# Dell EMC Networking OS9 Switch Configuration Guide for VxRail 4.5

Deploying a pair of S5048F-ON switches for a VxRail 4.5 cluster

## Abstract

This document provides Dell EMC Networking OS9 switch configuration examples and topology options for a VxRail 4.5 cluster deployment.

March 2019

# Revisions

| Date | Description |
|------|-------------|
| March 2019 | Changed switch node-facing interface settings from "flowcontrol rx on tx on" to "flowcontrol rx on tx off" as a best practice. |
| August 2018 | Initial release |

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# Table of contents

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# 1 Introduction

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 hyper-converged appliance. VxRail has a simple, scale-out architecture that leverages 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 hyper-converged solutions. In most cases, VxRail clusters (minimum of three and maximum of 64 nodes) connect to a pre-existing IP network at the customer site. The inclusion of dedicated switches for the VxRail cluster simplifies this process and avoids many of the pitfalls associated with the deployment of a hyper-converged solution that originates in network connectivity.

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 Networking switches is purchased with the cluster. This document covers the process of connecting a cluster of VxRail nodes to:

- A pair of Dell Networking switches configured for Virtual Link Trunking (VLT). Using VLT is the preferred topology.
- A pair of Dell Networking switches not configured for VLT.
- A single Dell Networking switch.

This document provides switch topology options and configuration examples for a VxRail 4.5 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 Networking OS9.

## 1.1 Supported switches and operating systems

The examples provided in this deployment guide use VxRail 4.5 nodes connected to Dell EMC Networking S5048F-ON switches running Dell Networking OS9.

Dell EMC Networking supports the following switch and OS combinations for VxRail 4.0 and later:

| Dell EMC Networking Switches Supported for VxRail 4.0 and future releases* | | |
| --- | --- | --- |
| Dell EMC Networking Switch | Networking OS 9 ver 9.12.1.0 and future releases | Networking OS 10 ver 10.4.0R3 and future releases |
| S3048-ON | Supported | Supported |
| S3124 / S3124F / S3124P / S3148 / S3148P | Supported | |
| S4048F-ON / S4048T-ON | Supported | Supported |
| S4112F-ON / S4112T-ON / S4128F-ON / S4128T-ON | | Supported |
| S4148F-ON / S4148FE-ON / S4148T-ON | | Supported |
| S4148U-ON | | Supported |
| S4248FB-ON / S4248FBL-ON | | Supported |
| S5048F-ON | Supported | |
| S6010-ON | Supported | Supported |
| S6100-ON | Supported | |
| Z9100-ON[1] | Supported | Supported |
| Z9264F-ON[2] | | Supported |

*DELL EMC PROVIDES THIS SUPPORTED SWITCH LIST AS IS, WITHOUT EXPRESS OR IMPLIED WARRANTIES OF ANY KIND. THIS LIST IS FOR INFORMATIONAL PURPOSES ONLY AND MAY CONTAIN TYPOGRAPHICAL AND TECHNICAL INACCURACIES. DELLEMC SHALL NOT BE LIABLE FOR ANY DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OF THIS LIST.
[1]Z9100-ON is supported with 10GbE connections to nodes. Z9100-ON support for 25GbE connections to nodes is planned for future releases.
[2]Z9264-ON is supported with OS10 ver 10.4.1 or later

Figure 1    Supported Dell EMC Networking switches and operating systems

## 1.2     Typographical conventions

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

| | |
|---|---|
| Monospace Text | CLI examples |
| Underlined Monospace Text | 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 Networking S5048F-ON

The S5048F-ON is a 1-Rack Unit (RU), multilayer switch with 48x25GbE, and 6x100GbE or 72x25GbE ports. This guide uses two S5048F-ONs as leaf switches.
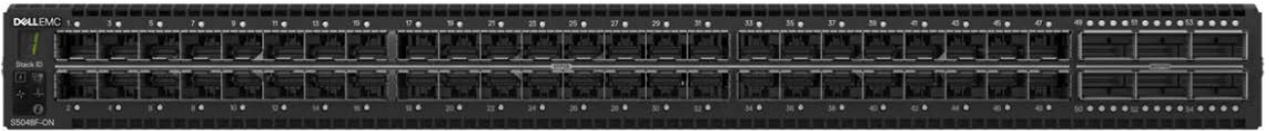


Figure 2    Dell EMC Networking S5048F-ON

## 2.2 Dell EMC Networking 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.
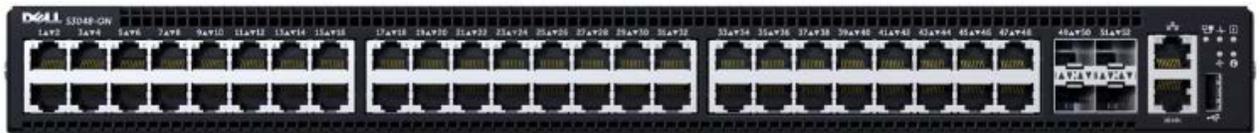


