Dell EMC SmartFabric OS10 Switch Configuration Guide for VxRail 4.7

Deploying S5200F-ON series switches for a VxRail 4.7 cluster

Abstract

This document provides Dell EMC SmartFabric OS10 switch configuration examples and topology options for a VxRail 4.7 cluster deployment using S5200F-ON series switches.

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1 Introduction

Our vision at Dell EMC is to be the essential infrastructure company from the edge, to the core, and to the cloud. Dell EMC Networking ensures modernization for today's applications and for the emerging cloud-native world. Dell EMC is committed to disrupting the fundamental economics of the market with an open strategy that gives you the freedom of choice for networking operating systems and top-tier merchant silicon. The Dell EMC strategy enables business transformations that maximize the benefits of collaborative software and standards-based hardware, including lowered costs, flexibility, freedom, and security. Dell EMC provides further customer enablement through validated deployment guides which demonstrate these benefits while maintaining a high standard of quality, consistency, and support.

VxRail sits at the forefront of a fundamental shift in IT infrastructure consumption – away from application-specific, "build-your-own" infrastructure and toward virtualized, general-purpose, engineered systems. Dell EMC and VMware have embraced this shift with the VxRail hyperconverged appliance. VxRail has a simple, scale-out architecture that uses VMware vSphere and VMware vSAN to provide server virtualization and software-defined storage.

To take full advantage of the VxRail solution, one must carefully consider the network that not only connects multiple nodes into a single cohesive cluster but also enables connectivity to the customer's IT environment. Numerous industry studies have shown that networking is the primary source of both deployment issues and poor performance of hyperconverged solutions. Usually, VxRail clusters (minimum of three and maximum of 64 nodes) connect to a preexisting IP network at the customer site. The inclusion of dedicated switches for the VxRail cluster simplifies this process and avoids many of the network connectivity pitfalls associated with the deployment of a hyperconverged solution.

The audience for this document includes professional services or onsite IT personnel responsible for the deployment of a VxRail cluster when a pair of dedicated Dell EMC PowerSwitches is purchased with the cluster. This document covers the process of connecting a cluster of VxRail nodes to:

- A pair of Dell PowerSwitches configured for Virtual Link Trunking (VLT), using VLT as the preferred topology
- A pair of Dell PowerSwitches not configured for VLT
- A single Dell PowerSwitch

This document provides switch topology options and configuration examples for a VxRail 4.7 cluster using nodes built on 14th generation (14G) PowerEdge servers. Nodes in these examples use 25GbE network adapters. Switches in this guide use Dell EMC SmartFabric OS10.5.

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1.1 Supported switches and operating systems

The examples provided in this deployment guide use VxRail 4.7 nodes connected to S5248F-ON switches running Dell EMC SmartFabric OS10.

Dell EMC Networking supports the following switches and operating systems for VxRail 4.7 and later:

Dell EMC PowerSwitch model	Dell EMC SmartFabric OS10 version 10.5.0.0 and later releases
S3048-ON	Supported
S3124 / S3124F / S3124P / S3148 / S3148P	
S4048F-ON / S4048T-ON	Supported
S4112F-ON / S4112T-ON / S4128F-ON / S4128T-ON	Supported
S4148F-ON / S4148FE-ON / S4148T-ON / S4148U-ON	Supported
S4248FB-ON / S4248FBL-ON	Supported
S5048F-ON	
S5148F-ON	
S5212F-ON / S5224F-ON / S5232F-ON / S5248F-ON / S5296F-ON	Supported
S6010-ON	Supported
S6100-ON	
Z9100-ON	Supported
Z9264F-ON / Z9296F-ON	Supported

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Figure 1   Supported Dell EMC PowerSwitches and operating systems

1.2 Typographical conventions

The CLI and GUI examples in this document use the following conventions:

`Monospace Text`	CLI examples
<u>`Underlined Monospace Text`</u>	CLI examples that wrap the page
`Italic Monospace Text`	Variables in CLI examples
`Bold Monospace Text`	Commands entered at the CLI prompt, or to highlight information in CLI output
Bold text	GUI fields and information entered in the GUI

1.3 Attachments

This document in .pdf format includes switch configuration file attachments. To access attachments in Adobe Acrobat Reader, click the ▶ icon in the left pane halfway down the page, then click the 📎 icon.

2 Hardware overview

This section briefly describes the hardware used to validate this deployment. Appendix A contains a complete listing of hardware and software validated for this guide.

2.1 Dell EMC PowerSwitch S5248F-ON

The S5248F-ON is a 1-Rack Unit (RU), multilayer switch with 48x25GbE, 4x100GbE, and 2x200GbE ports. This guide uses two S5248F-ONs as leaf switches.
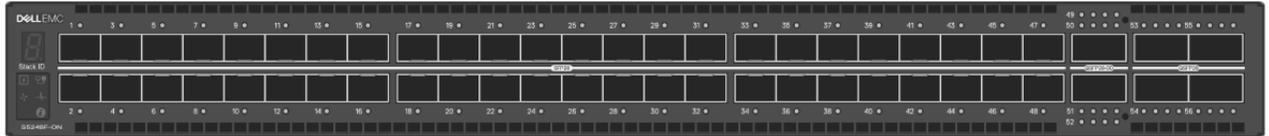
Figure 2   Dell EMC PowerSwitch S5248F-ON

2.2 Dell EMC PowerSwitch S3048-ON

The S3048-ON is a 1-RU switch with 48x1GbE BASE-T ports and 4x10GbE SFP+ ports. This guide uses one S3048-ON switch for out-of-band (OOB) management traffic.
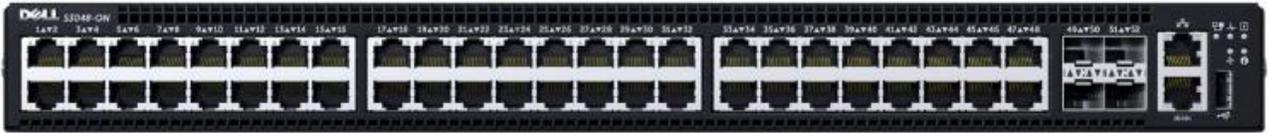
Figure 3   Dell EMC PowerSwitch S3048-ON

2.3 Dell EMC VxRail 14G nodes

Current Dell EMC VxRail P, V, S, and E Series nodes are built on 14th generation (14G) PowerEdge servers. VxRail P, V, and S Series nodes use a 2-RU form factor, as shown in Figure 4.

Figure 4   Dell EMC VxRail 2-RU node (P, V, and S Series)

VxRail E Series nodes use a 1-RU form factor, as shown in Figure 5.

Figure 5   Dell EMC VxRail E Series node

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Note: The deployment examples in this guide build a VxRail cluster consisting of four P570 VxRail nodes.

2.3.1 Dell EMC VxRail P Series node

VxRail P Series nodes are ideal for CPU-intensive workloads such as databases. P Series nodes support up to 44 CPU cores, 1536GB memory, and 24TB hybrid or 46TB all-flash storage.

2.3.2 Dell EMC VxRail V Series node

VxRail V Series nodes are graphics-ready for uses such as high-end 2D/3D visualization. V Series nodes support up to 40 CPU cores, 1024GB memory, 3 GPUs, and 24TB hybrid or 46TB all-flash storage.

2.3.3 Dell EMC VxRail S Series node

VxRail S Series nodes provide expanded storage capacity for collaboration, data, and analytics. S Series nodes support up to 36 CPU cores, 1536GB memory, and 48TB hybrid storage.

2.3.4 Dell EMC VxRail E Series node

VxRail E Series nodes are best suited for remote office or entry workloads. E Series nodes support up to 40 CPU cores, 1536GB memory, and 16TB hybrid or 30TB all-flash storage.

2.3.5 VxRail node network adapters

Each 14G VxRail node includes a rack server Network Daughter Card (rNDC) with one of the following port combinations:

- 2x25GbE SFP28 ports
- 2x10GbE SFP+ or BASE-T ports
- 4x10GbE SFP+ or BASE-T ports
- 4x1GbE BASE-T ports (for single CPU nodes only, max 8 nodes/cluster)
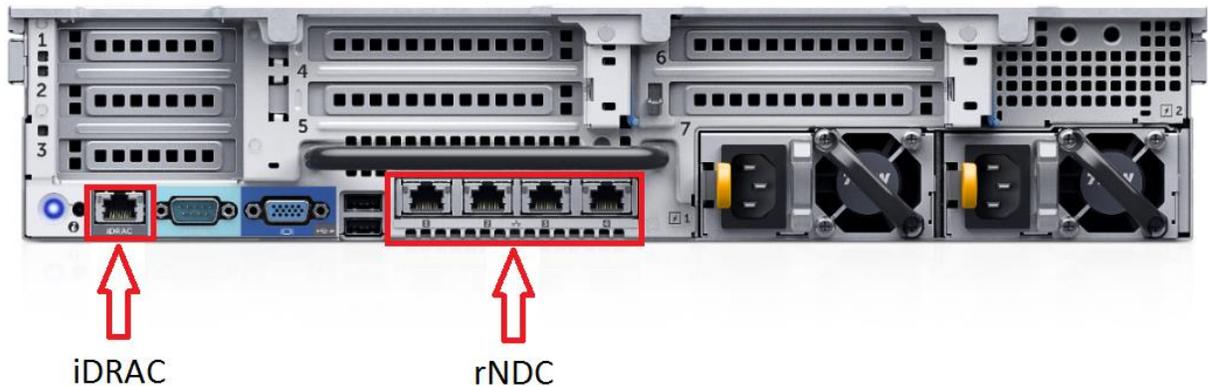
Figure 6   Rear view of VxRail 2-RU node (1-RU node is similar)

Note: Each of the VxRail P570 nodes in the deployment examples in this guide contains a Broadcom 57414 rNDC with 2x25GbE SFP28 ports.

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VxRail optimizes network traffic by splitting it across rNDC uplinks and by using Network I/O control (NIOC) shares for different traffic types. See the *Dell EMC VxRail Network Planning Guide* for more information**.**

P, V, S, and E Series VxRail nodes also include a 1GbE BASE-T integrated Dell Remote Access Card (iDRAC) for OOB management.

Note: P, V, and S Series nodes support additional network adapters in PCIe slots. See the *Dell EMC VxRail Network Planning Guide* for more information**.**

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3 Topology options

VxRail may be deployed using a single or dual switch topology. Using a single switch provides a lower initial cost but creates a single point of failure. A dual switch configuration helps ensure high availability by eliminating this single point of failure.

