on I/O Module 0 of the bottom Node A, to Port 5 of the bottom switch (Switch1).
2.	Connect Port 0 on I/O Module 0 of the top Node B, to Port 50 of the top switch (Switch2).

Cable the NAS network

Cable the nodes to the Top of Rack (ToR) switches for the Network Attached Storage (NAS) network.

Cable the node ports for the NAS network.

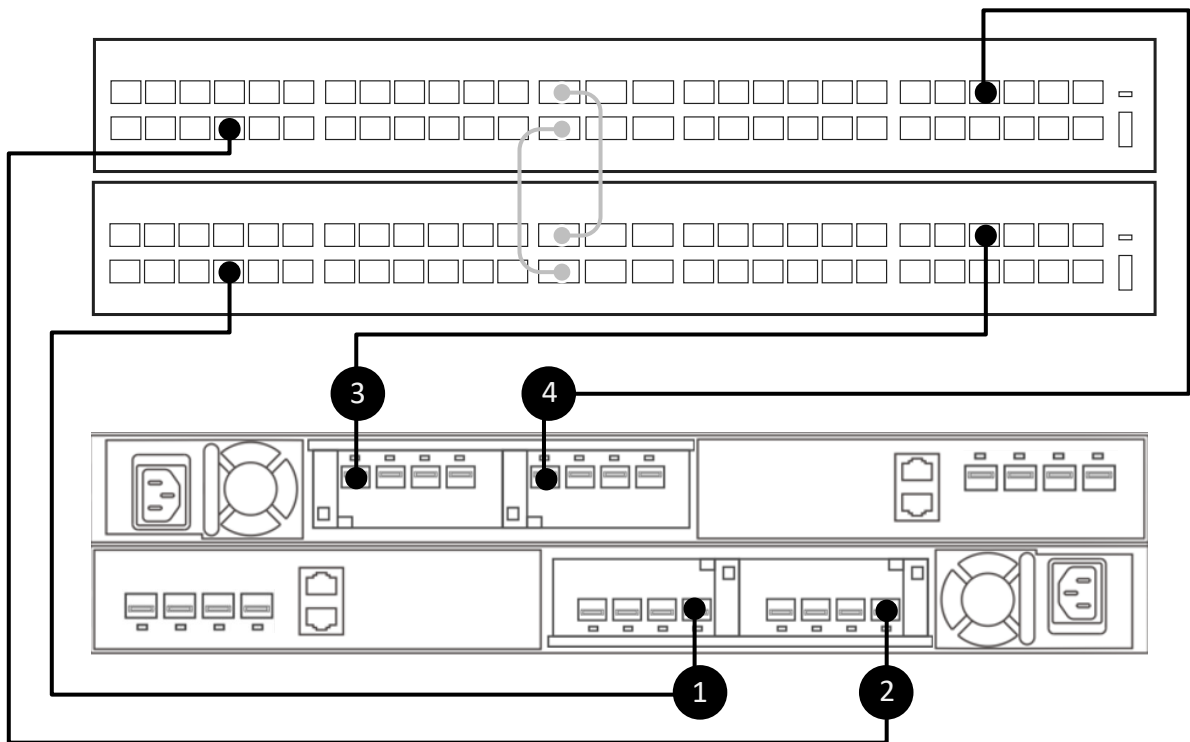


Figure 23. Connect node ports to the ToR switches for the NAS network

1.	Connect Port 3 on I/O Module 0 of the bottom Node A to Port 8 of the bottom switch (Switch 1).
2.	Connect Port 3 on I/O Module 1 of the bottom Node A to Port 8 of the top switch (Switch 2).
3.	Connect Port 3 on I/O Module 0 of the top Node B, to Port 47 of the bottom switch (Switch 1).
4.	Connect Port 3 on I/O Module 1 of the top Node B, to Port 47 of the top switch (Switch 2).

Cable the Cluster network

Cable the nodes to the Top of Rack (ToR) switches for the cluster network.

Cable the node ports for the Cluster network.

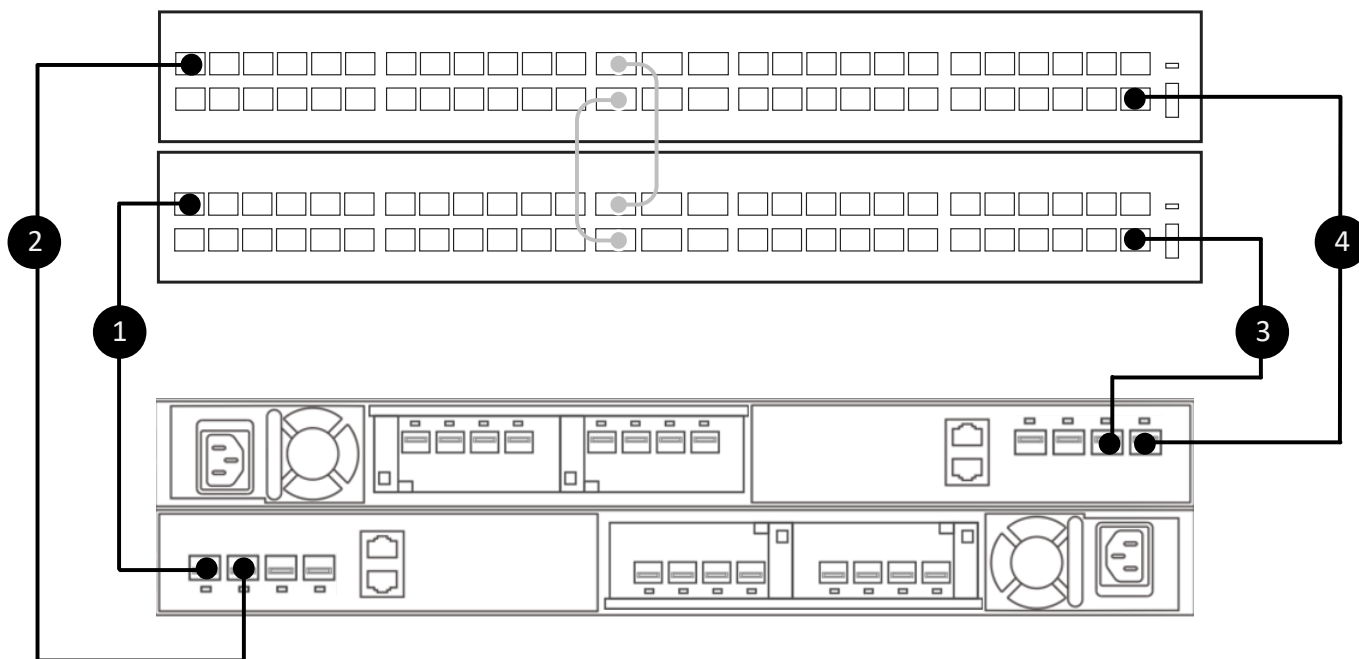


Figure 24. Connect node ports to the ToR switches for the Cluster network

Table 35. Steps to cable to the switch for the Cluster network

1.	Connect Port 0 of the bottom node (A) to Port 1 of the bottom switch (1).
2.	Connect Port 1 of the bottom node (A) to Port 1 of the top switch (2).
3.	Connect Port 1 of the top node (B), to Port 54 of the bottom switch (1).
4.	Connect Port 0 of the top node (B), to Port 54 of the top switch (2).

Validate PowerSwitch Series configuration with ToR switches

This chapter includes the following information.

Topics:

- [Validate configuration on the Top-of-Rack \(ToR\) switches](#)
- [Network Validation Tool after adding the Top-of-Rack switches to your PowerStore T model deployment](#)

Validate configuration on the Top-of-Rack (ToR) switches

Once you have configured and cabled your ToR switches, validate the configuration prior to discovering your PowerStore T model deployment.

1. [Establish a terminal session to the switch.](#)
2. Validate the interface status.

```
show interface status | grep up
```

Port	Description	Status	Speed	Duplex	Mode	Vlan	Tagged-Vlans
Eth 1/1/1	NodeA_4port_p..	up	10G	full	-	-	-
Eth 1/1/5	NodeA_IO_0_po..	up	10G	full	T	1	300
Eth 1/1/7	NodeA_IO_0_po..	up	10G	full	T	1	200,400
Eth 1/1/8	NodeA_IO_0_po..	up	10G	full	-	-	-
Eth 1/1/25	VLTi	up	100G	full	-	-	-
Eth 1/1/26	VLTi	up	100G	full	-	-	-
Eth 1/1/29	Uplink_Ports	up	100G	full	-	-	-
Eth 1/1/30	Uplink_Ports	up	100G	full	A	1	-
Eth 1/1/47	NodeB_IO_1_po..	up	10G	full	-	-	-
Eth 1/1/54	NodeB_4port_p..	up	10G	full	-	-	-

3. Validate the port channel configuration.

```
show port-channel summary
```

Flags: D - Down I - member up but inactive P - member up and active
 U - Up (port-channel) F - Fallback Activated IND - LACP Individual

Group	Port-Channel	Type	Protocol	Member Ports
10	port-channel10	(U)	Eth	DYNAMIC 1/1/8 (P)
20	port-channel20	(U)	Eth	DYNAMIC 1/1/47 (P)
30	port-channel30	(U)	Eth	DYNAMIC 1/1/1 (P)
40	port-channel40	(U)	Eth	DYNAMIC 1/1/54 (P)
50	port-channel50	(U)	Eth	DYNAMIC 1/1/29 (P) 1/1/30 (P)
1000	port-channel1000	(U)	Eth	STATIC 1/1/25 (P) 1/1/26 (P)

4. Validate the VLAN configuration

```
show vlan
```

```
Codes: * - Default VLAN, M - Management VLAN, R - Remote Port Mirroring VLANs,
        @ - Attached to Virtual Network, P - Primary, C - Community, I - Isolated
Q: A - Access (Untagged), T - Tagged
NUM    Status    Description    Q Ports
*  1      Active    Cluster_Network    A Eth1/1/2-1/1/7,1/1/9-1/1/24,
                        1/1/31-1/1/46,1/1/48-1/1/53
                        A Po10,20,30,40,50,1000
                        T Eth1/1/7
                        T Po50,1000
                        T Eth1/1/5
                        T Po50,1000
                        T Eth1/1/7
                        T Po50,1000
                        T Po10,20,50,1000
                        T Po1000
200     Active    iSCSI_Network
300     Active    NVMe_Network
400     Active    RepBlockImport_Network
500     Active    NAS_Network
4094    Active
```

5. Validate the link layer discovery protocol (LLDP) configuration

```
show lldp neighbors
```

Loc PortID	Rem Host Name	Rem Port Id	Rem Chassis Id
ethernet1/1/1	Not Advertised	00:e0:ec:da:5c:da	00:e0:ec:da:5c:da
ethernet1/1/1	Dell PowerStore	00:e0:ec:da:5c:ca	cyc-coreos
ethernet1/1/5	Not Advertised	00:60:16:a1:1a:4c	00:60:16:a1:1a:4c
ethernet1/1/5	Dell PowerStore	00:60:16:a1:1a:3c	cyc-coreos
ethernet1/1/7	Not Advertised	00:60:16:a1:1a:4e	00:60:16:a1:1a:4e
ethernet1/1/7	Dell PowerStore	00:60:16:a1:1a:3e	cyc-coreos
ethernet1/1/8	Not Advertised	00:60:16:a0:d6:7f	00:60:16:a0:d6:7f
ethernet1/1/8	Dell PowerStore	00:60:16:a0:d6:6f	cyc-coreos
ethernet1/1/25	Switch2	ethernet1/1/25	68:4f:64:0e:31:d9
ethernet1/1/26	Switch2	ethernet1/1/26	68:4f:64:0e:31:d9
ethernet1/1/29	UX-Spine-1	ethernet1/1/29	68:4f:64:68:c7:1d
ethernet1/1/30	UX-Spine-1	ethernet1/1/30	68:4f:64:68:c7:1d
ethernet1/1/47	Not Advertised	00:60:16:a1:83:b3	00:60:16:a1:83:b3
ethernet1/1/47	Dell PowerStore	00:60:16:a1:83:a3	cyc-coreos
ethernet1/1/54	Not Advertised	00:e0:ec:da:5b:23	00:e0:ec:da:5b:23
ethernet1/1/54	Dell PowerStore	00:e0:ec:da:5b:13	cyc-coreos
mgmt1/1/1	UX-Spine-1	ethernet1/1/41	68:4f:64:68:c7:1d