Figure 3    Dell EMC Networking S3048-ON

## 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.

### 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 in a 2-RU form factor.



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

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

### 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 in a 2-RU form factor.

### 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 in a 2-RU form factor.

### 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 in a 1-RU form factor.



Figure 5     Dell EMC VxRail E Series node

### 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)
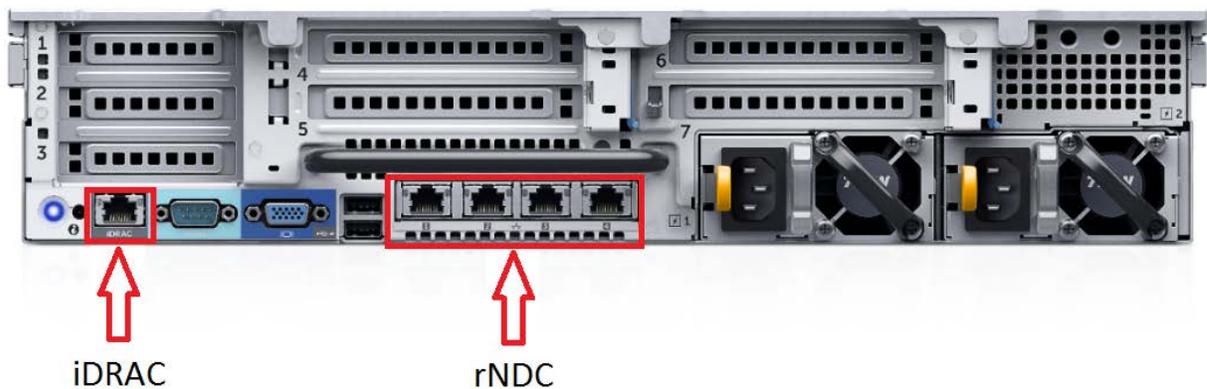


Figure 6     Rear view of VxRail 2-RU node (1-RU node is similar)

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

VxRail optimizes network traffic by splitting it across rNDC uplinks and by using Network I/O control (NIOC) shares for different traffic types. See Appendix B 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 Guide_ for more information.

# 3 Topology options

VxRail may be deployed using a single or dual switch topology. Using a single switch provides the lowest 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 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.
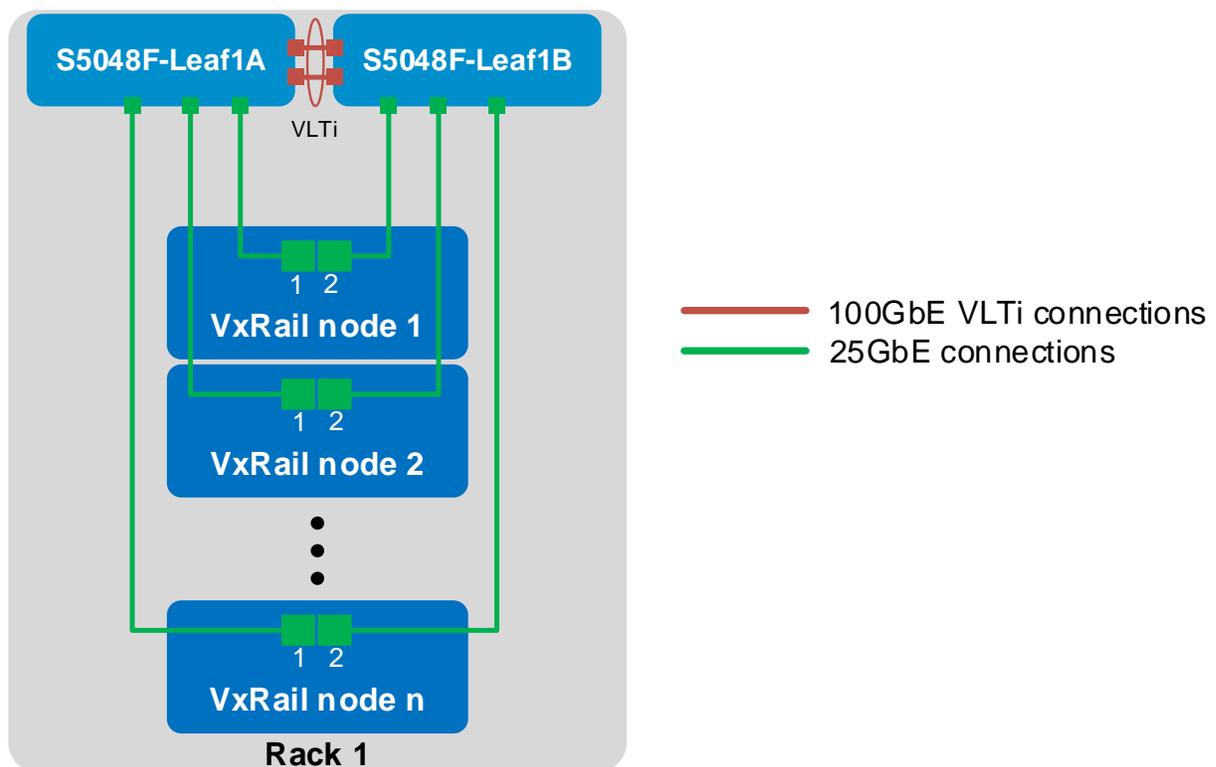