A dual switch configuration may be used with or without VLT. Dell EMC recommends a dual switch configuration with VLT. The sections that follow explain the different options.

3.1 Dual switch

In a dual switch topology, each VxRail node has one or more connections to each of the two leaf switches providing redundancy at the NIC and switch levels. If VLT is used, the switches are connected with a VLT interconnect (VLTi). If VLT is not used, the switches are connected with a standard LACP port channel.

3.1.1 Dual switch with VLT

Dell EMC recommends using a dual switch configuration with VLT, as shown in Figure 7.
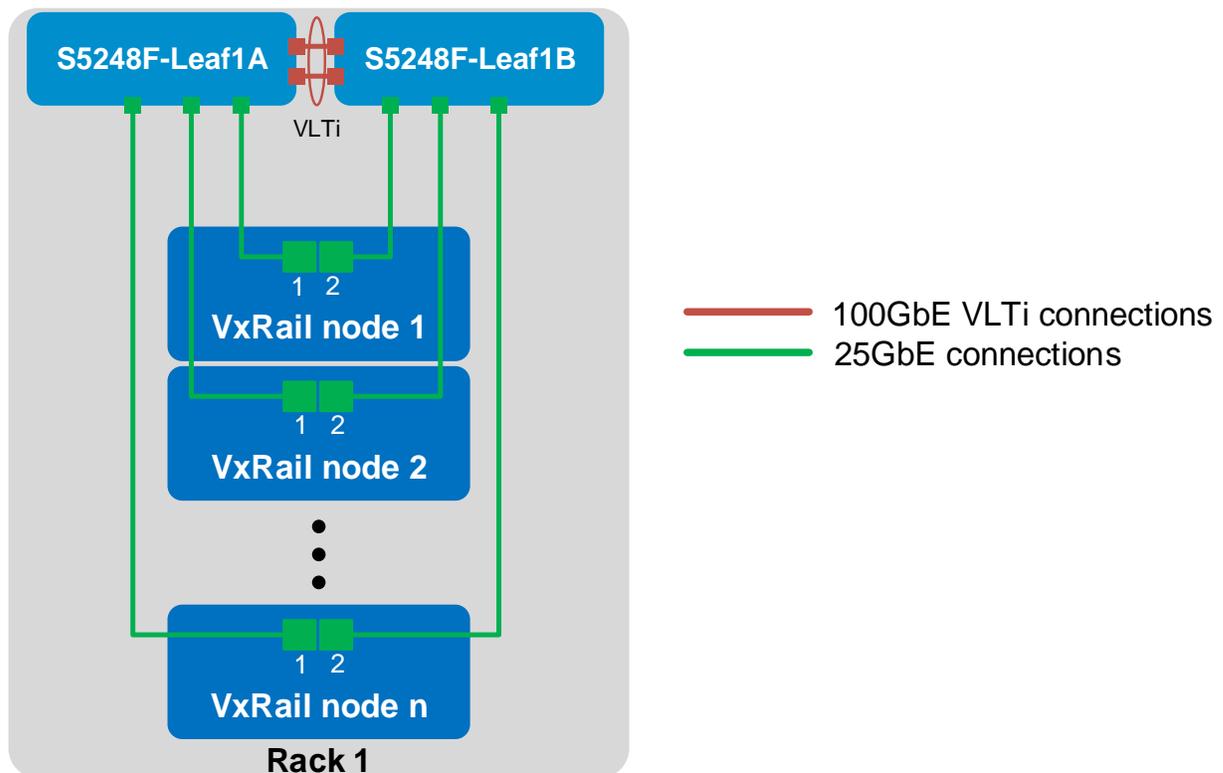
Figure 7   Dual switch topology with VLT

VLT synchronizes ARP, MAC tables, and IPv6 neighbors between the VLT peers and makes the switch pair appear as one logical unit to connected devices.

VLT provides the following benefits:

- Provides a loop-free topology and eliminates STP-blocked ports
- Optimizes the use of all available uplink bandwidth

- Guarantees fast convergence if either a link or a device fails
- Provides link-level resiliency
- Assures high availability
- Allows a single device to use a LAG across two upstream switches
- Provides Layer 2 multipathing

Note: While VxRail nodes use active and standby network adapters instead of LAGs, other servers in the rack can connect to the VLT switch pair with an LACP LAG for active/active Layer 2 multipathing. For more information about VLT, see the *Dell EMC SmartFabric OS10 User Guide Release 10.5.0*.

3.1.2   Dual switch without VLT

The configuration of a switch pair without VLT is supported, but it does not provide the advantages of VLT covered in the previous section.

The switch pair is cabled, as shown in Figure 8. The links connecting the two switches are configured in an LACP port channel.
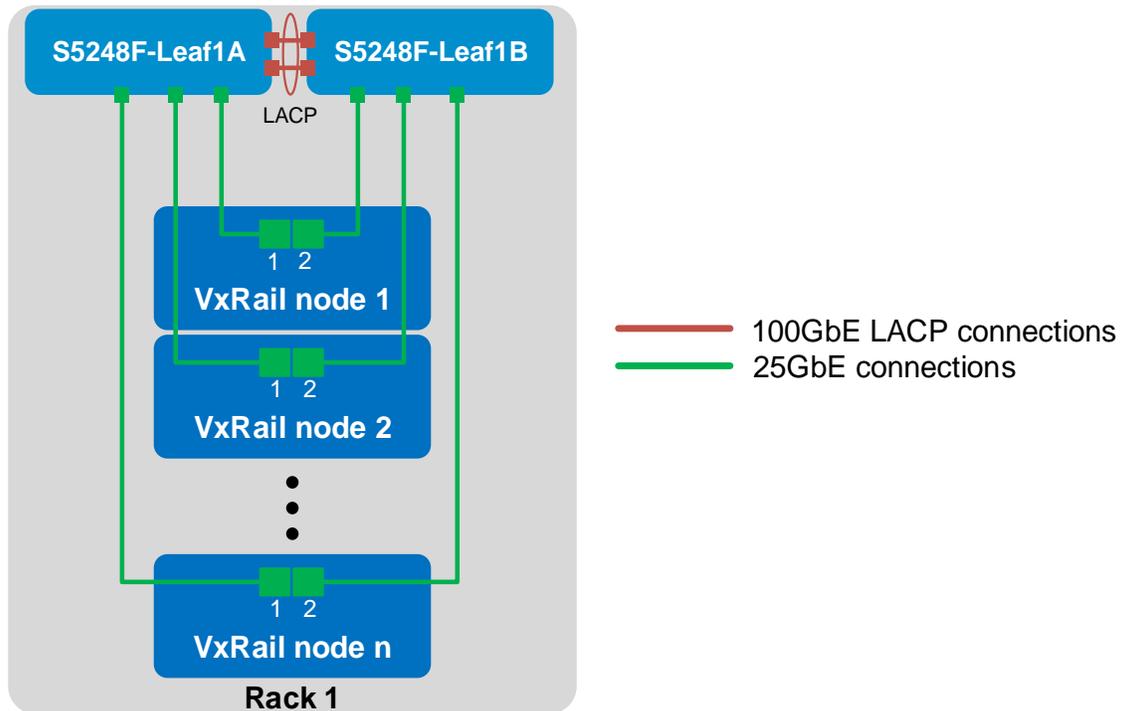
Figure 8   Dual switch topology without VLT

3.2 Single switch

In a single switch topology, all VxRail nodes connect to a single switch. This topology is not recommended as the switch becomes a single point of failure.

S5248F-ON

VxRail node 1

VxRail node 2

VxRail node n

Rack 1

──── 25GbE connections
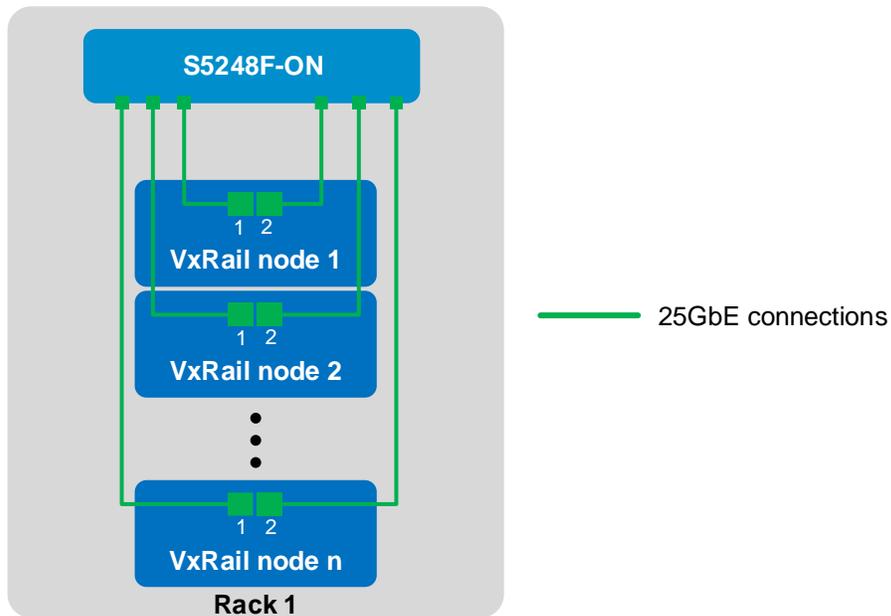
Figure 9   Single switch topology