6. Validate the VLT domain_id

```
show vlt <domain_id>
```

```
Domain ID      : 1
Unit ID       : 1
Role          : primary
```

```

Version : 3.1
Local System MAC address : 68:4f:64:0e:6d:d9
Role priority : 4096
VLT MAC address : 00:00:00:00:00:01
IP address : fda5:74c8:b79e:1::1
Delay-Restore timer : 90 seconds
Peer-Routing : Enabled
Peer-Routing-Timeout timer : 0 seconds
Multicast peer-routing timer : 300 seconds
VLTi Link Status
  port-channel1000 : up

```

VLT Peer Unit ID	System MAC Address	Status	IP Address	Version
2	68:4f:64:0e:31:d9	up	fda5:74c8:b79e:1::2	3.1

7. Validate VLT backup link

```
show vlt <domain_id> backup-link
```

```

VLT Backup Link
-----
Destination : 100.0.100.11
Peer Heartbeat status : Up
Heartbeat interval : 30
Heartbeat timeout : 90
Destination VRF : default

```

8. Validate that there is no mismatch with the VLT domain_id.

```
show vlt <domain_id> mismatch
```

```

VLT-MAC mismatch:
No mismatch

Peer-routing mismatch:
No mismatch

VLAN mismatch:
No mismatch

Private VLAN mode mismatch:
No mismatch

Private VLAN mapping mismatch:
No mismatch

Private VLAN port mode mismatch:
No mismatch

LACP Individual mismatch:
No mismatch

VLT VLAN mismatch:
No mismatch

VLT Virtual Network Mismatch:

Virtual Network Name Mismatch:
No mismatch

Virtual Network VLTi-VLAN Mismatch:
No mismatch

Virtual Network Mode Mismatch:
No mismatch

Virtual Network Tagged Interfaces Mismatch:
No mismatch

```

```

Virtual Network Untagged Interfaces Mismatch:
No mismatch

Virtual Network VNI Mismatch:
No mismatch

Virtual Network Remote-VTEP Mismatch:
No mismatch

Virtual Network anycast ip Mismatch:
No mismatch

Virtual Network anycast mac Mismatch:
No mismatch

EVPN Mismatch:

EVPN Mode Mismatch:
No mismatch

EVPN EVI Mismatch:
No mismatch

EVPN VRF Mismatch:
No mismatch

EVPN ARP-ND SUPPRESSION Mismatch:
No mismatch

NVE Mismatch:
No mismatch

VLAN anycast ip Mismatch:
No mismatch

VLAN anycast mac Mismatch:
No mismatch

DHCP Snooping Mismatch:

Global Snooping Configuration Mismatch

-----
Codes: SE - Static Entry Mismatch
      DT - DAI Trust Mismatch
      ST - Snooping Trust Mismatch
      SAV - Source-Address-Validation Mismatch
      ARP - ARP Inspection Mismatch
      VS - VLAN Snooping Mismatch
      Interface      Interface Snooping Configuration Mismatch
-----

DHCP Relay Mismatch:

Global Relay Configuration Mismatch

-----

VRF Relay Configuration Mismatch

-----

Interface Relay Configuration Mismatch

-----

DHCP V6 Relay Mismatch:

Global Dhcpv6 Relay Configuration Mismatch

-----

```


Interface Dhcpv6 Relay Configuration Mismatch

RA Guard Mismatch:

Global RA Guard Configuration Mismatch: No

Interface	Vlan	Reason
-----------	------	--------

Multicast Snooping configuration mismatch:

Flood-restrict configuration:

Local	Peer
-------	------

No mismatch

Global Snooping configuration:

Protocol	Local	Peer
----------	-------	------

No Mismatch

Vlan status	IPv4		IPv6	
VlanId	Local	Peer	Local	Peer

No mismatch

Mismatch check for NLB configs in VLT

No mismatch

Multicast routing mismatches:

Global status:

Parameter	VRF	Local	Peer
-----------	-----	-------	------

No mismatch

SSM-Range status:

Parameter	VRF	Local	Peer
-----------	-----	-------	------

No mismatch

Register Filter status:

Parameter	VRF	Local	Peer
-----------	-----	-------	------

No mismatch

Vlan status	IPv4		IPv6	
VlanId	Local	Peer	Local	Peer

```

-----
No mismatch
Neighbor Filter status:          IPv4          IPv6
VlanId          Local      Peer      Local      Peer
-----
No mismatch

Join Filter status:          IPv4          IPv6
VlanId          Local      Peer      Local      Peer
-----
No mismatch
PIM Anycast RP information mismatches:
Anycast RP:
Parameter      VRF          Local          Peer
-----

Anycast RP-Set:
RP-address      VRF          Local          Peer
-----

No mismatch
Mismatch check for Port Security configs in VLT
-----
GLOBAL PORT-SECURITY CONFIGURATION
-----
No mismatch
-----
VLT-LAG PORT-SECURITY CONFIGURATION
-----
No mismatch

```

9. Validate the VLT port configuration.

```
show vlt <domain_id> vlt-port-detail
```

```

vlt-port-channel ID : 10
VLT Unit ID      Port-Channel      Status      Configured ports      Active ports
-----
* 1              port-channel10      up          1                      1
  2              port-channel10      up          1                      1

vlt-port-channel ID : 20
VLT Unit ID      Port-Channel      Status      Configured ports      Active ports
-----
* 1              port-channel20      up          1                      1
  2              port-channel20      up          1                      1

```

vlt-port-channel ID : 30				
VLT Unit ID	Port-Channel	Status	Configured ports	Active ports

* 1	port-channel30	up	1	1
2	port-channel30	up	1	1
vlt-port-channel ID : 40				
VLT Unit ID	Port-Channel	Status	Configured ports	Active ports

* 1	port-channel40	up	1	1
2	port-channel40	up	1	1
vlt-port-channel ID : 50				
VLT Unit ID	Port-Channel	Status	Configured ports	Active ports

1	port-channel50	up	2	2
2	port-channel50	up	2	2

- Repeat steps on ToR switch 2.
- Review the running configuration for ToR switch 1, and repeat on ToR switch 2.

```
show running-configuration
```

For an example of the running configuration output see [Running configuration of PowerSwitch Series used in PowerStore T model deployments](#).

Network Validation Tool after adding the Top-of-Rack switches to your PowerStore T model deployment

Optionally, you can run the Network Validation Tool (NVT) for PowerStore after configuring the Top-of-Rack (ToR) switches for PowerStore T model appliance Storage services.

The NVT is available for download from the Dell Technologies Solutions page at: <https://central.dell.com/central/home>.

You must have an online support account to download the NVT. You can create an account from <https://www.dell.com/support>.

Once you have downloaded the NVT, see the *Network Validation Tool for PowerStore UserGuide.pdf*, which is downloaded in the zip file with the NVT.

Configure Storage networks in PowerStore Manager

This chapter includes the following information.

Topics:

- [Create Block-optimized Storage networks in PowerStore Manager](#)
- [Create NAS networks in PowerStore Manager](#)
- [Optionally, add the File Import Interface in PowerStore Manager](#)

Create Block-optimized Storage networks in PowerStore Manager

Once you have configured the ToR switches for Storage networks, you will need to create the Storage networks in PowerStore Manager.

This topic describes how to configure the iSCSI, NVMe/TCP, and Replication and Block Import networks in PowerStore Manager. For steps to configure networks for Network Attached Storage (NAS) networks, see [Create NAS networks in PowerStore Manager](#).

Get the completed *Network configuration worksheet for Storage services*.

The following *Network configuration worksheet for Storage services* has been completed with the network resources used in this guide. If you did not configure the Top-of-Rack switches with the resources used in this guide, you can complete a new *Network configuration worksheet for Storage services* with the information relevant to your environment. To download a blank worksheet see [Network configuration worksheet for Block-optimized Storage services \(blank\)](#).


Once you have configured the Cluster network on the switch, Cluster network configuration is automated in PowerStore Manager, and no further action is required.

Only one network can be tagged for Replication in PowerStore Manager. By default PowerStore Manager tags the Default storage network as the Replication network. You can change the Replication network tagging in PowerStore Manager at any time.

Table 36. Network configuration worksheet for additional Block-optimized storage services (completed)

Resource	iSCSI	NVMe/TCP	Replication and Block Import
Storage Network Name	iSCSI_Network	NVMe_Network	RepBlockImport_Network
(Optional) VLAN ID For better security and performance, it is recommended that you specify a unique VLAN ID for each type of network. If you are deploying into a single VLAN, ensure that you configure a unique subnet for the Management and each Storage network. Use the same VLAN IDs that were used to configure your Storage networks on the switch.	200	300	400

Table 36. Network configuration worksheet for additional Block-optimized storage services (completed) (continued)

Resource	iSCSI	NVMe/TCP	Replication and Block Import
Netmask/Prefix Length	24	24	24
Gateway	192.168.2.1	192.168.3.1	192.168.4.1
Storage Network IP addresses You must reserve a minimum 2 IP addresses for each Storage network you are adding. (1 IP address per node.)	192.168.2.11-12	192.168.3.11-12	192.168.4.11-12
(Optional) Global Storage Discovery IP It is recommended that you choose to create this IP address. It is used as the single highly available floating IP address for hosts to easily discover storage from your cluster.	192.168.2.10	192.168.3.10	192.168.4.10
Map Storage for Appliance/Network Interface (Include the port or Link Aggregation (LACP bond) for each appliance the storage will be mapped to)	Port 2 on I/O Module 0	Port 0 on I/O Module 0	Port 2 on I/O Module 0
Network MTU Size You can provide an MTU size from 1280 to 9000 bytes.  NOTE: It is recommended to set the MTU size to 9000.	9000	9000	9000

- From PowerStore Manager go to the **Settings > Network IPs > Storage** tab.
- Click **Create**.
- Enter the Storage network resources into the **Create Storage Network** wizard and select **Next**.
- Select the checkbox next to the name of the first port over which the storage traffic will run for the Storage network. PowerStore Manager will automatically map the Storage network to both the port you selected, and the corresponding port on the other node.
- Repeat steps 1 - 3 for each network you are adding.
- If not using the Default Storage network for the Replication and Block Import network, tag the network you will be using for Replication and Block Import.
 - Go to the **Hardware** page.
 - Select the appliance name and go to the **Ports** page.
 - Select the checkbox next to the port you are tagging for replication in the **Node-Module-Name** column.
 - Open the **More Actions** drop-down menu and select **Tag for Replication**.
The network appears selected in the **Tagged for Replication** column.
- To validate the Storage network was successfully configured:
 - Go to the **Hardware** page.
 - Select the appliance name and go to the **Ports** page.
 - Locate the port on which you created the Storage network in the **Node-Module-Name** column.
 - The **Link State** should be green, and the Storage network should appear in the **Mapped for Storage** column.
 - Locate the corresponding port on the other appliance node, to validate that the **Link State** is green, and the Storage network appears in the **Mapped for Storage** column.

Create NAS networks in PowerStore Manager

Once you have configured the ToR switches for Network Attached Storage (NAS) networks, you will need to create the NAS networks in PowerStore Manager.