Figure 7    Dual switch topology with VLT

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

When combined with Virtual Router Redundancy Protocol (VRRP), a dual switch topology with VLT provides more efficient Layer 3 forwarding than if VLT is not used. Packets coming from vmnics that are connected to the backup VRRP router are forwarded by the backup VRRP router, instead of crossing the VLTi to get to the VRRP master router. In a dual switch topology without VLT, packets coming from vmnics that are connected to the backup VRRP router must be sent over the inter-switch port channel to be forwarded by the master VRRP router.

**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 on VLT, see the _Dell Networking OS Configuration Guide for the S5048F-ON System_. Guides for other switch models are available at http://www.dell.com/support.

## 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.
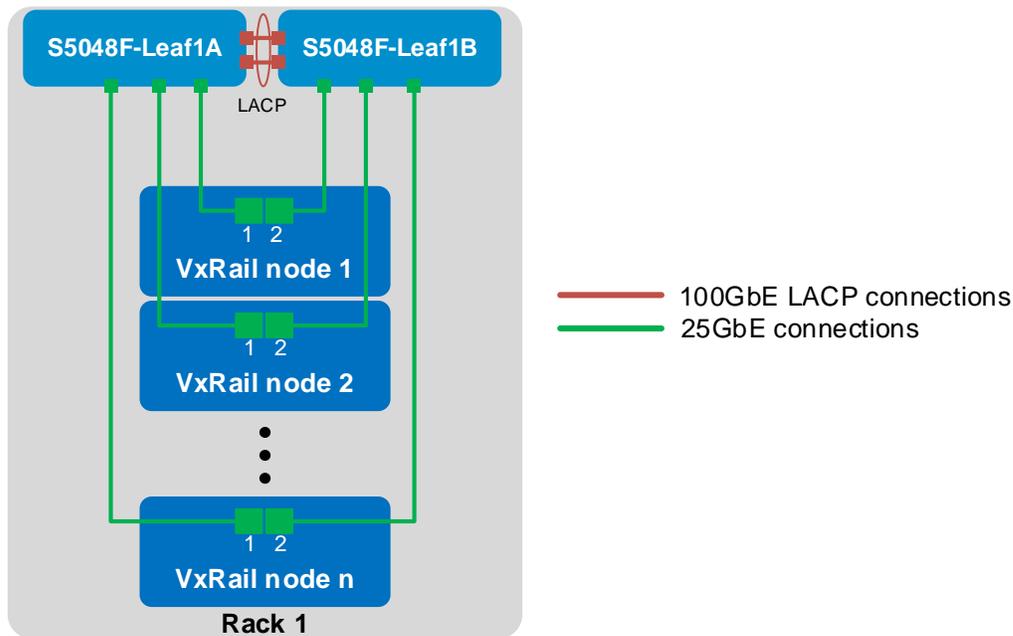


Figure 8    Dual switch topology without VLT

## 3.2 Single switch

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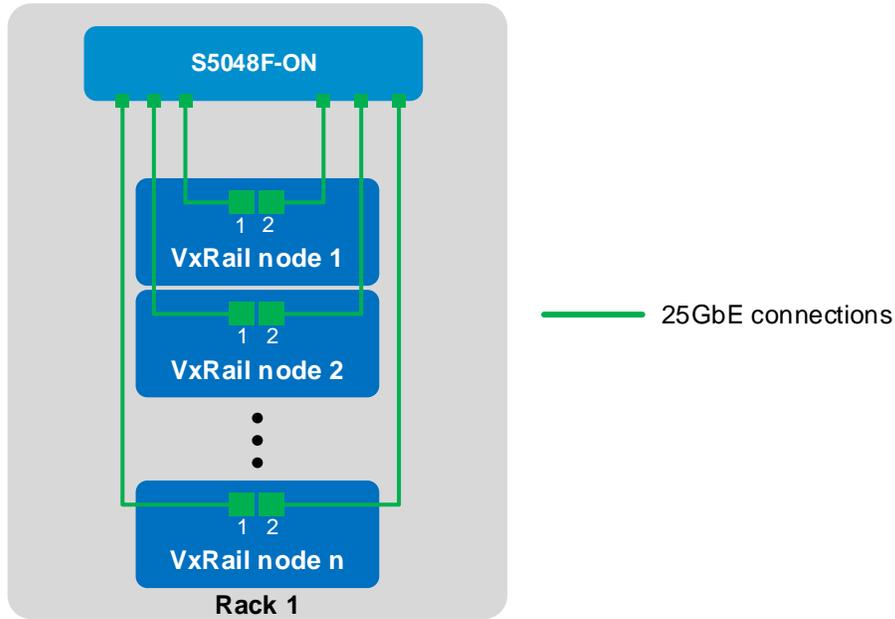