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4 VxRail in the data center

4.1 Leaf-spine network

Dell EMC recommends using a leaf-spine network in the data center with leaf switches configured as VLT peers. The switches and VxRail nodes covered in this guide are shown in Rack 1 in Figure 10 and are incorporated into a data center's leaf-spine network.
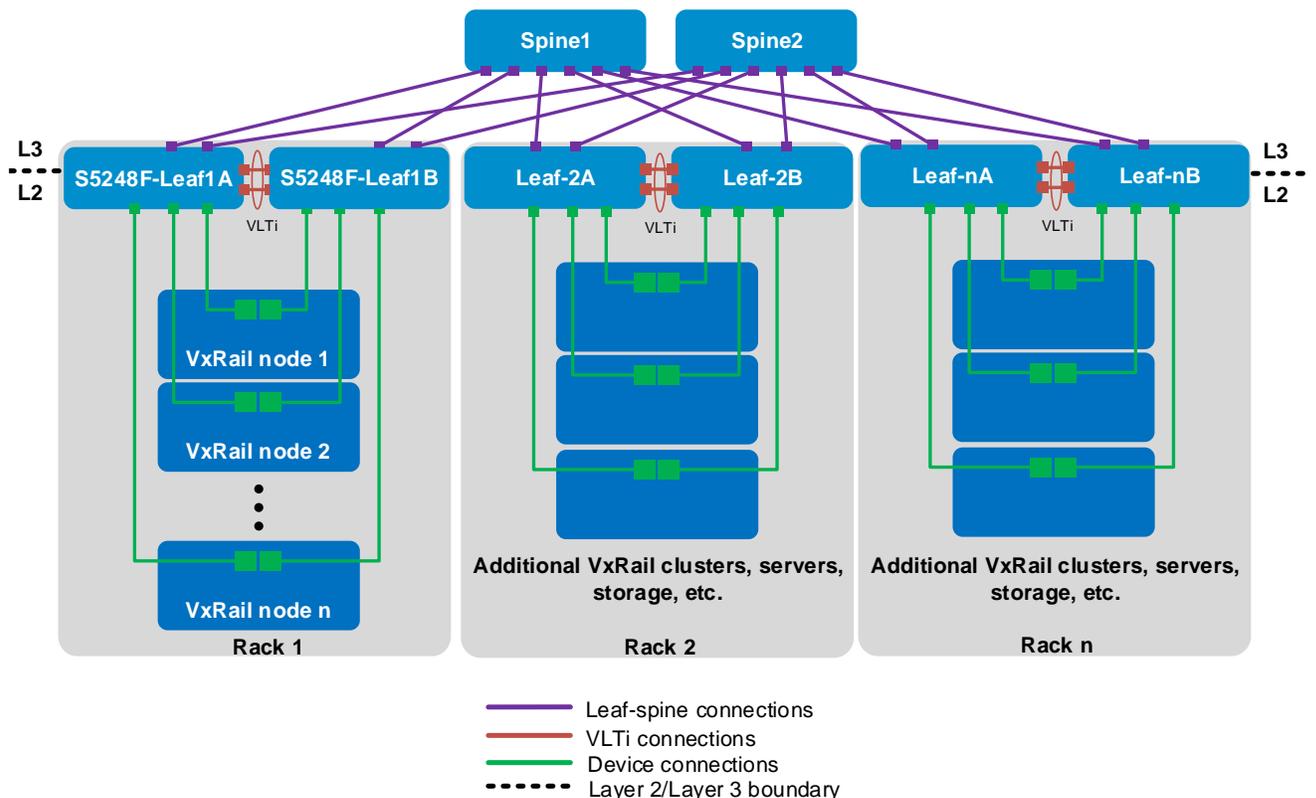
Figure 10   Dual switch topology with VLT connected to a leaf-spine network

In Figure 10, the Layer 2/Layer 3 boundary is at the leafs, meaning traffic within each rack is switched (Layer 2) and traffic between racks is routed (Layer 3). *VMware Validated Design for Software-Defined Data Center 5.1 - Architecture and Design* recommends isolating vSAN traffic to its own Layer 2 VLAN. Therefore, for this leaf-spine topology, each vSAN should be contained within a single rack. Since a VxRail cluster contains a vSAN, a VxRail cluster is also contained within a single rack.

Note: By default, VxRail does not enable routing of vSAN or vMotion traffic.

The leaf-spine topology in Figure 10 scales to sixteen racks or more, depending on the number of ports available in each spine. Racks may contain additional VxRail clusters, switches, servers, storage arrays, and other devices as needed.

To configure the remainder of the leaf-spine network, including spine switches, connections between leafs and spines, and routing protocols, see the *Dell EMC Networking Layer 3 Leaf-Spine Deployment and Best Practices with OS10* document.

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4.2 OOB Management network

The Out-of-band (OOB) Management network is an isolated network for remote management of servers, switches, and storage devices using their dedicated hardware management ports. It is also commonly used to carry heartbeat messages sent between switches configured as VLT peers.

For OOB Management network connections, one S3048-ON switch is installed in each rack as shown:
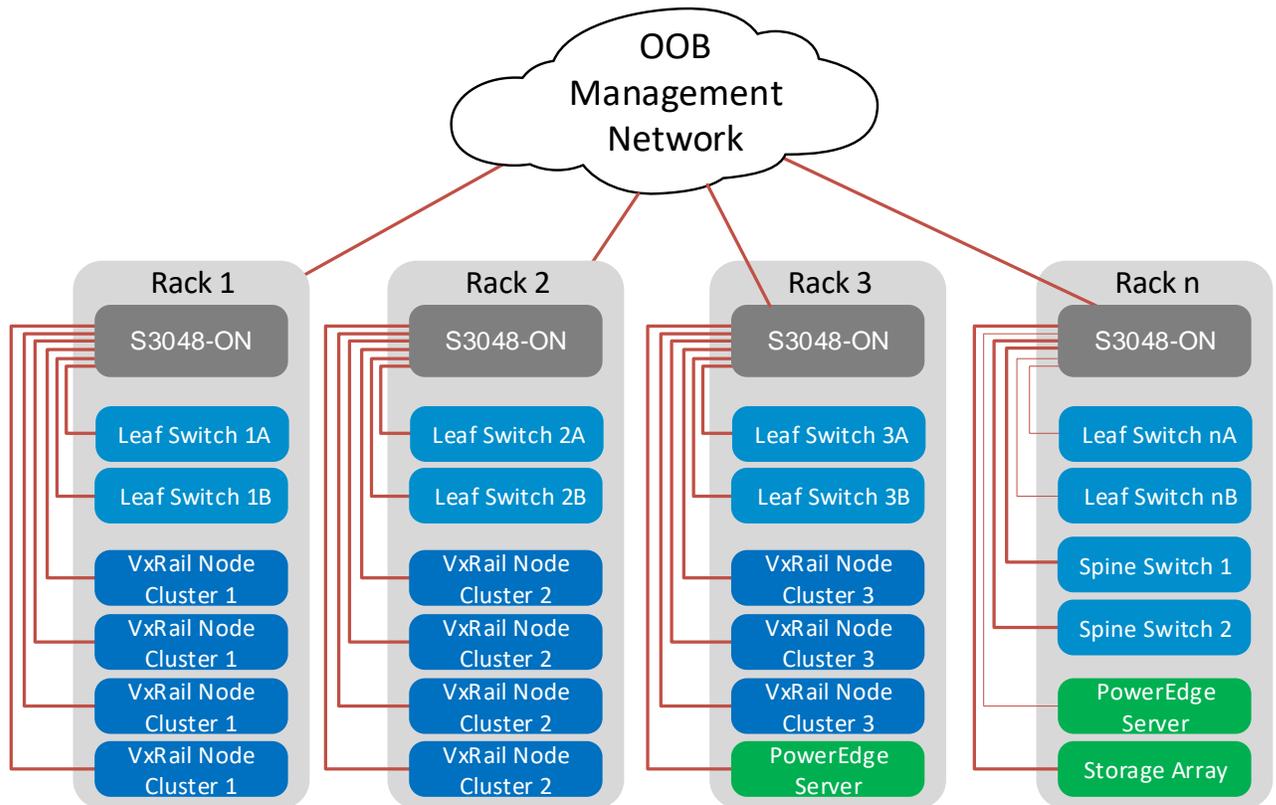
Figure 11   OOB management network connections

Note: This guide focuses on the devices in Rack 1. Devices shown in other racks are for illustration purposes only.

1GbE BASE-T ports on each S3048-ON are connected downstream to hardware management ports on each device. This includes VxRail node iDRACs, PowerEdge Server iDRACs, and dedicated management ports on switches and storage arrays.

Four 10GbE SFP+ ports are available on each S3048-ON for use as uplinks to the OOB management network core.

Note: The OOB Management network is not to be confused with the External and Internal Management networks. The External and Internal Management networks and their VLANs are covered in Chapter 5.

Devices on the OOB Management network in this guide use the 100.67.0.0/16 IP address block.

5 Configuration planning

5.1 VLANs and IP addresses

VLANs and IP addresses used for VxRail node traffic must be planned before switch configuration and VxRail deployment can begin.

VxRail node traffic is divided into five or more VLANs, as shown in Table 1.

Table 1   VLANs used for VxRail nodes

VLAN	Purpose
External Management	VxRail Manager, ESXi, vCenter Server, NTP, DNS, and vRealize Log Insight traffic
vMotion	Virtual machine (VM) migration
vSAN	Distributed storage traffic
VM network(s)	One or more VLANs for VM data traffic
Internal Management	VxRail node discovery

Note: All VLANs in Table 1 share the physical connections shown in Chapter 3.

VLAN configuration and IP network addresses planned for this deployment are shown in Table 2.

Table 2   VLAN IDs and IP addresses

VLAN ID	Description	Network	Gateway	VLAN ports
1611	External Management	172.16.11.0/24	172.16.11.254	Untagged
1612	vMotion	172.16.12.0/24	NA	Tagged
1613	vSAN	172.16.13.0/24	NA	Tagged
1614	VM Network A	172.16.14.0/24	Optional, not used	Tagged
1615	VM Network B	172.16.15.0/24	Optional, not used	Tagged
3939	Internal Management	IPv6 multicast	not used	Tagged

Note: By default, VxRail does not enable routing of vSAN or vMotion traffic.

This example uses two networks for VM data traffic, VM Network A and VM Network B, with each on a separate VLAN. The actual number of VM data networks used is based on customer requirements.

The Internal Management VLAN, 3939, is used exclusively for VxRail node discovery using IPv6 multicast. Multicast Listener Discovery (MLD) snooping and querier must be enabled on this VLAN for node discovery to succeed.

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5.2 VxRail network configuration table

Information provided in the VxRail network configuration table is used during VxRail deployment. The values used for this deployment example are shown in the right column. The VLANs and IP addresses used are based on the information from Table 2.