This topic describes how to configure the NAS network in PowerStore Manager. For steps to configure networks for the iSCSI, NVMe/TCP, Replication and Import, or Cluster network in PowerStore Manager, see [Create Storage networks in PowerStore Manager](#).

NAS services are enabled when you select **Unified** mode in the PowerStore Manager **Initial Configuration Wizard** the first time you create a cluster in PowerStore Manager.

Get the completed *Network configuration worksheet for NAS storage services*.

The following *Network configuration worksheet for NAS storage services* has been completed with the resources used in this guide for NAS networks. If you did not configure the Top-of-Rack switches with the resources used in this guide, you can complete a new *Network configuration worksheet for NAS storage services* with the information relevant to your environment. To download a blank worksheet see [Network configuration worksheet for NAS storage service \(blank\)](#).

NAS networks are configured while creating a NAS server in PowerStore Manager. You will need the following information to set up the NAS network while creating a NAS server. For additional requirements to set up a NAS server and detailed steps see the *PowerStore Configuring NFS Guide* or the *PowerStore Configuring SMB Guide*.

NAS networks require that you configure an LACP bond in PowerStore Manager.

Table 37. Network configuration worksheet for NAS storage service (completed)

Resource	NAS
Network Name	NAS_Network
(Optional) VLAN ID For better security and performance, it is recommended that you specify a unique VLAN ID for each type of network. If you are deploying into a single VLAN, ensure that you configure a unique subnet for the Management, Storage, and NAS networks. Use the same VLAN IDs that were used to configure your storage networks on the switch.	500
Netmask/Prefix Length	24
Gateway	192.168.5.1
Network IP addresses You must reserve a minimum of 1 IP address for NAS Server production. Optionally, you can reserve additional IP addresses for NAS Server backups.	Production: 192.168.5.11 Backup: 192.168.5.12
Map Storage for Appliance/Network Interface Include the Node ports, or port channel on which the networks are configured.	Node A: • Port 3 on I/O Module 0 • Port 3 on I/O Module 1 Node B: • Port 3 on I/O Module 0 • Port 3 on I/O Module 1 The ports are configured into BaseEnclosure-NodeA-Bond1

1. Configure the Link Aggregation in PowerStore Manager for the LACP bond you created for the NAS network on the switch.
 - a. From PowerStore Manager, go to the **Hardware** page and select the appliance for which you configured the bond.
 - b. Open the **Ports** card.
 - c. Select the two ports on Node A which were configured for the bond on Node A.
 - d. Click **Link Aggregation > Aggregate Links**.
PowerStore Manager automatically creates a name for the bond using the following format: "BaseEnclosure-<Node>-<nextLACPbondcreated>" where:

- BaseEnclosure is constant
- Node is the node displayed in the **Node-Module-Name** list.
- nextLACPbondcreated is the numbered by the order in which the bond was created in PowerStore Manager, starting with 0 for the first created.

For example, the second LACP bond created in PowerStore Manager on Node A would be named: **BaseEnclosure-NodeA-Bond1**.

- Optionally, provide a **Description** of the bond.

It is recommended to put the name of the bond created on the switch that maps to this bond.

The same LACP bond is configured on the opposite node. For example if you configured the LACP bond on Node A, then the same LACP bond would be configured on Node B.

- Create a NAS server.

NAS networks are created in PowerStore Manager when you create NAS servers. See the *PowerStore Configuring NFS Guide* or the *PowerStore Configuring SMB Guide* for detailed steps.

Optionally, add the File Import Interface in PowerStore Manager

The File Import interface (network) is added when you add the Remote system to PowerStore Manager.

Every active import requires its own File Import interface be created. However, a File Import interface can be reused for File Import when no other session is currently using it.

NAS Services must be enabled on your PowerStore T model cluster.

The File Mobility network must be configured in PowerStore Manager.

The LACP bond used for File Import must have been configured on the switch and in PowerStore Manager.

You can create a new Link Aggregation in PowerStore T model or reuse the Link Aggregation that was configured for NAS services for the File Import interface.

The following network resources must be reserved before you can define the File Import interface in PowerStore Manager.

The network used for File Import is configured while creating the File Import Interface in PowerStore Manager. You will need the following information to set up the File Import network in PowerStore Manager. For additional requirements to set up a File Import interface and detailed steps see the *PowerStore Importing External Storage to PowerStore Guide*.

Table 38. Network configuration worksheet for File Import (completed sample)

Resource	File Import
(Optional) VLAN ID	N/A
Netmask/Prefix Length	24
Gateway	192.168.6.1
Network IP addresses A minimum of 1 IP address is required for each active file import session. However, a File Import interface can be reused for File Import when no other session is currently using it.	192.168.6.11
(Optional) Global Storage Discovery IP It is recommended that you choose to create this IP address. It is used as the single highly available floating IP address for hosts to easily discover storage from your cluster.	N/A
Map Storage for Appliance/Network Interface Include the Node ports, or port channel on which the networks are configured.	Reuse BaseEnclosure-NodeA-Bond1 configured for NAS services

- If you have not created a Link Aggregation in PowerStore Manager for the LACP bond you created on the switch for File Import perform the following steps, otherwise continue to step 2.
 - From PowerStore Manager, go to the **Hardware** page and select the appliance for which you configured the bond.

- b. Open the **Ports** card.
- c. Select the two ports on Node A which were configured for the bond on Node A.
 - You can create a new Link Aggregation or reuse the Link Aggregation that was configured for NAS services for the File Import interface.
 - Bond 0 is reserved for the Cluster network. You cannot reuse the Link Aggregation created for the Cluster network for the File Import interface.

d. Click **Link Aggregation > Aggregate Links**.

PowerStore Manager automatically creates a name for the bond using the following format: "BaseEnclosure-<Node>-<nextLACPbondcreated>" where:

- BaseEnclosure is constant
- Node is the node displayed in the **Node-Module-Name** list.
- nextLACPbondcreated is numbered by the order in which the bond was created in PowerStore Manager, starting with 0 for the first created.

For example, the second LACP bond created in PowerStore Manager on Node A would be named: **BaseEnclosure-NodeA-Bond1**.

- e. Optionally, provide a **Description** of the bond.

It is recommended to put the name of the bond created on the switch that maps to this bond.

The same LACP bond is configured on the opposite node. For example if you configured the LACP bond on Node A, then the same LACP bond would be configured on Node B.

2. Add the Remote system from the PowerStore Manager **Migration > Import External Storage > Add Remote System** page.

You will define the File Import interface while adding the Remote system. See the PowerStore Manager online help, or the *PowerStore Importing External Storage to PowerStore Guide* for details.

File Mobility

This appendix contains the following information.

Topics:

- [File Mobility overview](#)
- [Create File Mobility in PowerStore Manager](#)

File Mobility overview

File Mobility is a prerequisite for replication and import traffic of File storage.

File Mobility runs over the Management network through the Management switch. PowerStore T model clusters use the File Mobility interface to establish SSH connections with external file resources. The local File Mobility addresses communicate through the management switch to the remote File Mobility addresses.

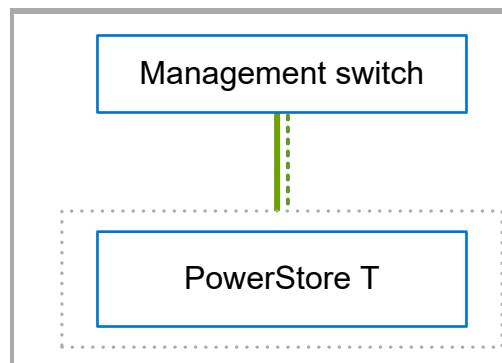




Figure 25. Management network

Table 39. Management network with File Mobility

Identifier	Network
	Management
	File Mobility

For details about the Management network, and how to configure it see [Part 1 Initial Deployment](#).

File Mobility for file replication

To perform File replication you must configure File Mobility in PowerStore Manager, and at least one Storage network for replication on the switches. File Mobility utilizes the Management network over the management switch, while the Replication network runs over the two Top-of-Rack (ToR) switches to communicate with the remote systems.



The Replication network can be used for both Block and File storage replication. File replication can run over an existing Storage network that has been tagged for Replication. To configure a Replication network, see [Part 2 Add Storage Services](#).

NOTE: Replication and Block Import is a shared network. The Block Import network is not used for any File functionality. Only the Replication portion of the network, with File Mobility, is used for replication of File storage.

File Mobility for file import

To import File storage from external sources, you must configure File Mobility in PowerStore Manager and configure a network for File Import on the switches and in PowerStore Manager. File Mobility utilizes the Management switch, while the File Import interface runs over the Top-of-Rack (ToR) switches.

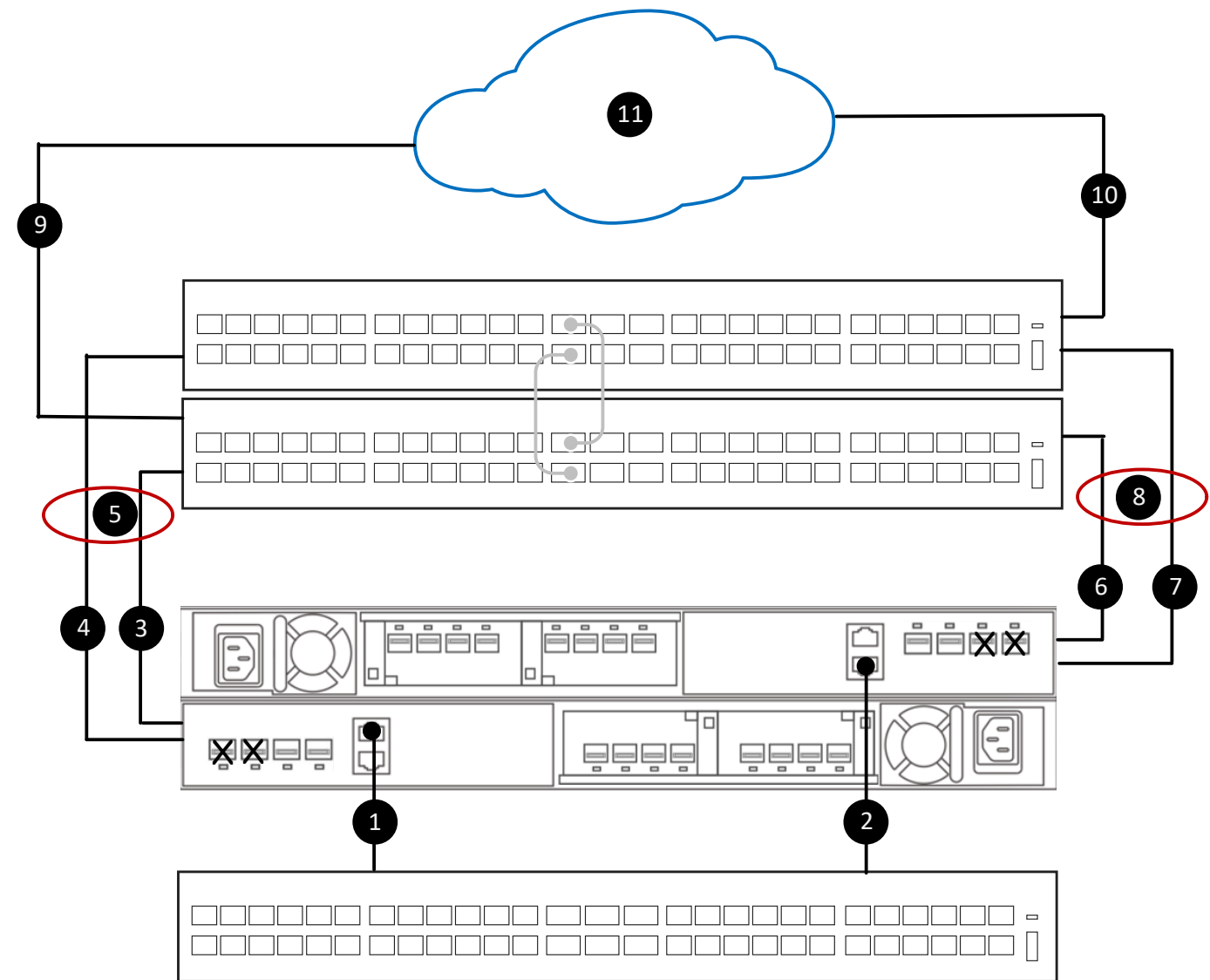


Figure 27. Networks required for importing file storage from a remote system

Identifier	Description
X	Unavailable ports on the nodes.
1	Node A Management port to Management switch
2	Node B Management port to Management switch
3	Node A connection to Bottom, Top-of-Rack Switch 1.
4	Node A connection to Top, Top-of-Rack Switch 1.
5	LACP bond between Node A and the ToR switches.