Note: For additional information on the VxRail network configuration table, see the _Dell EMC VxRail Network Planning Guide._

Table 3   VxRail network configuration table

Row		Category	Description	Values used
1	VxRail	Management VLAN ID	The recommended is untagged traffic on the Native VLAN. If you want the host to send only tagged frames, manually configure the VLAN on each ESXi™ host using DCUI, and set tagging for your management VLAN on your switch before you deploy VxRail.	0*
2		VxRail initial IP	If you cannot reach the default (192.168.10.200/24), set an alternate IP address	192.168.10.200
3	System	Global settings	Time zone	
4			NTP server(s)	172.16.11.50
5			DNS server(s)	172.16.11.50
6		Proxy settings	IP address and port	
7			Username and password	
8	Management	ESXi hostnames and IP addresses	ESXi hostname prefix	vxhost
9			Separator	none
10			Iterator	Num 0x
11			Offset	1
12			Suffix	none
13			Domain	dell.local
14			ESXi starting address for IP pool	172.16.11.1
15			ESXi ending address for IP pool	172.16.11.40
16		vCenter Server Leave blank if Customer Supplied VC	vCenter Server hostname	vxvcenter
17			vCenter Server IP address	172.16.11.100
18			Platform Services Controller hostname	vxpsc
19			Platform Services Controller IP address	172.16.11.101
20		Customer Supplied vCenter Server Leave blank if VxRail VC	Customer Supplied Platform Services Controller (PSC) Hostname (FQDN) Leave	
21			Customer Supplied vCenter Server hostname (FQDN)	
22			Customer Supplied vCenter Server SSO domain	
23			admin username/password or the newly created VxRail non-admin username and password	
24			New VxRail management username and password	
25			Customer Supplied data center name	
26			New cluster name	
27		VxRail Manager	VxRail hostname	vxman
28			VxRail IP address	172.16.11.102
29		Networking	Subnet mask	255.255.255.0
30			Gateway	172.16.11.254
31		Passwords	ESXi "root" passwords. Can be different for each host starting with Release 4.0.100.	_root_password_
32			VxRail Manager and VxRail vCenter Server "administrator@vsphere.local"	_administrator_password_
33	vMotion		Starting address for IP pool	172.16.12.1

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Row		Category	Description	Values used
34			Ending address for IP pool	**172.16.12.40**
35			Subnet mask	**255.255.255.0**
36			VLAN ID	**1612**
37	vSAN		Starting address for IP pool	**172.16.13.1**
38			Ending address for IP pool	**172.16.13.40**
39			Subnet mask	**255.255.255.0**
40			VLAN ID	**1613**
41	VM Networks	… (unlimited number)	VM Network name and VLAN ID	**VM_Network_A, 1614**
42			VM Network name and VLAN ID	**VM_Network_B, 1615**
43	Solutions	Logging	vRealize Log Insight™ hostname	**vxinsight**
44			vRealize Log Insight IP address	**172.16.11.103**
45			Syslog server (instead of Log Insight)	

*Setting this value to 0 is explained in Section 9.1 of this guide.

This deployment uses four VxRail nodes. However, host IP address pools are configured for the Management, vMotion, and vSAN VLANs using addresses in the .1 - .40 range in Table 3. This ensures IP addresses are preconfigured for hosts that may be added later as the VxRail cluster grows.

5.3 Using a jump box or laptop computer

For VxRail deployment, VxRail Manager is accessed using the leaf switches connected to the nodes. This may be done by connecting a laptop computer directly to a leaf or by using a jump box (also known as a jump server or jump host) for remote access.

Reserve at least one interface on a leaf switch for this connection. This interface is configured on the External Management VLAN during switch configuration.

Note: A PowerEdge server is used as a jump box in this deployment. More information on jump box connections is provided in Chapter 9.

5.4 DNS and NTP servers

VxRail nodes must be able to reach a correctly configured DNS server from the External Management VLAN during and after VxRail deployment. The DNS server must include forward and reverse lookup entries for ESXi hosts, vCenter, the Platform Services Controller, VxRail Manager, and vRealize Log Insight.

Add forward and reverse lookup records on the DNS server using the hostnames and IP addresses in the VxRail network configuration table (Table 3). Table 4 summaries the DNS entries for this deployment.

Table 4   Hostnames and IP addresses used

Hostname	IP Address
vxhost01.dell.local	172.16.11.1
vxhost02.dell.local	172.16.11.2
vxhost03.dell.local	172.16.11.3
vxhost04.dell.local	172.16.11.4

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Hostname	IP Address
vxvcenter.dell.local	172.16.11.100
vxpsc.dell.local	172.16.11.101
vxman.dell.local	172.16.11.102
vxinsight.dell.local	172.16.11.103

An NTP server is not required but is recommended. If an NTP server is not provided, VxRail uses the time that is set on VxRail node 1.

Note: For this deployment guide, the PowerEdge server used as the jump box also provides DNS and NTP services for the VxRail cluster. It is connected to both leaf switches for redundancy using Microsoft Windows NIC teaming (switch-independent load balancing).

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6 Switch configuration prerequisites

6.1 Check switch OS version

S5248F-ON switches must be running SmartFabric OS10.5.0.0 or later. Run the **show version** command to check the OS version. Dell EMC recommends upgrading to the latest release available on Dell Digital Locker (account required).

```
OS10# show version
S5248F-ON# show version
Dell EMC Networking OS10-Enterprise
Copyright (c) 1999-2019 by Dell Inc. All Rights Reserved.
OS Version: 10.5.0.0
Build Version: 10.5.0.0.326
```

Note: Figure 1 at the beginning of this guide lists supported switches and operating systems for VxRail deployments.

6.2 Verify license installation

Run the command show license status to verify license installation. The License Type: field should indicate PERPETUAL. If an evaluation license is installed, licenses purchased from Dell EMC are available for download on Dell Digital Locker. Installation instructions are provided in the *Dell EMC SmartFabric OS10 User Guide Release 10.5.0*.

```
OS10# show license status

System Information
----------------------------------------------------------
Vendor Name    :        Dell EMC
Product Name   :        S5248F-ON
Hardware Version:       A01
Platform Name  :        x86_64-dellemc_s5200f_c3538-r0
PPID           :        CN00Y2VTCES0082O0018
Service Tag    :        D8MCG02
License Details
---------------
Software       :        OS10-Enterprise
Version        :        10.5.0.0
License Type   :        PERPETUAL
License Duration:       Unlimited
License Status :        Active
License location:       /mnt/license/D8MCG02.lic
----------------------------------------------------------
```

Note: If SmartFabric OS10 was factory installed, a perpetual license is already on the switch.

6.3　Factory default configuration

The configuration commands in the sections that follow begin with S5248F-ON switches at their factory default settings. Dell EMC PowerSwitches running SmartFabric OS10 can be reset to their default configuration using the serial console port as follows:

```
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
```

Note: The above commands can also be performed from an SSH or Telnet session, but the `reload` command immediately ends the remote access session to the switch.

The switch reboots to its factory default configuration.

Note: SmartFabric OS10 at its default settings has Telnet disabled, SSH enabled, Rapid per-VLAN Spanning Tree Plus (RPVST+) enabled, and the OOB management interface configured to get its IP address using DHCP. The default username and password are both `admin`. Dell EMC recommends changing the admin password to a complex password during the first login.

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7 Configure switches

This section covers switch configuration for S5248F-ON switches in the different topologies. Commands for all examples are provided as attachments to this guide.

7.1 Dual switch with VLT

This example uses a four-node VxRail cluster connected to a pair of switches configured with VLT, as shown in Figure 12. Dell EMC recommends using this topology.

25GbE connections

100GbE VLTi connections, ports 1/1/53-54

Note: The jump box/DNS server, not shown, is connected to port 1/1/9 on each switch.
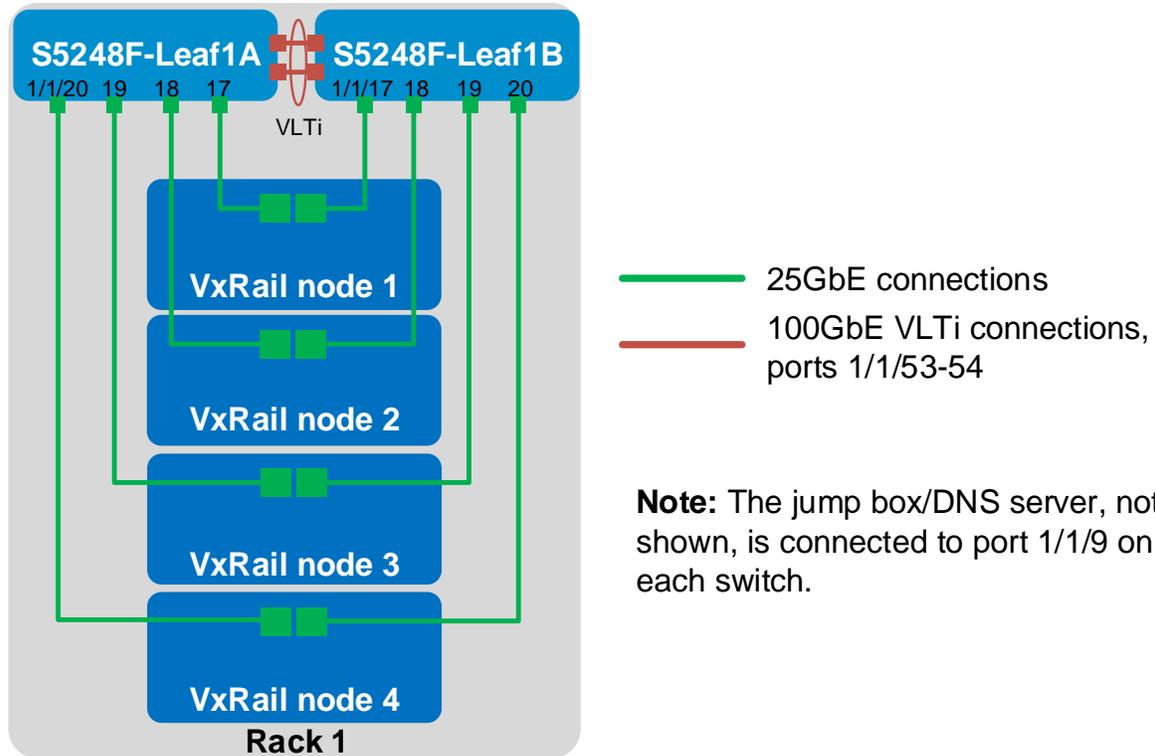
Figure 12   Four-node cluster connected to a pair of switches configured with VLT

The commands in the following sections are run to complete the configuration of both leaf switches. The port numbers used in the configuration commands correspond to those shown in Figure 12.

Note: The commands in the tables below should be entered in the order shown. All commands are provided in the file attachments named S5248F-1A-vlt.txt and S5248F-1B-vlt.txt.

7.1.1 General settings

Configure the hostname, OOB management IP address, and default gateway. Enable IPv6 MLD snooping to allow discovery of the VxRail nodes. Specify an NTP server accessible by the switch. The example shows an NTP server on the OOB management network with a different IP address than the one used by the VxRail nodes on the External Management network.

> **Note:** Default spanning tree settings are used in this deployment. In SmartFabric OS10, RVPST+ is enabled by default, and RPVST+ VLAN priority numbers start at 32769. Modify the spanning tree settings if required for your environment. LLDP is enabled on each interface and globally by default. LLDP is useful for troubleshooting and validation. Dell EMC recommends leaving it enabled.

Table 5   General settings – dual switch with VLT

S5248F-Leaf1A	S5248F-Leaf1B
configure terminal hostname S5248F-Leaf1A interface mgmt1/1/1 no ip address ip address 100.67.172.38/24 no shutdown management route 0.0.0.0/0 100.67.172.254 ipv6 mld snooping enable ntp server 100.67.10.20	configure terminal hostname S5248F-Leaf1B interface mgmt1/1/1 no ip address ip address 100.67.172.37/24 no shutdown management route 0.0.0.0/0 100.67.172.254 ipv6 mld snooping enable ntp server 100.67.10.20

7.1.2 Configure VLANs

In this section, VLANs are configured per Table 2.

Create the External Management VLAN and assign a unique IP address on each switch. Configure VRRP to provide gateway redundancy. Set the VRRP priority. The switch with the largest priority value becomes the master VRRP router. Assign the same virtual address to both switches.

Create the vMotion, vSAN, VM Network, and Internal Management VLANs. Enable IPv6 MLD snooping querier on the Internal Management VLAN for node discovery.

Table 6   Configure VLANs – dual switch with VLT

S5248F-Leaf1A	S5248F-Leaf1B
interface vlan1611 description External_Mgmt ip address 172.16.11.253/24 vrrp-group 11 priority 150 virtual-address 172.16.11.254 no shutdown	interface vlan1611 description External_Mgmt ip address 172.16.11.252/24 vrrp-group 11 priority 100 virtual-address 172.16.11.254 no shutdown

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S5248F-Leaf1A	S5248F-Leaf1B
```interface vlan1612 description vMotion no shutdown```	```interface vlan1612 description vMotion no shutdown```
```interface vlan1613 description vSAN no shutdown```	```interface vlan1613 description vSAN no shutdown```
```interface vlan1614 description VM_Network_A no shutdown```	```interface vlan1614 description VM_Network_A no shutdown```
```interface vlan1615 description VM_Network_B no shutdown```	```interface vlan1615 description VM_Network_B no shutdown```
```interface vlan3939 description Internal_Mgmt no shutdown ipv6 mld snooping querier```	```interface vlan3939 description Internal_Mgmt no shutdown ipv6 mld snooping querier```

7.1.3 Configure interfaces

Configure the interfaces for the jump box or laptop computer connections to be used during VxRail deployment. This example uses 10GbE interface 1/1/9:1 on each switch.

Note: See Appendix B to change the native speed of S5248F-ON port groups from 25GbE to 10GbE for jump box or laptop computer connections.

While only one connection to the jump box is required, two may be used for redundancy. Add these interfaces as access ports on VLAN 1611 (the External Management VLAN).

Note: In this example, the jump box also provides DNS and NTP services as covered in Section 5.4. If these services are on other devices, ensure the corresponding switch interfaces are also in the External Management VLAN.

Configure the interfaces for connections to the VxRail nodes. Interfaces 1/1/17 through 1/1/20 are used in this example.

Use the `switchport mode trunk` command to enable ports to carry traffic for multiple VLANs. Configure the ports as access (untagged) ports on VLAN 1611 (the External Management VLAN). Configure the ports as trunk (tagged) ports on VLANs 1612-1615, and 3939 (the vMotion, vSAN, VM Network, and Internal Management VLANs).

Configure ports directly connected to nodes, servers, or other endpoints as STP edge ports. Set flow control to "receive on" and "transmit off" on node-connected ports as a best practice.

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Note: Flow control is enabled on all network interfaces in ESXi by default. For more information, see *VMware vSAN Network Design*.

Table 7   Configure interfaces – dual switch with VLT

S5248F-Leaf1A	S5248F-Leaf1B
interface ethernet1/1/9:1 description JumpBox_DNS switchport access vlan 1611 spanning-tree port type edge no shutdown interface ethernet1/1/17 description Node1_Port1 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown interface ethernet1/1/18 description Node2_Port1 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown interface ethernet1/1/19 description Node3_Port1 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown interface ethernet1/1/20 description Node4_Port1 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown	interface ethernet1/1/9:1 description JumpBox_DNS switchport access vlan 1611 spanning-tree port type edge no shutdown interface ethernet1/1/17 description Node1_Port2 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown interface ethernet1/1/18 description Node2_Port2 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown interface ethernet1/1/19 description Node3_Port2 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown interface ethernet1/1/20 description Node4_Port2 switchport mode trunk switchport access vlan 1611 switchport trunk allowed vlan 1612-1615,3939 spanning-tree port type edge flowcontrol receive on flowcontrol transmit off no shutdown

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7.1.4 Configure VLT

Use 100GbE interfaces for the VLTi between the two leaf switches. This example uses interfaces 1/1/53 and 1/1/54. Remove each interface from Layer 2 mode with the `no switchport` command.

Create the VLT domain. The backup destination is the OOB management IP address of the VLT peer switch. Configure the interfaces used as the VLTi with the `discovery-interface` command. Enable peer routing.

Note: For more information on VLT, see the *Dell EMC SmartFabric OS10 User Guide Release 10.5.0*.

When the configuration is complete, exit configuration mode and save the configuration with the `end` and `write memory` commands.

Table 8   Configure VLT – dual switch with VLT

S5248F-Leaf1A	S5248F-Leaf1B
interface ethernet1/1/53 description VLTi no switchport no shutdown interface ethernet1/1/54 description VLTi no switchport no shutdown vlt-domain 127 backup destination 100.67.172.37 discovery-interface ethernet1/1/53-1/1/54 peer-routing end write memory	interface ethernet1/1/53 description VLTi no switchport no shutdown interface ethernet1/1/54 description VLTi no switchport no shutdown vlt-domain 127 backup destination 100.67.172.38 discovery-interface ethernet1/1/53-1/1/54 peer-routing end write memory

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7.2 Dual switch without VLT

This example uses a four-node VxRail cluster connected to a switch pair without VLT, as shown in Figure 13.
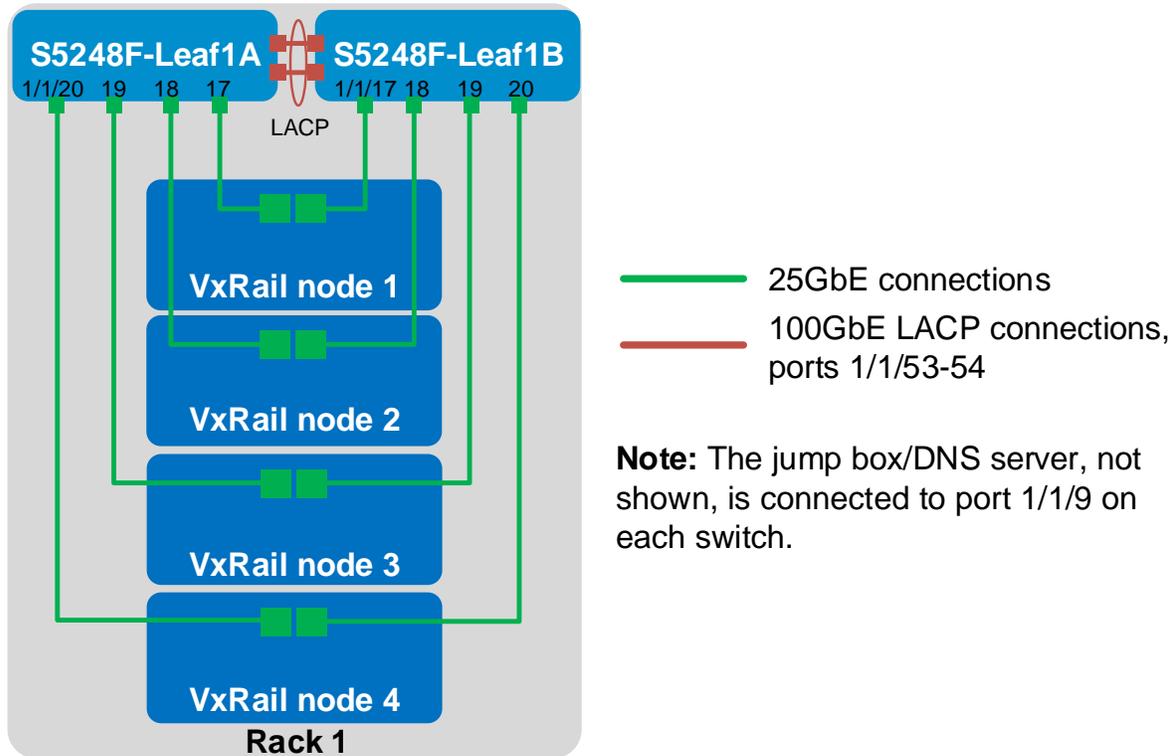
Figure 13   Four-node cluster connected to a switch pair without VLT

In this topology, an LACP port channel is used to connect the two switches.

The commands in the following sections are run to complete the configuration of both switches. The port numbers used in the configuration commands correspond to those shown in Figure 13.

Note: The commands in the tables below should be entered in the order shown. All commands are provided in the file attachments named S5248F-1A-no-vlt.txt and S5248F-1B-no-vlt.txt.

7.2.1 General settings

Configure the hostname, OOB management IP address, and default gateway. Enable IPv6 MLD snooping to allow discovery of the VxRail nodes. Specify an NTP server accessible by the switch. In this example, this is an NTP server on the OOB management network, with a different IP address than the one used by the VxRail nodes on the External Management network.

> **Note:** Default spanning tree settings are used in this deployment. In SmartFabric OS10, RVPST+ is enabled by default, and RPVST+ VLAN priority numbers start at 32769. Modify the spanning tree settings if required for your environment. LLDP is enabled on each interface and globally by default. LLDP is useful for troubleshooting and validation. Dell EMC recommends leaving it enabled.

Table 9   General settings - dual switch without VLT

S5248F-Leaf1A	S5248F-Leaf1B
configure terminal hostname S5248F-Leaf1A interface mgmt1/1/1 no ip address ip address 100.67.172.38/24 no shutdown management route 0.0.0.0/0 100.67.172.254 ipv6 mld snooping enable ntp server 100.67.10.20	configure terminal hostname S5248F-Leaf1B interface mgmt1/1/1 no ip address ip address 100.67.172.37/24 no shutdown management route 0.0.0.0/0 100.67.172.254 ipv6 mld snooping enable ntp server 100.67.10.20

7.2.2 Configure VLANs

In this section, VLANs are configured per Table 2.

Create the External Management VLAN and assign a unique IP address on each switch. Configure VRRP to provide gateway redundancy. Set the VRRP priority. The switch with the largest priority value becomes the master VRRP router. Assign the same virtual address to both switches.

Create the vMotion, vSAN, VM Network, and Internal Management VLANs. Enable IPv6 MLD snooping querier on the Internal Management VLAN for node discovery.

Table 10   Configure VLANs - dual switch without VLT

S5248F-Leaf1A	S5248F-Leaf1B
interface vlan1611 description External_Mgmt ip address 172.16.11.253/24 vrrp-group 11 priority 150 virtual-address 172.16.11.254 no shutdown interface vlan1612	interface vlan1611 description External_Mgmt ip address 172.16.11.252/24 vrrp-group 11 priority 100 virtual-address 172.16.11.254 no shutdown interface vlan1612

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S5248F-Leaf1A	S5248F-Leaf1B
| ```
description vMotion
no shutdown

interface vlan1613
description vSAN
no shutdown

interface vlan1614
description VM_Network_A
no shutdown

interface vlan1615
description VM_Network_B
no shutdown

interface vlan3939
description Internal_Mgmt
no shutdown
ipv6 mld snooping querier
``` | ```
description vMotion
no shutdown