Identifier	Description
6	Node B connection to Bottom, Top-of-Rack Switch 1.
7	Node B connection to Top, Top-of-Rack Switch 1.
8	LACP bond between Node B and the ToR switches.
9	Bottom, Top-of-Rack Switch 1 connection to the remote system.
10	Top, Top-of-Rack Switch 2 connection to the remote system
11	Connection to the remote system.

To configure a network for File Import, see [Part 2 Add Storage Services](#).

Create File Mobility in PowerStore Manager

File Mobility runs over the Management network. File Mobility does not need to be configured on the switch, but must be configured in PowerStore Manager.

PowerStore T model must have been deployed in **Unified** mode.

You must reserve 3 IP addresses for File Mobility.

Table 40. IP address assignments for Storage networks

IP Address per	Assigned to	Number of IP Addresses required
Appliance	Node A	1
	Node B	1
Cluster	Cluster	1

1. From PowerStore Manager, go to the **Settings > Networking > File Mobility** tab and click **Create**.
2. Enter the resources reserved for the File Mobility network into the **Create File Mobility Network** page and click **Create**.
3. Map the File Mobility network to the first Management port on Node A (**BaseEnclosure-NodeA-EmbeddedModule-MgmtPort**).

The File Mobility network will automatically be mapped to Node B.

- NOTE:** Reconfiguring the File Mobility interface can be disruptive. Before you reconfigure the File Mobility interface:
- Verify with your network administrator that the configuration information is accurate
 - Ensure that there are no active file migrations or file replication sessions

Expand a Storage network to run across multiple ports

The appendix contains the following information.

Topics:

- [Expand a Storage network](#)

Expand a Storage network

You can expand a Storage network to run across multiple ports on a PowerStore T model appliance.

You will require the following information to perform the steps to expand a Storage network.

NOTE: The sample network resources below can be used to expand the iSCSI storage network configured in [Add Storage Services](#) on the two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches. If you did not configure the same iSCSI network described in this guide, then replace the sample resources with values matching your environment.

Table 41. iSCSI storage network resources

Network resource	Sample
Storage network name	iSCSI_Network
Node Port of the PowerStore T model appliance. NOTE: Must be the same on both nodes.	Port 1 of I/O Module 0
ToR Switch 1 port to cable to the bottom node (A).	6
ToR Switch 2 port to cable to the bottom node (B).	49
VLAN ID of the Storage network being expanded.	200
IP addresses At least 2 IP addresses for each interface on which you are expanding the storage network. One IP address for Node A and the other for Node B.	192.168.2.13-14

Perform the following steps to configure an additional port and expand a Storage network that you have configured on the PowerStore T model appliance.

1. [Cable the nodes to the switches for storage network expansion.](#)
2. [Configure the VLAN on the Top-of-Rack \(ToR\) switches.](#)
3. [Add IP addresses and map the Storage network to the ports.](#)

Cable the nodes to the ToR switches

The following steps provide an example of cabling the PowerStore T model appliance nodes to two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches.

To use these instructions, an iSCSI storage network, and the ToR switches must have been configured as described in [Add Storage Services](#).

The following example uses port 1 on I/O Module 0. However, you can choose to use any available port on either I/O module if your nodes have been configured with I/O modules.

NOTE: Ports 0 and 1 of the 4-port card are reserved for the cluster network with all PowerStore T model appliances. If deploying PowerStore a 500T model appliance ports 2 and 3 of the 4-port card are reserved for connectivity to the 24 Drive 2.5 Inch NVMe (ENS24) expansion enclosures.

As demonstrated in the diagram, when cabling the nodes to the ToR switches the bottom node (A), and the top node (B) must be cabled to opposite switches.

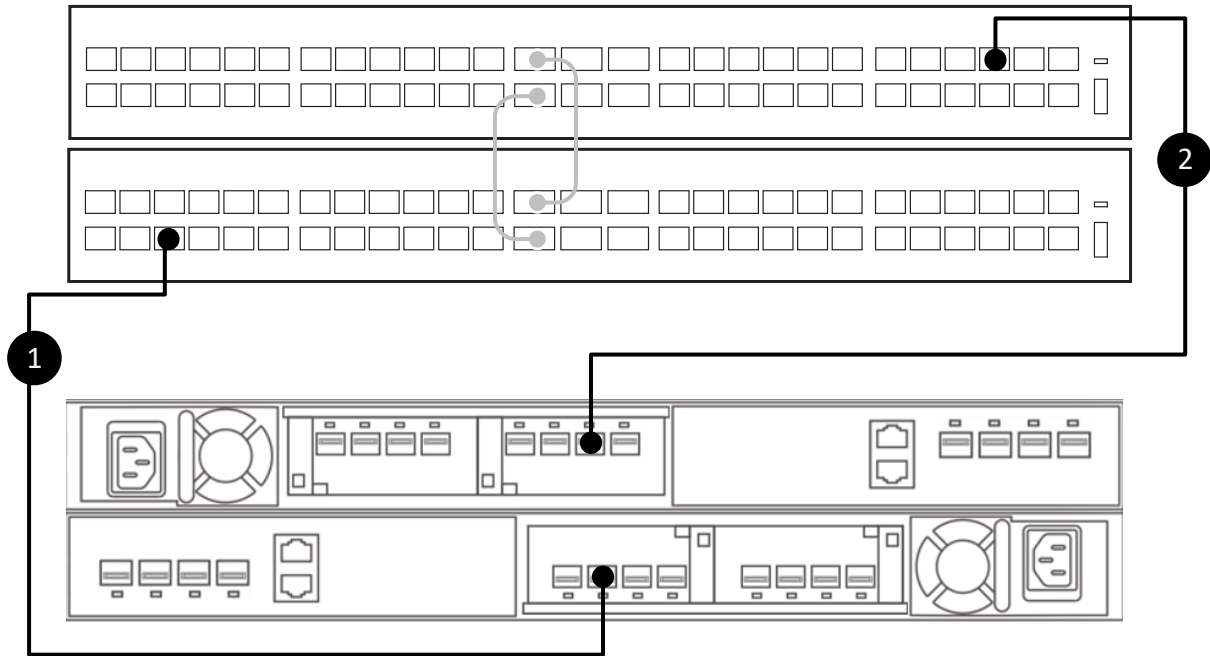


Figure 28. Cable the additional port

1. Connect Port 1 in I/O Module 0 of the bottom Node A to Port 6 of the bottom Switch (1).
2. Connect Port 1 in I/O Module 0 of the top Node B, to Port 49 of the top Switch (2).

Configure the VLAN on the ToR switches

The following steps provide an example of configuring VLANs on two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches.

You can cable the PowerStore T model appliance nodes to the switches before or after you perform these steps. For steps, see [Cable the nodes to the ToR switches](#).

You can skip this step if you have already configured the additional ToR switch ports with the VLAN on which the iSCSI storage network was created.

See [iSCSI Storage network resources](#) for a list of:

- Network resources required to expand a storage network
 - Sample values used in the following steps
1. [Establish a terminal connection](#) to the first ToR switch (Switch1).
 2. Enter global configuration mode.

```
configure terminal
```

3. Configure the storage network VLAN to run over ToR Switch 1 port 6.

```
interface ethernet 1/1/6
description NodeA_IO_0_port_1
no shutdown
switchport mode trunk
switchport trunk allowed vlan 200
```

```
no shutdown
exit
```

4. Repeat steps 1 - 3 on the second ToR switch (Switch2) as demonstrated below.

 **NOTE:** Be sure to use the correct ethernet ports when configuring the second ToR switch (Switch 2)

Table 42. Code sample for configuring ToR switches to expand an iSCSI Storage network

Tor Switch 1	ToR Switch 2
<pre>configure terminal interface ethernet 1/1/6 description NodeA_IO_0_port_1 no shutdown switchport mode trunk switchport trunk allowed vlan 200 no shutdown exit</pre>	<pre>configure terminal interface ethernet 1/1/49 description NodeB_IO_0_port_1 no shutdown switchport mode trunk switchport trunk allowed vlan 200 no shutdown exit</pre>

Add IP addresses and map the Storage network to the ports

Once you have configured and cabled the Top-of-Rack (ToR) switches for expanding the storage network, you will need to add IP addresses, and map the ports for expansion in PowerStore Manager.

See [iSCSI storage network resources](#) for a list of:

- Network resources required to expand a storage network
 - Sample values used in the following steps
1. From PowerStore Manager go to **Settings > Networking > Network IPs** and select the **Storage** tab.
 2. Select the checkbox next to the name of the Storage network you are expanding.
 3. Select **Add IPs**.
 4. Select **Add** in the **IP Addresses for <storage network name> page**.
 5. Enter the IP addresses or address range for the addresses reserved for expanding the storage network and Select **Add**.
 6. Go to the **Hardware** page.
 7. Select the appliance name and go to the **Ports** tab.
 8. Select the checkbox next to the name of one of the ports on which you are expanding the Storage network.
 9. Select **Map Storage Network**.
 10. Select the checkbox next to the Storage network you are expanding on the **Map Storage Network** page, and Select **Map Network**.
PowerStore Manager automatically maps the unused IP addresses you added in Step 5.
 11. Select **Map Network** again in the **Map Storage Network** confirmation dialog box.
PowerStore Manager will automatically map the Storage network to both the port you selected, and the corresponding port on the other node.
 12. To validate the Storage network was successfully configured:
 - a. Locate the port on which you expanded the Storage network in the **Node-Module-Name** column.
 - b. The **Link State** should be green, and the Storage network should appear in the **Mapped for Storage** column.
 - c. Locate the corresponding port on the other appliance node, to validate that the **Link State** is green, and the Storage network appears in the **Mapped for Storage** column.

Create an additional Storage network

This appendix contains the following information.

Topics:

- [Create a new Storage network](#)

Create a new Storage network

You can configure up to 32 storage networks, with a maximum of 8 networks per port on the node.

You will require the following information to perform the steps to create a new Storage network.

NOTE: The sample network resources below can be used on the two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches configured for the original NVMe/TCP network described in [Add Storage Services](#). If you did not use the same Dell PowerSwitch Series S4148 ToR switches described in this guide, then replace the sample resources with values matching your environment.

Table 43. New Storage network resources

Network resource	Sample
Storage network name	NVMe_Network2
Port on the PowerStore T model appliance. NOTE: Must be the same on both nodes.	Port 1 on I/O Module 0
ToR Switch 1 port to cable to the bottom node (A).	6
ToR Switch 1 port to cable to the bottom node (B).	49
VLAN ID	210
Netmask/Prefix Length	24
Gateway	192.168.21.1
Optional, Global IP Address	192.168.21.70
IP addresses At least 2 IP addresses; one IP address for Node A iSCSI target and the other for Node B iSCSI target.	192.168.21.71-72

Perform the following steps to configure an additional port on which to create a new Storage network on the PowerStore T model appliance.