interface vlan1613
description vSAN
no shutdown

interface vlan1614
description VM_Network_A
no shutdown

interface vlan1615
description VM_Network_B
no shutdown

interface vlan3939
description Internal_Mgmt
no shutdown
ipv6 mld snooping querier
``` |

7.2.3   Configure interfaces

Configure the interfaces for the jump box or laptop computer connections to be used during VxRail deployment. This example uses 10GbE interface 1/1/9:1 on each switch.

Note: See Appendix B to change the native speed of S5248F-ON port groups from 25GbE to 10GbE for jump box or laptop computer connections.

While only one connection to the jump box is required, two may be used for redundancy. Add these interfaces as access ports on VLAN 1611 (the External Management VLAN).

Note: In this example, the jump box also provides DNS and NTP services as covered in Section 5.4. If these services are located on other devices, ensure the corresponding switch interfaces are also in the External Management VLAN.

Configure the interfaces for connections to the VxRail nodes. Interfaces 1/1/17 through 1/1/20 are used in this example.

Use the `switchport mode trunk` command to enable ports to carry traffic for multiple VLANs. Configure the ports as access (untagged) ports on VLAN 1611 (the External Management VLAN). Configure the ports as trunk (tagged) ports on VLANs 1612-1615 and 3939 (the vMotion, vSAN, VM Network, and Internal Management VLANs).

Configure ports directly connected to nodes, servers, or other endpoints as STP edge ports. Set flow control to "receive on" and "transmit off" on node-connected ports as a best practice.

Note: Flow control is enabled on all network interfaces in ESXi by default. For more information, see .

Table 11   Configure interfaces – dual switch without VLT

S5248F-Leaf1A	S5248F-Leaf1B
| ```
interface ethernet1/1/9:1
description JumpBox_DNS
switchport access vlan 1611
spanning-tree port type edge
no shutdown

interface ethernet1/1/17
description Node1_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/18
description Node2_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/19
description Node3_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/20
description Node4_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown
``` | ```
interface ethernet1/1/9:1
description JumpBox_DNS
switchport access vlan 1611
spanning-tree port type edge
no shutdown

interface ethernet1/1/17
description Node1_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/18
description Node2_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/19
description Node3_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/20
description Node4_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-
1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown
``` |

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7.2.4 Configure the switch interconnect

Create a port channel to use between the two leaf switches, 127 in this example. Use the `switchport mode trunk` command to enable the port channel to carry traffic for multiple VLANs, and allow all VLANs on the port channel.

Use 100GbE interfaces for the port channel, 1/1/53 and 1/1/54 in this example. Add each interface to the port channel as LACP active members with the `channel-group 127 mode active` command.

When the configuration is complete, exit configuration mode and save the configuration with the `end` and `write memory` commands.

Table 12   Configure switch interconnect - dual switch without VLT

S5248F-Leaf1A	S5248F-Leaf1B
interface port-channel 127 description To_Leaf_1B switchport mode trunk switchport trunk allowed vlan 1611-1615,3939 no shutdown interface ethernet1/1/53 description To_Leaf_1B channel-group 127 mode active no shutdown interface ethernet1/1/54 description To_Leaf_1B channel-group 127 mode active no shutdown end write memory	interface port-channel 127 description To_Leaf_1A switchport mode trunk switchport trunk allowed vlan 1611-1615,3939 no shutdown interface ethernet1/1/53 description To_Leaf_1A channel-group 127 mode active no shutdown interface ethernet1/1/54 description To_Leaf_1A channel-group 127 mode active no shutdown end write memory

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7.3 Single switch

This example uses a four-node VxRail cluster connected to a single switch, as shown in Figure 14.

Figure 14   Four-node cluster connected to a single switch

The commands in the following sections are run to complete the switch configuration. The port numbers used in the configuration commands correspond to those shown in Figure 14.

Note: The commands in the tables below should be entered in the order shown. All commands are provided in the file attachment named S5248F-single-switch.txt.

7.3.1 General settings

Configure the hostname, OOB management IP address, and default gateway. Enable IPv6 MLD snooping to allow discovery of the VxRail nodes. Specify an NTP server accessible by the switch. In this example, this is an NTP server on the OOB management network, with a different IP address than the one used by the VxRail nodes on the External Management network.

Note: Default spanning tree settings are used in this deployment. In SmartFabric OS10, RVPST+ is enabled by default, and RPVST+ VLAN priority numbers start at 32769. Modify the spanning tree settings if required for your environment. LLDP is enabled on each interface and globally by default. LLDP is useful for troubleshooting and validation. Dell EMC recommends leaving it enabled.

Table 13   General settings – single switch

S5248F-ON
| ```
configure terminal

hostname S5248F-ON

interface mgmt1/1/1
no ip address
ip address 100.67.172.38/24
no shutdown
management route 0.0.0.0/0 100.67.172.254

ipv6 mld snooping enable

ntp server 100.67.10.20
``` |

7.3.2   Configure VLANs

In this section, VLANs are configured per Table 2.

Create the External Management VLAN and assign an IP address. Create the vMotion, vSAN, VM Network, and Internal Management VLANs. Enable IPv6 MLD snooping querier on the Internal Management VLAN for node discovery.

Table 14   Configure VLANs – single switch

S5248F-ON
| ```
interface vlan1611
description External_Mgmt
ip address 172.16.11.254/24
no shutdown

interface vlan1612
description vMotion
no shutdown

interface vlan1613
description vSAN
no shutdown

interface vlan1614
description VM_Network_A
no shutdown

interface vlan1615
description VM_Network_B
no shutdown

interface vlan3939
description Internal_Mgmt
no shutdown
ipv6 mld snooping querier
``` |

7.3.3 Configure interfaces

Configure the interfaces for the jump box or laptop computer connections to be used during VxRail deployment. This example uses 10GbE interfaces 1/1/9:1 and 1/1/10:1.

Note: See Appendix B to change the native speed of S5248F-ON port groups from 25GbE to 10GbE for jump box or laptop computer connections.

While only one connection to the jump box is required, two may be used for redundancy. Add these interfaces as access ports on VLAN 1611 (the External Management VLAN).

Note: In this example, the jump box also provides DNS and NTP services as covered in Section 5.4. If these services are located on other devices, ensure the corresponding switch interfaces are also in the External Management VLAN.

Configure the interfaces for connections to the VxRail nodes. Interfaces 1/1/17 through 1/1/24 are used in this example.

Use the `switchport mode trunk` command to enable ports to carry traffic for multiple VLANs. Configure the ports as access (untagged) ports on VLAN 1611 (the External Management VLAN). Configure the ports as trunk (tagged) ports on VLANs 1612-1615, and 3939 (the vMotion, vSAN, VM Network, and Internal Management VLANs).

Configure ports directly connected to nodes, servers, or other endpoints as STP edge ports. Set flow control to "receive on" and "transmit off" on node-connected ports as a best practice.

Note: Flow control is enabled on all network interfaces in ESXi by default. For more information, see *VMware vSAN Network Design*.

When the configuration is complete, exit configuration mode and save the configuration with the `end` and `write memory` commands.

Table 15   Configure interfaces – single switch

S5248F-ON
| ```
interface ethernet1/1/9:1
description JumpBox_DNS
switchport access vlan 1611
spanning-tree port type edge
no shutdown

interface ethernet1/1/10:1
description JumpBox_DNS
switchport access vlan 1611
spanning-tree port type edge
no shutdown

interface ethernet1/1/17
description Node1_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
``` |

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S5248F-ON
| ```
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/18
description Node1_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/19
description Node2_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/20
description Node2_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/21
description Node3_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/22
description Node3_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown
``` |

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S5248F-ON

```
interface ethernet1/1/23
description Node4_Port1
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

interface ethernet1/1/24
description Node4_Port2
switchport mode trunk
switchport access vlan 1611
switchport trunk allowed vlan 1612-1615,3939
spanning-tree port type edge
flowcontrol receive on
flowcontrol transmit off
no shutdown

end
write memory
```

8 Switch validation

After switches are configured and devices are connected, the switch CLI is used to validate the network configuration. This section provides a list of the most common commands and their output for the examples used in this guide.

8.1 General validation commands

The commands and output shown in this section are for S5248F-Leaf1A in the dual switch with VLT topology. The output of its peer, S5248F-Leaf1B, is similar. If the dual switch without VLT or single switch topology is used, notes are added where differences exist.

Note: For additional commands and output related to the leaf-spine portion of the topology, such as BGP and Uplink Failure Detection (UFD), see *Dell EMC Networking Layer 3 Leaf-Spine Deployment and Best Practices with OS10*.

8.1.1 show interface status

The `show interface status | grep up` command is used to verify required interfaces are up, and links are established at their appropriate speeds.

```
S5248F-Leaf1A# show interface status | grep up
Port            Description     Status   Speed   Duplex   Mode Vlan Tagged-Vlans
Eth 1/1/9:1     JumpBox_DNS     up       10G     full     A    1611 -
Eth 1/1/17      Node1_Port1     up       25G     full     T    1611 1612-1615,3939
Eth 1/1/18      Node2_Port1     up       25G     full     T    1611 1612-1615,3939
Eth 1/1/19      Node3_Port1     up       25G     full     T    1611 1612-1615,3939
Eth 1/1/20      Node4_Port1     up       25G     full     T    1611 1612-1615,3939
Eth 1/1/53      VLTi            up       100G    full     -
Eth 1/1/54      VLTi            up       100G    full     -
```

Note: For the dual switch without VLT topology, the output is identical to the above except for the description of ports 1/1/53-54. For the single switch topology, the output includes all eight node ports, and ports 1/1/53-54 are not used.

8.1.2 show port-channel summary

The `show port-channel summary` command is used to view port channel numbers, interfaces used, and status. In SmartFabric OS10, the VLTi is automatically configured as a static LAG using port channel 1000. Ports 1/1/53 and 1/1/54 are port channel members, and `(P)` indicates each is up and active.