1. [Cable the nodes to the ToR switches.](#)
2. [Configure a Storage network on the ToR switches.](#)
3. [Create additional Storage network in PowerStore Manager.](#)

Cable the nodes to the ToR switches

The following steps provide an example of cabling the PowerStore T model appliance nodes to two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches.

To use these instructions, an iSCSI storage network, and the ToR switches must have been configured as described in [Add Storage Services](#).

The following example uses port 1 on I/O Module 0. However, you can choose to use any available port on either I/O module if your nodes have been configured with I/O modules.

NOTE: Ports 0 and 1 of the 4-port card are reserved for the cluster network with all PowerStore T model appliances. If deploying PowerStore a 500T model appliance ports 2 and 3 of the 4-port card are reserved for connectivity to the 24 Drive 2.5 Inch NVMe (ENS24) expansion enclosures.

As demonstrated in the diagram, when cabling the nodes to the ToR switches the bottom node (A), and the top node (B) must be cabled to opposite switches.

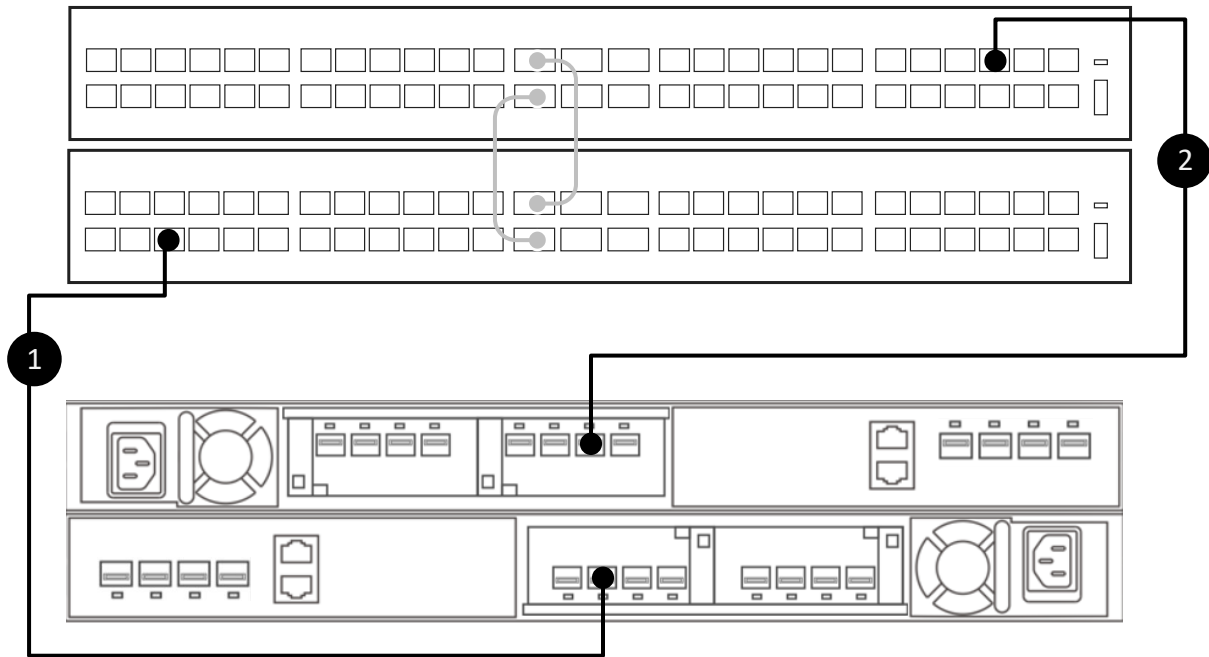


Figure 29. Cable the additional port

1. Connect Port 1 in I/O Module 0 of the bottom Node A to Port 6 of the bottom Switch (1).
2. Connect Port 1 in I/O Module 0 of the top Node B, to Port 49 of the top Switch (2).

Configure a Storage network on the ToR switches

The following steps provide an example of configuring an additional NVMe/TCP storage network on two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches.

You can cable the PowerStore T model appliance nodes to the switches before or after you perform these steps. For steps, see [Cable the nodes to the ToR switches](#).

See [New storage network resources](#) for a list of:

- Network resources required to add a new storage network
 - Sample values used in the following steps
1. [Establish a terminal connection](#) to the first ToR switch (Switch1).
 2. Enter global configuration mode.

```
configure terminal
```

3. Configure the Storage network on ToR Switch 1.

```
interface vlan 210
description NVMe_Network2
exit
```

4. Configure the Storage network to run over port 6 on ToR Switch 1.

```
interface ethernet 1/1/6
description NodeA_IO_0_port_1
no shutdown
switchport mode trunk
switchport trunk allowed vlan 210
mtu 9216
no shutdown
```

5. Repeat steps 1 - 3 on the second ToR switch (Switch2) as demonstrated below.


 **NOTE:** Be sure to use the correct ethernet ports when configuring the second ToR switch (Switch 2)

Table 44. Code sample for configuring ToR switches for a new iSCSI Storage network

Tor Switch 1	ToR Switch 2
<pre>configure terminal interface vlan 210 description NVMe_Network2 exit interface ethernet 1/1/6 description NodeA_IO_0_port_1 no shutdown switchport mode trunk switchport trunk allowed vlan 210 mtu 9216 no shutdown</pre>	<pre>configure terminal interface vlan 210 description NVMe_Network2 exit interface ethernet 1/1/49 description NodeB_IO_0_port_1 no shutdown switchport mode trunk switchport trunk allowed vlan 210 mtu 9216 no shutdown</pre>

Create an additional Storage network in PowerStore Manager

Once you have configured and cabled the Top-of-Rack (ToR) switches to the nodes, you will need to create the Storage network in PowerStore Manager.

See the [New Storage network resources](#) for a list of:

- Network resources required to add a storage network
 - Sample values used in the following steps
1. From PowerStore Manager go to **Settings > Networking > Network IPs** and select the **Storage** tab.
 2. Select **Create**.
 3. Enter the Storage network resources into the **Create Storage Network** wizard and select **Next**.
See [New Storage network resources](#) for sample values.
 4. Select the checkbox next to the name of the first port over which the storage traffic will run for the Storage network. PowerStore Manager will automatically map the Storage network to both the port you selected, and the corresponding port on the other node.
 5. To validate the Storage network was successfully configured:
 - a. Go to the **Hardware** page.
 - b. Select the appliance name and go to the **Ports** page.
 - c. Locate the port on which you created the Storage network in the **Node-Module-Name** column.
 - d. The **Link State** should be green, and the Storage network should appear in the **Mapped for Storage** column.
 - e. Locate the corresponding port on the other appliance node, to validate that the **Link State** is green, and the Storage network appears in the **Mapped for Storage** column.

Configuring a Fail Safe Network with Dell PowerSwitch Series S4148 Top-of-Rack switches

This appendix contains the following information.

Topics:



- [Sample Configuration](#)
- [Configure Dell PowerSwitch Series to extend the NAS network with a Fail Safe Network](#)

Sample Configuration

This chapter provides an example configuration for configuring a Fail Safe Network with Dell PowerSwitches.


Hardware

The sample deployment used in this document demonstrates configuring a PowerStore T model appliance with:

- A single cluster consisting of one appliance with a single base enclosure
- A single Dell PowerSwitch Series S4148 Management switch
-  **NOTE:** The following configuration section assume that you have completed initial deployment of the PowerStore T model appliance and the Management switch and networks are successfully configured.
- Two Dell PowerSwitch Series S4148 Top-of-Rack (ToR) switches with added I/O modules with no Multi-chassis Link Aggregation (MC-LAG) connection between the switches.
-  **NOTE:** If you are configuring a PowerStore T model appliance with different Dell switches or third-party switches, please refer to the switch proprietary documentation for commands and specific details. See the *PowerStore Third-party Switch Simple Support Matrix* for the list of supported switches, which is available from <https://www.dell.com/powerstoredocs>.
- PowerStore 500T model appliance with a 4-port card and two I/O modules.

Networks

The sample used in this guide demonstrates the following network connectivity between the PowerStore T model nodes and ToR switches.

-  **NOTE:** Port channels are used for the connectivity between the Top-of-Rack switches. There is no Multi-chassis Link Aggregation (MC-LAG) connection between the switches.

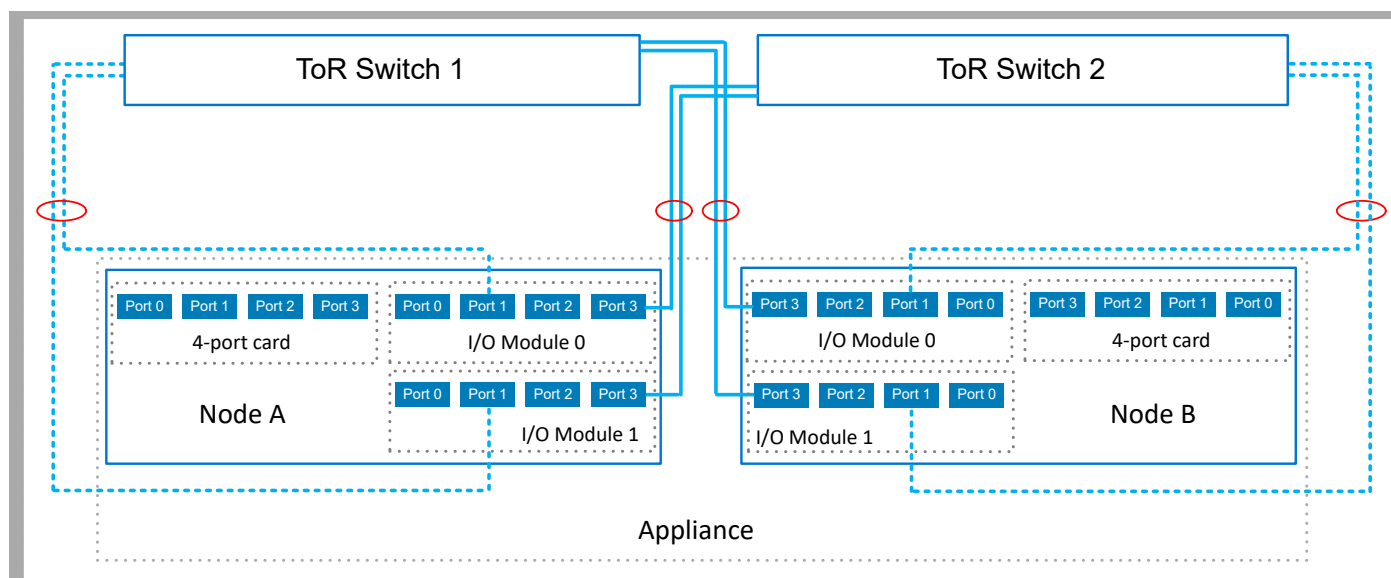


Figure 30. Sample configuration for a Fail Safe Network

Table 45. Sample Fail Safe Network configuration

Identifier	Network	Appliance Node	Node Ports	Description
	Primary	Node A	I/O Module 0, Port 3	<p>The primary network is the active network.</p> <p>The primary network must always be configured in an LACP bond.</p> <p>NOTE: The LACP bond can be configured with 2 or 4 ports on each node. The LACP bond in this example is configured with 2 ports on each node.</p>
			I/O Module 1, Port 3	
		Node B	I/O Module 0, Port 3	
			I/O Module 1, Port 3	
	Secondary	Node A	I/O Module 0, Port 1	<p>The secondary network is the standby network and can be configured on a single port, an LACP bond, or a combination of both.</p> <p>In this example the secondary networks are both configured in LACP bonds.</p>
			I/O Module 1, Port 1	
		Node B	I/O Module 0, Port 1	
			I/O Module 1, Port 1	

Configure Dell PowerSwitch Series to extend the NAS network with a Fail Safe Network


At a minimum you will need to configure one out-of-band (OOB) management switch, and two Top-of-Rack (ToR) switches for PowerStore T model to support Network Attached Storage (NAS).

NOTE: This section assumes that you have

- Completed initial deployment of the PowerStore T model appliance and the Management switch and networks are successfully configured
- Configured the ToR switch connectivity to the uplinks.

The following steps describe how to configure the two ToR switches with a Fail Safe Network.

1. [Get the completed Switch resources to extend NAS network with FSN worksheet.](#)

2. [Cable the switches.](#)
3. [Establish a terminal session to the switch.](#)
4. [Configure the Fail Safe Network on the ToR switches.](#)
-  **NOTE:** Ensure that the NAS network is applied to the uplink ports and port channels.
5. [Validate the ToR switch configuration.](#)
6. [Configure the Fail Safe Network in PowerStore Manager.](#)

Get the completed worksheet for Switch resources to extend the NAS network with a Fail Safe Network

The following table assumes the resources have already been reserved and configured the Top of Rack (ToR) switches with the storage networks, and uplinks prior to extending the NAS network with a Fail Safe network.

The following *Switch Resources to extend the NAS network with FSN worksheet* has been completed with the network resources used in the configuration described in this Appendix. You can use this worksheet exactly as it is if you are extending the NAS network with a Fail Safe Network with Dell PowerSwitches Series S4148 switches. If you are not configuring your switches and networks with the resources used in this guide, you can complete a new *Switch resources for Storage services worksheet* with the information relevant to your environment. To download a blank worksheet see [Switch resources for Storage services worksheet \(blank\)](#).

Table 46. Switch Resources to extend the NAS network with FSN worksheet (completed)


Details	Notes	
<p>Network Attached Storage (NAS)</p> <p>Must be configured in an LACP bond.</p> <p>It is recommended that you configure the bond with one port from different I/O modules.</p> <p>When configuring an LACP bond:</p> <ul style="list-style-type: none"> The PowerStore T model appliance node ports cabled for LACP must be the same speed. LACP can be configured using 2 or 4 ports on each node, however the same number of ports must be configured for LACP on both nodes. 	Network Name	NAS_active_network
	VLAN ID	500
	Record the LACP (port channel) ID for the node connections:	
	Node A	port channel 10
	Node B	port channel 20
	Record which appliance node port	To cable to the ToR switch number and port:
	Node A Port 3 on I/O Module 0	ToR Switch 2 Switch port 45
	Node A Port 3 on I/O Module 1	ToR Switch 2 Switch port 47
	Node B Port 3 on I/O Module 0	ToR Switch 1 Switch port 8
	Node B Port 3 on I/O Module 1	ToR Switch 1 Switch port 10
	MTU setting for Jumbo Frames  NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	9216
	If extending with a Fail Safe Network , record the following:	
	Network Name	NAS_standby_network

Table 46. Switch Resources to extend the NAS network with FSN worksheet (completed) (continued)

Details	Notes	
	VLAN ID	510
	Record the LACP (port channel) ID, or the port number for the node connections:	
	Node A	port channel 11
	Node B	port channel 12
	Record which appliance node port	To cable to the ToR switch number and port:
	Node A Port 1 of I/O Module 0	ToR Switch 1 Switch port 14
	Node A Port 1 of I/O Module 1	ToR Switch 1 Switch port 12
	Node B 1 of I/O Module 0	ToR Switch 2 Switch port 43
	Node B Port 1 of I/O Module 1	ToR Switch 2 Switch port 41
	MTU setting for Jumbo Frames i NOTE: It is recommended to configure jumbo frames with an MTU setting of 9216. The same MTU size must be set on both switches for both node ports.	9216

Cable the switches for the Fail Safe Network

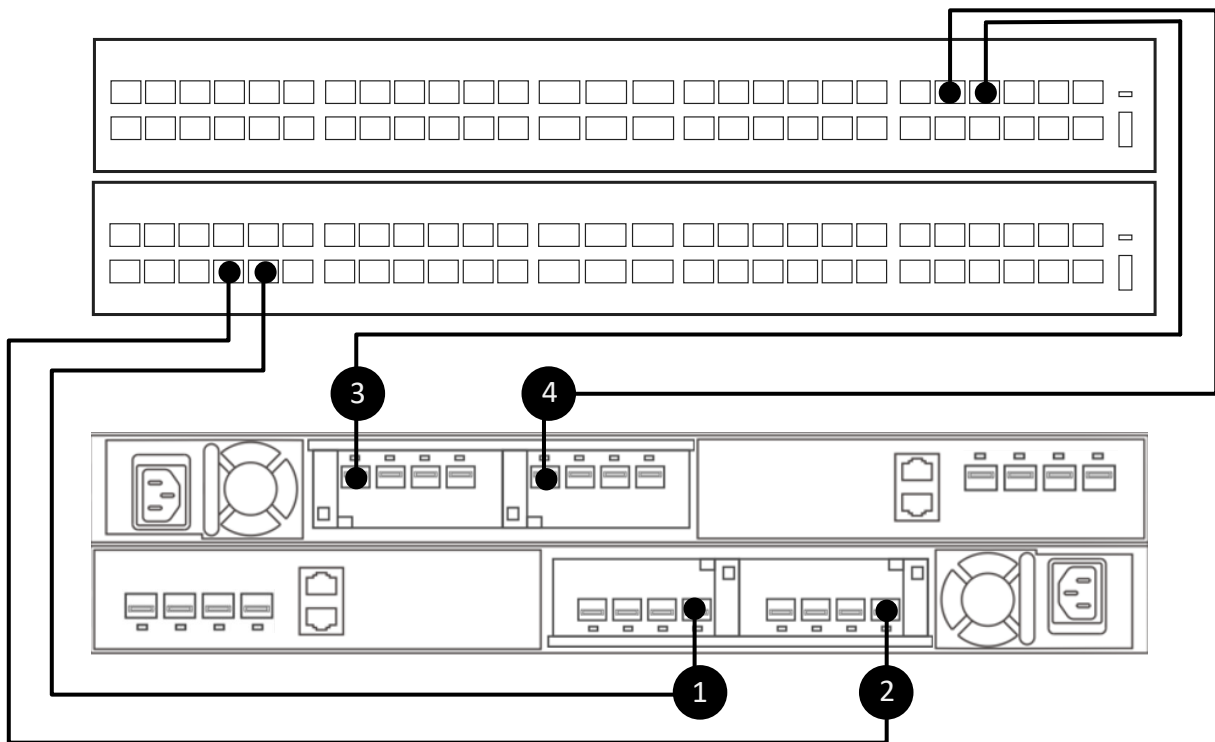


Figure 31. Connect node ports to the ToR switches for the NAS network

1.	Connect Port 3 on I/O Module 0 of the bottom Node A to Port 10 of the bottom switch (Switch 1).
2.	Connect Port 3 on I/O Module 1 of the bottom Node A to Port 8 of the bottom switch (Switch 1).
3.	Connect Port 3 on I/O Module 1 of the top Node B, to Port 47 of the bottom switch (Switch 2).
4.	Connect Port 3 on I/O Module 0 of the top Node B, to Port 45 of the top switch (Switch 2).

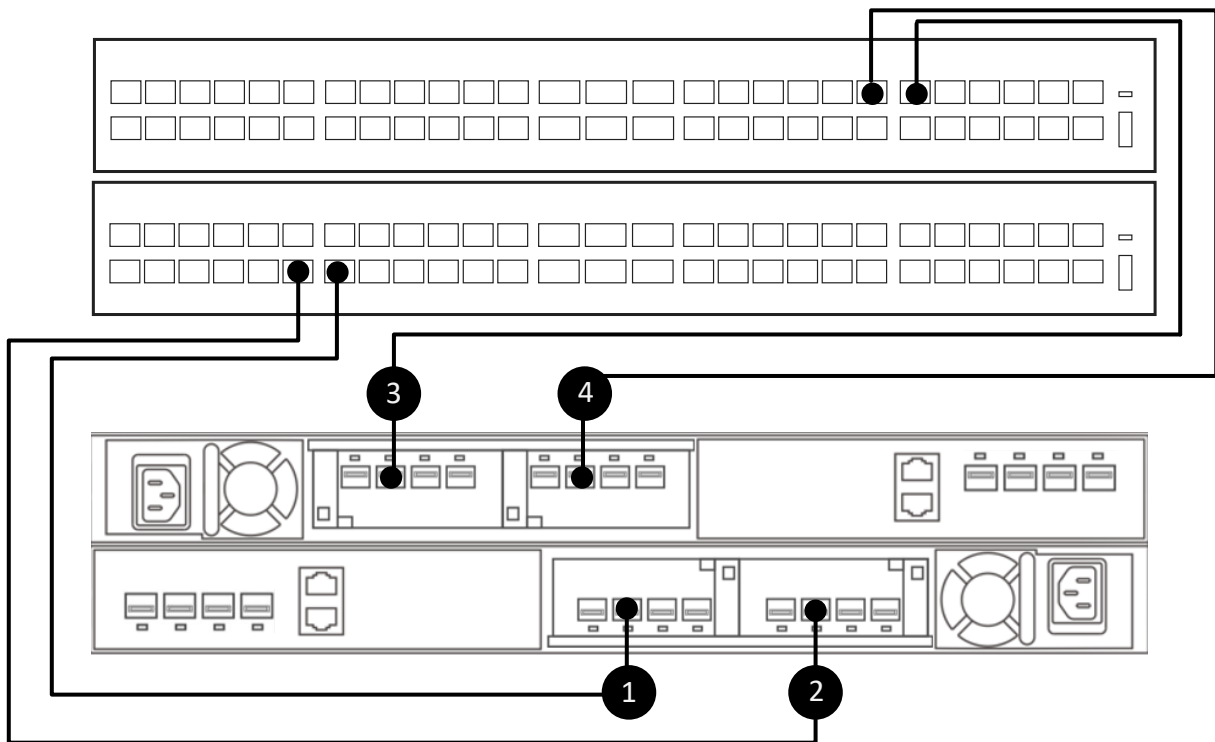


Figure 32. Connect node ports to the ToR switches to extend the NAS network with a Fail Safe Network

1.	Connect Port 1 on I/O Module 0 of the bottom Node A to Port 14 of the bottom switch (Switch 1).
2.	Connect Port 1 on I/O Module 1 of the bottom Node A to Port 12 of the bottom switch (Switch 1).
3.	Connect Port 1 on I/O Module 1 of the top Node B, to Port 43 of the bottom switch (Switch 2).
4.	Connect Port 1 on I/O Module 0 of the top Node B, to Port 41 of the top switch (Switch 2).

Establish a terminal session to the switch

Perform the following steps to establish a terminal session to the serial console port on the Dell PowerSwitch Series S4148 switch.

These steps are specific to establishing connections to Dell PowerSwitch S4148-ON switches.

For console serial port cable requirements, and further details refer to the *Dell PowerSwitch S4100-ON Series Installation Guide* located at: <https://www.dell.com/support/home/us/en/04/product-support/product/networking-s4148f-on/docs>.

You must establish a terminal session to each of the switches to configure the switches for deployment.

1. Power on the switch.
2. Use a serial cable to connect a computer to the serial console port, which is the top port located on the PSU-side of the PowerSwitch.



Identifier	Description
1	Serial Port
2	Management Port

3. Open a terminal emulator program, such as PuTTY, on the computer.
4. Configure the serial connection in the terminal emulator program using the following settings.