```
S5248F-Leaf1A# 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
-------------------------------------------------------------------------
1000 port-channel1000         Eth      STATIC    1/1/53(P) 1/1/54(P)
```

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Note: The command output for the dual switch without VLT topology is shown below. In this example, Port channel 127 is up `(U)`, and `DYNAMIC` indicates LACP is used. Ports 1/1/53 and 1/1/54 are port channel members, and **`(P)`** indicates each is up and active.

```
S5248F-Leaf1A# 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
--------------------------------------------------------------------------------
127  port-channel127 (U)     Eth       DYNAMIC    1/1/53(P) 1/1/54(P)
```

8.1.3   show vlan

The `show vlan` command is used to view interfaces assigned to each VLAN and whether the interfaces are access/untagged `(A)` or tagged `(T)`. Port channel 1000 is the VLTi. VLAN ID 4094 is reserved as an internal control VLAN for the VLT domain, and it is not user configurable.

```
S5248F-Leaf1A# 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                                   A Eth1/1/1-1/1/8,1/1/10:1,
1/1/11:1,1/1/12:1,1/1/13-1/1/16,1/1/21-1/1/52,1/1/55-1/1/56
                                                   A Po1000
   1611   Active    External_Mgmt                  T Po1000
                                                   A Eth1/1/9:1,1/1/17-1/1/20
   1612   Active    vMotion                        T Eth1/1/17-1/1/20
                                                   T Po1000
   1613   Active    vSAN                           T Eth1/1/17-1/1/20
                                                   T Po1000
   1614   Active    VM_Network_A                   T Eth1/1/17-1/1/20
                                                   T Po1000
   1615   Active    VM_Network_B                   T Eth1/1/17-1/1/20
                                                   T Po1000
   3939   Active    Internal_Mgmt                  T Eth1/1/17-1/1/20
                                                   T Po1000
   4094   Active                                   T Po1000
```

Note: For the dual switch without VLT topology, the VLAN portion of the command output is as follows:

```
    NUM     Status    Description                     Q Ports
    1       Active                                    A Eth1/1/1-1/1/8,1/1/10:1,
1/1/11:1,1/1/12:1,1/1/13-1/1/16,1/1/21-1/1/52
                                                      A Po127
    1611    Active    External_Mgmt                   T Po127
                                                      A Eth1/1/9:1,1/1/17-1/1/20
    1612    Active    vMotion                         T Eth1/1/17-1/1/20
                                                      T Po127
    1613    Active    vSAN                            T Eth1/1/17-1/1/20
                                                      T Po127
    1614    Active    VM_Network_A                    T Eth1/1/17-1/1/20
                                                      T Po127
    1615    Active    VM_Network_B                    T Eth1/1/17-1/1/20
                                                      T Po127
    3939    Active    Internal_Mgmt                   T Eth1/1/17-1/1/20
                                                      T Po127
```

For the single switch topology, the VLAN portion is as follows:

```
    NUM     Status    Description                     Q Ports
    1       Inactive                                  A Eth1/1/1-1/1/8,1/1/11:1,
1/1/12:1,1/1/13-1/1/16,1/1/25-1/1/56
    1611    Active    External_Mgmt                   A Eth1/1/9:1,1/1/10:1,
1/1/17-1/1/24
    1612    Active    vMotion                         T Eth1/1/17-1/1/24
    1613    Active    vSAN                            T Eth1/1/17-1/1/24
    1614    Active    VM_Network_A                    T Eth1/1/17-1/1/24
    1615    Active    VM_Network_B                    T Eth1/1/17-1/1/24
    3939    Active    Internal_Mgmt                   T Eth1/1/17-1/1/24
```

8.1.4   show ipv6 mld snooping interface

The `show ipv6 mld snooping interface vlan 3939` command is used to verify MLD snooping and querier are enabled on VLAN 3939 (shown in bold in the output below). These settings are required for discovery of the VxRail nodes before creating the VxRail cluster.

```
S5248F-Leaf1A# show ipv6 mld snooping interface vlan 3939

Vlan3939 is up, line protocol is up
MLD version is 2
MLD snooping is enabled on interface
MLD snooping query interval is 60 seconds
MLD snooping querier timeout is 130 seconds
MLD snooping last member query response interval is 1000 ms
MLD snooping max response time is 10 seconds
MLD snooping fast-leave is disabled on this interface
MLD snooping querier is enabled on this interface
Multicast snooping flood-restrict is enabled on this interface
```

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8.1.5 show lldp neighbors

The `show lldp neighbors` command is useful for identifying connected equipment. Interface 1/1/9:1 is connected to the jump box. Interfaces 1/1/17-20 are connected to the Broadcom adapter in each of the VxRail nodes, and 1/1/53-54 are connected to the other leaf.

```
S5248F-Leaf1A# show lldp neighbors
Loc PortID        Rem Host Name       Rem Port Id         Rem Chassis Id
-------------------------------------------------------------------------
ethernet1/1/9:1   Not Advertised      00:0a:f7:38:ba:a0   00:0a:f7:38:ba:a0
ethernet1/1/17    Broadcom Adv. Dua... 00:0a:f7:b6:15:d0  00:0a:f7:b6:15:d0
ethernet1/1/17    node-63356          00:0a:f7:b6:15:d0   vmnic0
ethernet1/1/18    Broadcom Adv. Dua... 00:0a:f7:b6:1a:80  00:0a:f7:b6:1a:80
ethernet1/1/18    node-94415          00:0a:f7:b6:1a:80   vmnic0
ethernet1/1/19    Broadcom Adv. Dua... 00:0a:f7:b6:11:c0  00:0a:f7:b6:11:c0
ethernet1/1/19    node-38673          00:0a:f7:b6:11:c0   vmnic0
ethernet1/1/20    Broadcom Adv. Dua... 00:0a:f7:b6:1c:10  00:0a:f7:b6:1c:10
ethernet1/1/20    node-86429          00:0a:f7:b6:1c:10   vmnic0
ethernet1/1/53    S5248F-Leaf1B       ethernet1/1/53      d8:9e:f3:bf:ae:00
ethernet1/1/54    S5248F-Leaf1B       ethernet1/1/54      d8:9e:f3:bf:ae:00
```

If an entry is not shown for the jump box or laptop computer (port 1/1/9:1 above), it means the NIC on the remote system does not have LLDP enabled. This is not required and may be ignored for this solution.

Note: For the dual switch without VLT topology, the output is identical to the above. For the single switch topology, the output includes all eight node-connected ports, and ports 1/1/53-54 are not used.

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8.1.6 show vrrp brief

In this deployment, VRRP is configured on the External Management VLAN, 1611, to provide gateway redundancy for management traffic. The output from the `show vrrp brief` command shows the master and virtual IP addresses and whether the switch is in the master or backup role. The switch configured with the largest priority value, shown in the `Priority` column, becomes the master.

```
S5248F-Leaf1A# show vrrp brief

Interface Group   Priority Prempt  State Version Master addr(s) Virtual addr
--------------------------------------------------------------------------------
vlan1611  IPv4 11 150      true    master  2     172.16.11.253  172.16.11.254
```

Note: For the dual switch without VLT topology, the output is identical to the above. For the single switch topology, this command is not applicable.

8.2 VLT validation commands

The commands in this section are only applicable to the dual switch with VLT topology.

8.2.1 show vlt *domain_id*

This command is used to validate the VLT configuration status. The `Role` for one switch in the VLT pair is `primary`, and its peer switch (not shown) is assigned the `secondary` role. Ensure `Peer-Routing` is `Enabled`. The `VLTi Link Status` and `VLT Peer Status` must both be `up`.

```
S5248F-Leaf1A# show vlt 127
Domain ID               : 127
Unit ID                 : 1
Role                    : primary
Version                 : 2.3
Local System MAC address : d8:9e:f3:c0:61:00
Role priority           : 32768
VLT MAC address         : d8:9e:f3:bf:ae:00
IP address              : fda5:74c8:b79e:1::1
Delay-Restore timer     : 90 seconds
Peer-Routing            : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000    : up

VLT Peer Unit ID    System MAC Address    Status    IP Address          Version
--------------------------------------------------------------------------------
  2                 d8:9e:f3:bf:ae:00     up        fda5:74c8:b79e:1::2   2.3
```

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8.2.2   show vlt *domain_id* backup-link

This command is used to verify VLT peers are communicating on the backup link over the OOB management network. The `Destination` is the management IP address of the peer. The `Peer Heartbeat status` must be `Up`.

```
S5248F-Leaf1A# show vlt 127 backup-link
VLT Backup Link
-----------------------
Destination                   : 100.67.172.37
Peer Heartbeat status         : Up
Heartbeat interval            : 30
Heartbeat timeout             : 90
Destination VRF               : default
```

8.2.3   show vlt *domain_id* mismatch

This command highlights any potential configuration issues between VLT peers. All items must indicate `No mismatch`.