Table 47. Serial connection settings

Setting	Value
Speed(baud)	115200 (9600 for micro-USB port)
Data bits	8
Stop bits	1
Parity	None
Flow control	None

5. Connect to the switch using the terminal emulator program.
6. Enter the switch log in credentials. Default username and password are:
 - Username: **admin**
 - Password: **admin**
7. Enter global configuration mode.

```
configure terminal
```

8. It is recommended that you change the password after logging into the switch for the first time. Use the following command to change the switch password.

```
username admin password <NEW_PASSWORD> role sysadmin
```

Configure the Fail Safe Network on the switch

Network Attached Storage (NAS) is only supported with Unified deployments.

Ensure that the networks are applied to the uplink ports and port channels.

1. [Establish a terminal connection](#) to the first ToR switch (Switch1).
2. Enter global configuration mode.

```
configure terminal
```

3. Use the existing VLAN created for NAS traffic or create a new NAS VLAN.
If using an existing VLAN, continue to step 4.

```
interface vlan 500
description NAS_network
no shutdown
exit
```

4. Create the standby NAS LACP port-channel for Node A ports.

```
interface port-channel 11
description NodeA_NAS_standby_port_channel
switchport mode trunk
switchport trunk allowed vlan 500
spanning-tree port type edge
```

```
mtu 9216
exit
```

5. Use the existing NAS port channel or create a new NAS LACP port-channel for Node B ports.
If using an existing port channel skip to step 6.

```
interface port-channel 20
description NodeB_NAS_active_port_channel
switchport mode trunk
switchport trunk allowed vlan 500
spanning-tree port type edge
mtu 9216
exit
```

6. Assign Node A ports to the LACP group.

```
interface ethernet 1/1/14
description NodeA_NASs_IOM_0_port1
no shutdown
channel-group 11 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit

interface ethernet 1/1/12
description NodeA_NASs_IOM_1_port1
no shutdown
channel-group 11 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

7. Assign Node B ports to the LACP group.

```
interface ethernet 1/1/8
description NodeB_NASa_IOM_0_port3
no shutdown
channel-group 20 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit

interface ethernet 1/1/10
description NodeB_NASa_IOM_1_port3
no shutdown
channel-group 20 mode active
flowcontrol receive off
flowcontrol transmit off
mtu 9216
exit
```

8. Use the existing NAS VLANuplink configuration or configure the NAS VLAN for the uplink.
If you have already configured the uplink, continue to step 9.

```
interface port-channel 50
switchport trunk allowed vlan 500
exit
```

9. Commit configuration changes to nvram.

```
copy running-configuration startup-configuration
```

10. Repeat steps 1 - 9 on the second ToR switch (Switch2) as demonstrated below.


 **NOTE:** Be sure to use the correct port channels and ethernet ports when configuring the second ToR switch (Switch2) as demonstrated below.

Table 48. Code sample for configuration NAS networks on the ToR switches

Switch 1	Switch 2
<pre> configure terminal interface vlan 500 description NAS_network no shutdown exit interface port-channel 11 description NodeA_NAS_standby_port_channel switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface port-channel 20 description NodeB_NAS_active_port_channel switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface ethernet 1/1/14 description NodeA_NASs_IOM_0_port1 no shutdown channel-group 11 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/12 description NodeA_NASs_IOM_1_port1 no shutdown channel-group 11 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/8 description NodeB_NASa_IOM_0_port3 no shutdown channel-group 20 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/10 description NodeB_NASa_IOM_1_port3 no shutdown channel-group 20 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 500 </pre>	<pre> configure terminal interface vlan 500 description NAS_active_network no shutdown exit interface port-channel 10 description NodeA_NAS_active_port_channel switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface port-channel 12 description NodeB_NAS_standby_port_channel switchport mode trunk switchport trunk allowed vlan 500 spanning-tree port type edge mtu 9216 exit interface ethernet 1/1/45 description NodeA_NASa_IOM_0_port3 no shutdown channel-group 10 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/47 description NodeA_NASa_IOM_1_port3 no shutdown channel-group 10 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/43 description NodeB_NASs_IOM_1_port1 no shutdown channel-group 12 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface ethernet 1/1/41 description NodeB_NASs_IOM_0_port1 no shutdown channel-group 12 mode active flowcontrol receive off flowcontrol transmit off mtu 9216 exit interface port-channel 50 switchport trunk allowed vlan 500 exit </pre>

Table 48. Code sample for configuration NAS networks on the ToR switches

Switch 1	Switch 2
copy running-configuration startup-configuration	copy running-configuration startup-configuration

Validate NAS with FSN configuration on the Top-of-Rack (ToR) switches

Once you have configured and cabled your ToR switches, validate the configuration prior to discovering your PowerStore T model deployment.

1. [Establish a terminal session to the switch.](#)
2. Validate the interface status.

```
show interface status | grep up
```

ort	Description	Status	Speed	Duplex	Mode	Vlan	Tagged-Vlans
Eth 1/1/8	NodeB_NASa_IO..	up	10G	full	-		
Eth 1/1/10	NodeB_NASa_IO..	up	10G	full	-		
Eth 1/1/12	NodeA_NASs_IO..	up	10G	full	-		
Eth 1/1/14	NodeA_NASs_IO..	up	10G	full	-		

3. Validate the port channel configuration.

```
show port-channel summary
```

```
Flags:  D - Down      I - member up but inactive    P - member up and active
        U - Up (port-channel)    F - Fallback Activated    IND - LACP Individual
-----
```

Group	Port-Channel	Type	Protocol	Member Ports
11	port-channel11	(U)	Eth	DYNAMIC 1/1/12 (P) 1/1/14 (P)
20	port-channel20	(U)	Eth	DYNAMIC 1/1/8 (I) 1/1/10 (P)

4. Validate the VLAN configuration

```
show vlan
```

```
Codes: * - Default VLAN, M - Management VLAN, R - Remote Port Mirroring VLANs,
        @ - Attached to Virtual Network, P - Primary, C - Community, I - Isolated,
        S - VLAN-Stack VLAN
Q: A - Access (Untagged), T - Tagged
```

NUM	Status	Description	Q Ports
* 1	Active	Cluster_Network	A Eth1/1/29-1/1/30,1/1/47-1/1/54 A Po10-11,20-21,30,40,50,1000
500	Active	NAS_active_network	T Po10,20

5. Repeat steps on ToR switch 2.

Create the Fail Safe Network in PowerStore Manager

Once you have configured the ToR switches with the networks required to create a Fail Safe Network (FSN) for NAS, you will need to create the Fail Safe Network in PowerStore Manager.

You must have the following information prior to creating the Fail Safe Network (FSN) in PowerStore Manager:

- The node ports that will be used to create the FSN
- If creating the FSN with Link Aggregation, you will need to know which ports to include in the Link Aggregation

You will need the following information to create the NAS Server with a Fail Safe Network:

- Network Name
- Netmask/Prefix Length
- Gateway
- Network IP addresses - You must reserve a minimum of 1 IP address for NAS Server production. Optionally, you can reserve additional IP addresses for NAS Server backups.
- Fail Safe Network name

1. Create the Link Aggregation in PowerStore Manager for the LACP bond you configured on the switch as the primary network in your Fail Safe Network.

- a. From PowerStore Manager, go to the **Hardware** page and select the appliance for which you configured the bond.
- b. Open the **Ports** card.
- c. Select the two ports on Node A which were configured for the bond on Node A.
- d. Click **Link Aggregation > Aggregate Links**.

PowerStore Manager automatically creates a name for the bond using the following format: "BaseEnclosure-<Node>-<nextLACPbondcreated>" where:

- BaseEnclosure is constant
- Node is the node displayed in the **Node-Module-Name** list.
- nextLACPbondcreated is the numbered by the order in which the bond was created in PowerStore Manager, starting with 0 for the first created.


For example, the second LACP bond created in PowerStore Manager on Node A would be named: **BaseEnclosure-NodeA-Bond1**.

- e. Optionally, provide a **Description** of the bond.

It is recommended to put the name of the bond created on the switch that maps to this bond.

The same LACP bond is configured on the opposite node. For example if you configured the LACP bond on Node A, then the same LACP bond would be configured on Node B.


2. Repeat step 1 for the LACP bond you configured on the switch for secondary network in your Fail Safe Network.

 **NOTE:** Our example uses an LACP bond for the secondary (standby) network. You can skip this step if you are using a single port for the secondary network.

The same LACP bond is configured on the opposite node. For example if you configured the LACP bond on Node A, then the same LACP bond would be configured on Node B.

3. Select the Link Aggregations you created in steps 1 and 2, and click **FSN > Create FSN**.

4. Select the Link Aggregation that will be used as the primary network.

 **NOTE:** The primary port cannot be changed once is used to create a NAS Server.

5. Optionally, add a description of the Fail Safe Network.

6. Click **Create**.

PowerStore Manager automatically creates a name for the Fail Safe Network using the following format: "BaseEnclosure-<Node>-fsn<nextLACPbondcreated>" where:

- BaseEnclosure is constant
- Node is the node displayed in the **Node-Module-Name** list.
- nextLACPbondcreated is the numbered by the order in which the bond was created in PowerStore Manager, starting with 0 for the first created.

For example, the first FSN created in PowerStore Manager on Node A would be named: **BaseEnclosure-NodeA-FSN0**.

The same Fail Safe Network (FSN) is configured on the opposite node. For example if you configured the FSN on Node A, then the same FSN would be configured on Node B.

7. Create a NAS server with the Fail Safe Network.

The Fail Safe Network is applied to the NAS server while creating the NAS server in PowerStore Manager. See the *PowerStore Configuring NFS Guide* or the *PowerStore Configuring SMB Guide* for detailed steps.

Configuring PowerStore T model with ToR switches and no VLT interconnect


This appendix includes the following information.

Topics:

- [Steps to configure PowerStore T model with ToR switches without VLT](#)

Steps to configure PowerStore T model with ToR switches without VLT

The following are the steps required to deploy PowerStore T model with two Top-or-Rack switches without a Virtual Link Trunking interconnect.

 **NOTE:** This section assume that you have completed initial deployment of the PowerStore T model appliance and the Management switch and networks are successfully configured.

Specific code sample for the following steps for configuring PowerSwitch Series are available in [Configuring Dell PowerSwitch Series for deployments with ToR switches](#).

1. [Establish a terminal session to the switch.](#)
2. [Validate the switch version and licensing.](#)
3. Repeat steps 1 and 2 for each switch.
4. [Configure the general settings on the ToR switches.](#)
5. [Configure the uplink ports on the ToR switches.](#)
6. If you have not done so already:
 - a. [Cable the OOB management switch to the PowerStore T model base enclosure nodes](#)
 - b. [Cable the base enclosure to the ToR switches](#)
 - c. [Cable the ToR switches to the core uplinks](#)
7. [Validate PowerSwitch Series configuration with ToR switches.](#)

Other Dell PowerSwitch Series configuration operations

This appendix contains the following information.

Topics:

- [Dell SmartFabric Services](#)
- [Dell SmartFabric Storage Software](#)
- [Reset the switch to factory settings](#)
- [Running configuration of PowerSwitch Series used in PowerStore T model deployments](#)

Dell SmartFabric Services

Dell SmartFabric Services enables an end to end automated fabric with up to 98% of the tasks automated offering simplicity and agility towards day 2 network operations for cluster and network expansion. The single pane of management with vCenter allows users to operate and perform life cycle management of one or more fabrics from within vCenter.

If you are interested in applying Dell SmartFabric services to your PowerStore networks deployment, see the following documents for more information:

- [Dell SmartFabric Services with Dell PowerStore Reference Architecture Guide](#)
- [PowerStore: Configuring SmartFabric for a PowerStore environment](#)


You can also refer to [SolVe Online](#) for steps to configure the Top-of-Rack switches using SmartFabric.

Dell SmartFabric Storage Software

Dell SmartFabric Storage Software (SFSS) automates storage connectivity for your NVMe IP Storage Area Network (SAN). It allows host and storage interfaces to register with a Centralized Discovery Controller, enables storage administrators to create and activate zoning configurations and then automatically notifies hosts of new storage resources. Hosts will then automatically connect to these storage resources. SmartFabric Storage Software is supported on both PowerStore T model and PowerStore X model appliances. For more information, see the *Dell SmartFabric Storage Software Deployment Guide*.


Reset the switch to factory settings

If necessary, you can reset the Dell PowerSwitch Series S4148-ON switches to the default factory settings.

 **NOTE:** If you reset the switch, all the existing configuration will be lost, and if the switch is being used, there will be a disruption in traffic.

When a Dell PowerSwitch Series S4148-ON switch is reset to the factory default settings:

- Telnet is disabled
- SSH is enabled
- DHCP is enabled
- The default switch username and password are both admin.

 **NOTE:** Dell recommends changing the admin password during the first login.