```
S5248F-Leaf1A# show vlt 127 mismatch
VLT-MAC mismatch:
No mismatch


Peer-routing mismatch:
No mismatch


VLAN 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
 (Output truncated)
```

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9 Deploy VxRail

A laptop computer or jump box with a web browser for the VxRail user interface is required. It is either directly plugged into a leaf switch or able to logically reach the VxRail External Management VLAN from elsewhere on the network.

By default, the initial VxRail Manager IP address is 192.168.10.200/24. After initial configuration, the address changes to its new address on the External Management network. The new VxRail Manager address used in this guide is 172.16.11.102/24 per the planning data in Table 3.

During installation, the laptop or jump box must be able to reach both the initial and new VxRail Manager addresses, so two addresses are configured on the network adapter, one for each network.

Note: Both addresses may be configured simultaneously if the network adapter supports it, or in sequence if required.

The IP addresses configured on the laptop computer/jump box in this example are as follows:

- 192.168.10.1/24, to communicate with the initial VxRail Manager address, 192.168.10.200/24
- 172.16.11.50/24, to communicate with the new VxRail Manager address, 172.16.11.102/24

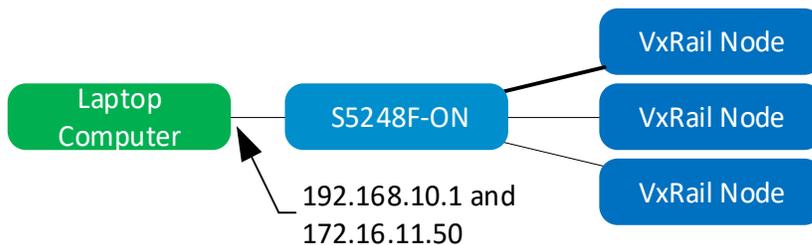If a laptop computer is used, the connections appear, as shown in Figure 15.

Figure 15   Use of a laptop computer for deployment

If a PowerEdge server is used as a jump box, make the connections, as shown in Figure 16. Access the jump box's operating system from a workstation using the iDRAC virtual console.

Figure 16   PowerEdge server as a jump box

Note: This deployment uses a PowerEdge server as a jump box that is also in the roles of DNS and NTP server. It may be connected to both leaf switches for redundancy using NIC teaming. Figure 16 shows a single connection from a jump box to a leaf switch for clarity. Port-group1/1/3 on the S5248F-ON is set to 10GbE to allow connectivity to a 10GbE NIC on the jump box. See Appendix B for information on S5248F-ON port-group configuration.

In a web browser on the laptop computer or jump box, connect to https://192.168.10.200 and deploy VxRail using the planning data in Table 3.

Note: Step-by-step VxRail deployment GUI screenshots are beyond the scope of this guide.

9.1 Management network VLAN ID

During VxRail 4.7 deployment, the user is prompted for the **Management Network VLAN ID** in the GUI. This refers to the External Management VLAN, which is VLAN 1611 in this guide. Since ports in this VLAN are access ports (untagged), leave the value set to 0, as shown in Figure 17.

Figure 17   Management Network VLAN ID is set to 0 during deployment

Use the actual VLAN numbers for the remaining VLANs when prompted by the deployment GUI. Ports in the remaining VLANs are tagged.

A Validated components for S5248F-ON using VxRail 4.7

The following tables include hardware, software, and firmware that was used to configure and validate the examples in this guide.

A.1 Dell EMC PowerSwitches

Table 16   Switches and operating system versions

Qty	Item	OS version
2	Dell EMC PowerSwitch S5248F-ON leaf switches	10.5.0.0
1	Dell EMC PowerSwitch S3048-ON management switch	10.5.0.0

A.2 DAC Cables

Table 17   DAC cables

Qty	Item	Dell PN
8	DAC-SFP28-25G-3.0M (Node connections)	0VXFJY
2	DAC-QSFP28-4SFP28-3M (VLTi connections)	07R9N9

Note: Dell EMC supported fiber optic cables and transceivers may also be used.

A.3 VxRail P570 nodes

A cluster of four VxRail P570 nodes was used to validate the examples in this guide. The nodes were each configured using the information provided below.

Table 18   VxRail P570 node components

Qty per node	Item	Firmware version
2	Intel Xeon Gold 6136 CPU @ 3.00GHz, 12 cores	
12	16GB DDR4 DIMMs (192GB total)	
2	240GB SAS SSD	
8	1.2TB SAS HDD	
1	Dell HBA330 Storage Controller	15.17.09.06
1	Boot Optimized Storage Solution (BOSS) Controller	2.5.13.3016
1	Broadcom 57414 rNDC – 2x25GbE SFP28 ports	21.40.22.21
-	BIOS	2.1.8
-	iDRAC with Lifecycle Controller	3.32.32.32

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A.4 VxRail appliance software

The examples in this guide were validated using VxRail 4.7 appliance software. The software consists of the component versions that are provided below:

Table 19   VxRail appliance software component versions

Item	Version
VxRail Manager	4.7.211 build 13893929
VMware ESXi	6.7 EP09 build 13644319
VMware vCenter Server Appliance	6.7 U2a 13643870
VMware vSAN	6.7 EP09
VMware vRealize Log Insight	4.6.0 build 8080673

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B S5248F-ON port groups

In the example used in this guide, interface eth1/1/9 is connected to a 10GbE adapter on a PowerEdge server used as a jump box. On S5248F-ON, this interface must be changed from its native speed of 25GbE to 10GbE using the `port-group` command.

> **Note:** In place of a jump box, a laptop computer containing a 1GbE BASE-T network adapter may be directly connected to an S5248F-ON leaf switch for VxRail deployment as described in Chapter 9. In this case, use an SFP-to-1GbE BASE-T adapter, Dell part number XTY28, in the leaf switch. Configure the corresponding S5248-ON port for 10GbE as described below. The switch port auto-negotiates to 1GbE when the laptop is connected.

To determine the port-group-to-interface mapping, run the `show port-group` command:

```
S5248F-Leaf1A# show port-group

Port-group            Mode            Ports      FEM
port-group1/1/1       Eth 25g-4x      1   2   3   4       -
port-group1/1/2       Eth 25g-4x      5   6   7   8       -
port-group1/1/3       Eth 25g-4x      9   10  11  12      -
port-group1/1/4       Eth 25g-4x      13  14  15  16      -
port-group1/1/5       Eth 25g-4x      17  18  19  20      -
port-group1/1/6       Eth 25g-4x      21  22  23  24      -
port-group1/1/7       Eth 25g-4x      25  26  27  28      -
port-group1/1/8       Eth 25g-4x      29  30  31  32      -
port-group1/1/9       Eth 25g-4x      33  34  35  36      -
port-group1/1/10      Eth 25g-4x      37  38  39  40      -
port-group1/1/11      Eth 25g-4x      41  42  43  44      -
port-group1/1/12      Eth 25g-4x      45  46  47  48      -
port-group1/1/13      Eth 100g-2x     49  50      -
port-group1/1/14      Eth 100g-2x     51  52      -
port-group1/1/15      Eth 100g-1x     53          -
port-group1/1/16      Eth 100g-1x     54          -
port-group1/1/17      Eth 100g-1x     55          -
port-group1/1/18      Eth 100g-1x     56          -
```

In the output above, interface eth1/1/9 is in port-group 1/1/3 which is at its default setting of 25GbE. The commands to change the interfaces in port-group 1/1/3 from 25GbE to 10GbE are as follows:

```
S5248F-Leaf1A# configure terminal
S5248F-Leaf1A(config)# port-group 1/1/3
S5248F-Leaf1A(conf-pg-1/1/3)# mode eth 10g-4x
```

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Verify the settings with the following command:

```
S5248F-Leaf1A(conf-pg-1/1/3)# do show port-group

Port-group              Mode            Ports     FEM
port-group1/1/1         Eth 25g-4x      1  2  3  4      -
port-group1/1/2         Eth 25g-4x      5  6  7  8      -
port-group1/1/3         Eth 10g-4x      9  10  11  12    -
(Output truncated)
```

The four interfaces in port-group1/1/3 are now set to 10GbE.

Note: The `mode` command changes the native speed of all interfaces in the port group, eth 1/1/9-1/1/12. In this guide, only port 1/1/9 is used. Repeat the above commands on the second leaf switch if it is also connected to a 10GbE adapter on the jump box.

After the port group mode change is made, the interface naming changes from eth 1/1/x to eth 1/1/x:n, where x is the physical port number, and n is the logical port number. In this example, changing port group 1/1/3 to 10GbE also changes the affected interface names to eth1/1/9:1– 1/1/12:1.

Port-group configuration options for the S5248F-ON are shown in Table 20.

Table 20   S5248F-ON port-group configuration options

Port group number	Native physical interface name	Native speed	Other supported speeds	Non-native logical interface name
1/1/1	Eth 1/1/1-1/1/4	25g-4x	10g-4x	Eth 1/1/x:1
1/1/2	Eth 1/1/5-1/1/8	25g-4x	10g-4x	Eth 1/1/x:1
1/1/3	Eth 1/1/9-1/1/12	25g-4x	10g-4x	Eth 1/1/x:1
1/1/4	Eth 1/1/13-1/1/16	25g-4x	10g-4x	Eth 1/1/x:1
1/1/5	Eth 1/1/17-1/1/20	25g-4x	10g-4x	Eth 1/1/x:1
1/1/6	Eth 1/1/21-1/1/24	25g-4x	10g-4x	Eth 1/1/x:1
1/1/7	Eth 1/1/25-1/1/28	25g-4x	10g-4x	Eth 1/1/x:1
1/1/8	Eth 1/1/29-1/1/32	25g-4x	10g-4x	Eth 1/1/x:1
1/1/9	Eth 1/1/33-1/1/36	25g-4x	10g-4x	Eth 1/1/x:1
1/1/10	Eth 1/1/37-1/1/40	25g-4x	10g-4x	Eth 1/1/x:1
1/1/11	Eth 1/1/41-1/1/44	25g-4x	10g-4x	Eth 1/1/x:1
1/1/12	Eth 1/1/45-1/1/48	25g-4x	10g-4x	Eth 1/1/x:1
1/1/13	Eth 1/1/49-1/1/50	100g-2x	50g-4x 40g-2x 10g-8x 25g-8x	Eth 1/1/x:n
1/1/14	Eth 1/1/51-1/1/52	100g-2x	50g-4x 40g-2x 10g-8x 25g-8x	Eth 1/1/x:n
1/1/15	Eth 1/1/53	100g-1x	50g-2x 40g-1x 10g-4x 25g-4x	Eth 1/1/x:n
1/1/16	Eth 1/1/54	100g-1x	50g-2x 40g-1x 10g-4x 25g-4x	Eth 1/1/x:n
1/1/17	Eth 1/1/55	100g-1x	50g-2x 40g-1x 10g-4x 25g-4x	Eth 1/1/x:n
1/1/18	Eth 1/1/56	100g-1x	50g-2x 40g-1x 10g-4x 25g-4x	Eth 1/1/x:n

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C Technical resources

Dell EMC Networking Guides

Dell EMC SmartFabric OS10 User Guide Release 10.5.0

Manuals and documentation for Dell EMC PowerSwitch S3048-ON

Manuals and documentation for Dell EMC PowerSwitch S5248F-ON

Dell EMC Networking Layer 3 Leaf-Spine Deployment and Best Practices with OS10

Dell EMC VxRail Network Planning Guide

Dell EMC VxRail support and documentation (account required)

Dell EMC VxRail Support Matrix (account required)

Dell EMC VxRail Appliance 4.5.x and 4.7.x Event Code Reference (account required)

VMware vSAN Network Design

VMware Validated Design Documentation

VMware Validated Design for Software-Defined Data Center 5.1 - Architecture and Design

D   Support and feedback

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