```
OS10# delete startup-configuration
Proceed to delete startup-configuration [confirm yes/no(default)]:y

OS10# reload
```

```
System configuration has been modified. Save? [yes/no]:n
Proceed to reboot the system? [confirm yes/no]:y
```

Running configuration of PowerSwitch Series used in PowerStore T model deployments

Use the following command to generate a running configuration file when Dell PowerSwitch Series S4148 switches are used for the Management and Top-of-Rack (ToR) switches:

```
show running-configuration
```

See the following sections for output examples:

- [Example of running configuration for the Management switch](#)
- [Example of running-configuration for the ToR switches](#)

Example of running configuration for the Management switch

```
! Version 10.5.x.x
! Last configuration change at Mar 19 04:19:20 2020
!
snmp-server contact http://www.dell.com/support
hostname powerstoreMgmtSwitch
interface breakout 1/1/25 map 100g-1x
interface breakout 1/1/26 map 100g-1x
interface breakout 1/1/29 map 100g-1x
interface breakout 1/1/30 map 100g-1x
username admin password
$6$rounds=656000$.zmPnShW0cq6sTT1$8VG.h5byJqnohgTkW3Vhn5yAU7SKQtpOL0aaYmcxEXiDLWw4jOma/
Di/1dEJQlYStbN.fbwrSTltlX8hdwQlG. role sysadmin
ntp server 100.0.100.200
iscsi enable
iscsi target port 860
iscsi target port 3260
aaa authentication login default local
aaa authentication login console local
!
class-map type application class-iscsi
!
policy-map type application policy-iscsi
!
interface vlan1
 no shutdown
!
interface vlan100
 description managementNetwork
 no shutdown
!
interface port-channel10
 description Uplink
 no shutdown
 switchport mode trunk
 switchport access vlan 1
 switchport trunk allowed vlan 100
!
interface ethernet1/1/1
 description discoveryWorkstation
 no shutdown
 switchport access vlan 100
 flowcontrol receive off
 flowcontrol transmit off
!
interface ethernet1/1/2
 description PowerStoreNodeA_MgmtPort
```



```

no shutdown
switchport access vlan 100
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/3
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/4
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/5
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/6
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/7
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/8
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/9
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/10
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/11
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/12
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/13
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/14
shutdown

```

```

switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/15
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/16
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/17
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/18
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/19
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/20
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/21
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/22
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/23
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/24
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/25
description Uplink
no shutdown
channel-group 10 mode active
no switchport
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/26

```

```

description Uplink
no shutdown
channel-group 10 mode active
no switchport
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/29
no shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/30
no shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/31
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/32
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/33
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/34
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/35
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/36
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/37
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/38
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/39
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!

```

```

interface ethernet1/1/40
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/41
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/42
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/43
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/44
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/45
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/46
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/47
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/48
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/49
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/50
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/51
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/52

```

```

shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/53
description PowerStoreNodeB_MgmtPort
no shutdown
switchport access vlan 100
flowcontrol receive off
flowcontrol transmit off
!
interface ethernet1/1/54
shutdown
switchport access vlan 1
flowcontrol receive off
flowcontrol transmit off
!
interface mgmt1/1/1
no shutdown
no ip address dhcp
ip address 100.0.100.50/24
ipv6 address autoconfig
!
management route 0.0.0.0/0 100.0.100.1
!
support-assist

```

Example of running-configuration for the ToR switches

Table 49. Example of running-configuration for ToR Switch 1 and Switch 2

Switch1	Switch 2
<pre> ! Version 10.5.3.0 ! Last configuration change at May 04 16:13:40 2022 ! ip vrf default ! no multicast snooping flood-restrict spanning-tree mode rstp spanning-tree rstp priority 40960 hostname Switch1 system-user linuxadmin password **** interface breakout 1/1/25 map 100g-1x interface breakout 1/1/26 map 100g-1x interface breakout 1/1/29 map 100g-1x interface breakout 1/1/30 map 100g-1x iscsi enable iscsi target port 860 iscsi target port 3260 username admin password **** role sysadmin priv-lvl 15 aaa authentication login default local aaa authentication login console local ! class-map type application class-iscsi ! policy-map type application policy-iscsi ! interface vlan1 description Cluster_Network no shutdown ! interface vlan200 description iSCSI_Network no shutdown </pre>	<pre> ! Version 10.5.x.x ! Last configuration change at May 04 16:22:40 2022 ! ip vrf default ! no multicast snooping flood-restrict spanning-tree mode rstp spanning-tree rstp priority 45056 hostname Switch2 system-user linuxadmin password **** interface breakout 1/1/25 map 100g-1x interface breakout 1/1/26 map 100g-1x interface breakout 1/1/29 map 100g-1x interface breakout 1/1/30 map 100g-1x iscsi enable iscsi target port 860 iscsi target port 3260 username admin password **** role sysadmin priv-lvl 15 aaa authentication login default local aaa authentication login console local ! class-map type application class-iscsi ! policy-map type application policy-iscsi ! interface vlan1 description Cluster_Network no shutdown ! interface vlan200 description iSCSI_Network no shutdown </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Switch 2

Switch1	Switch 2
<pre> ! interface vlan300 description NVMe_Network no shutdown ! interface vlan400 description RepBlockImport_Network no shutdown ! interface vlan500 description NAS_Network no shutdown ! interface port-channel10 description NodeA_NAS_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 500 mtu 9216 spanning-tree port type edge vlt-port-channel 10 ! interface port-channel20 description NodeB_NAS_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 500 mtu 9216 spanning-tree port type edge vlt-port-channel 20 ! interface port-channel30 description NodeA_Cluster_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 mtu 9216 spanning-tree port type edge vlt-port-channel 30 ! interface port-channel40 description NodeB_Cluster_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 mtu 9216 spanning-tree port type edge vlt-port-channel 40 ! interface port-channel50 description Uplink no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 200,300,400,500 mtu 9216 vlt-port-channel 50 ! interface mgmt1/1/1 no shutdown no ip address dhcp ip address 10.241.133.22/26 ipv6 address autoconfig </pre>	<pre> ! interface vlan300 description NVMe_Network no shutdown ! interface vlan400 description RepBlockImport_Network no shutdown ! interface vlan500 description NAS_Network no shutdown ! interface port-channel10 description NodeA_NAS_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 500 mtu 9216 spanning-tree port type edge vlt-port-channel 10 ! interface port-channel20 description NodeB_NAS_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 500 mtu 9216 spanning-tree port type edge vlt-port-channel 20 ! interface port-channel30 description NodeA_Cluster_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 mtu 9216 spanning-tree port type edge vlt-port-channel 30 ! interface port-channel40 description NodeB_Cluster_LACP_port_channel no shutdown switchport mode trunk switchport access vlan 1 mtu 9216 spanning-tree port type edge vlt-port-channel 40 ! interface port-channel50 description Uplink no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 200,300,400,500 mtu 9216 vlt-port-channel 50 ! interface mgmt1/1/1 no shutdown no ip address dhcp ip address 10.241.133.23/26 ipv6 address autoconfig </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Swtich 2

Switch1	Switch 2
<pre> ! interface ethernet1/1/1 description NodeA_4port_port_0 no shutdown channel-group 30 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/2 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/3 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/4 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/5 description NodeA_IO_0_port_0 no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 300 mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/6 shutdown switchport access vlan 1 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/7 description NodeA_IO_0_port_2 no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 200,400 mtu 9216 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/8 description NodeA_IO_0_port_3 no shutdown channel-group 10 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/9 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off </pre>	<pre> ! interface ethernet1/1/1 description NodeA_4port_port_1 no shutdown channel-group 30 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/2 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/3 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/4 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/5 shutdown switchport access vlan 1 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/6 shutdown switchport access vlan 1 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/7 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/8 description NodeA_IO_1_port_3 no shutdown channel-group 10 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/9 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/10 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/11 </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Switch 2

Switch1	Switch 2
<pre> ! interface ethernet1/1/10 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/11 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/12 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/13 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/14 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/15 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/16 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/17 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/18 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/19 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/20 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/21 </pre>	<pre> shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/12 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/13 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/14 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/15 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/16 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/17 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/18 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/19 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/20 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/21 shutdown switchport access vlan 1 </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Swtich 2

Switch1	Switch 2
<pre> shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/22 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/23 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/24 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/25 description VLTi no shutdown no switchport flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/26 description VLTi no shutdown no switchport flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/29 description Uplink_Ports no shutdown channel-group 50 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/30 description Uplink_Ports no shutdown switchport access vlan 1 mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/31 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/32 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/33 shutdown </pre>	<pre> flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/23 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/24 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/25 description VLTi no shutdown no switchport flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/26 description VLTi no shutdown no switchport flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/29 description Uplink_ports no shutdown channel-group 50 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/30 description Uplink_ports no shutdown channel-group 50 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/31 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/32 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/33 shutdown switchport access vlan 1 </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Switch 2

Switch1	Switch 2
<pre> switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/34 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/35 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/36 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/37 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/38 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/39 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/40 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/41 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/42 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/43 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/44 shutdown switchport access vlan 1 flowcontrol receive on </pre>	<pre> flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/35 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/36 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/37 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/38 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/39 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/40 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/41 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/42 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/43 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/44 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/45 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Switch 2

Switch1	Switch 2
<pre> flowcontrol transmit off ! interface ethernet1/1/45 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/46 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/47 description NodeB_IO_1_port_3 no shutdown channel-group 20 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/48 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/49 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/50 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/51 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/52 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/53 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/54 description NodeB_4port_port_1 no shutdown channel-group 40 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! </pre>	<pre> ! interface ethernet1/1/46 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/47 description NodeB_IO_0_port_3 no shutdown channel-group 20 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! interface ethernet1/1/48 description NodeB_IO_0_port_2 no shutdown switchport mode trunk switchport access vlan 1 switchport trunk allowed vlan 200,400 mtu 9216 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/49 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/50 description NodeB_IO_0_port_0 no shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/51 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/52 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/53 shutdown switchport access vlan 1 flowcontrol receive on flowcontrol transmit off ! interface ethernet1/1/54 description NodeB_4port_port_0 no shutdown channel-group 40 mode active no switchport mtu 9216 flowcontrol receive off flowcontrol transmit off ! management route 0.0.0.0/0 100.0.100.10.1 ! </pre>

Table 49. Example of running-configuration for ToR Switch 1 and Swtich 2

Switch1	Switch 2
<pre> management route 0.0.0.0/0 100.0.100.10.1 ! vlt-domain 1 backup destination 100.0.100.11 discovery-interface ethernet1/1/25-1/1/26 peer-routing primary-priority 4096 vlt-mac 00:00:00:00:00:01 ! </pre>	<pre> vlt-domain 1 backup destination 100.0.100.10 discovery-interface ethernet1/1/25-1/1/26 peer-routing primary-priority 8192 vlt-mac 00:00:00:00:00:01 ! </pre>