Figure 9    Single switch topology

# 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.
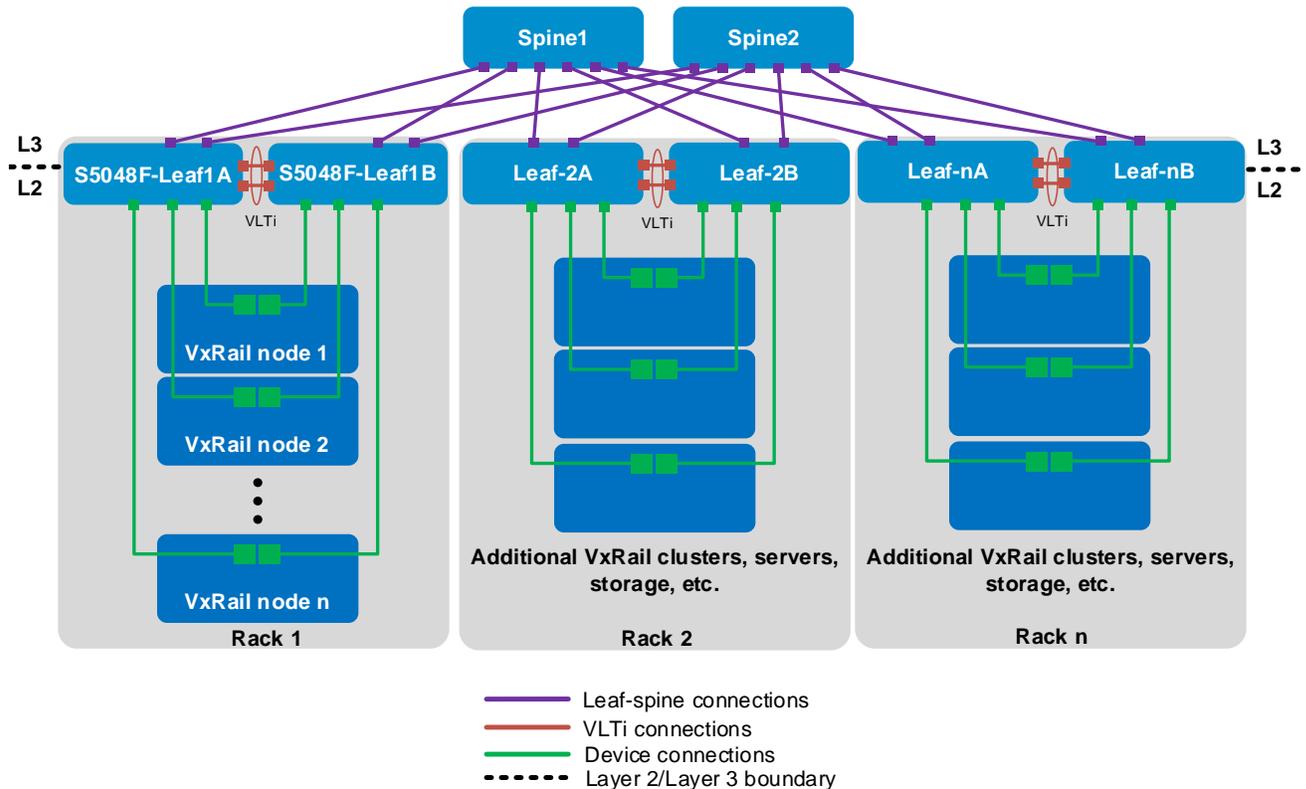


Figure 10    Dual switch topology with VLT connected to a leaf-spine network

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 Documentation release 4.3 recommends isolating vSAN traffic to its own Layer 2 network segment. 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 Leaf-Spine Deployment and Best Practices Guide*.

## 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 via their dedicated hardware management ports. It is also commonly used to carry heartbeat messages sent between switches configured as VLT peers.

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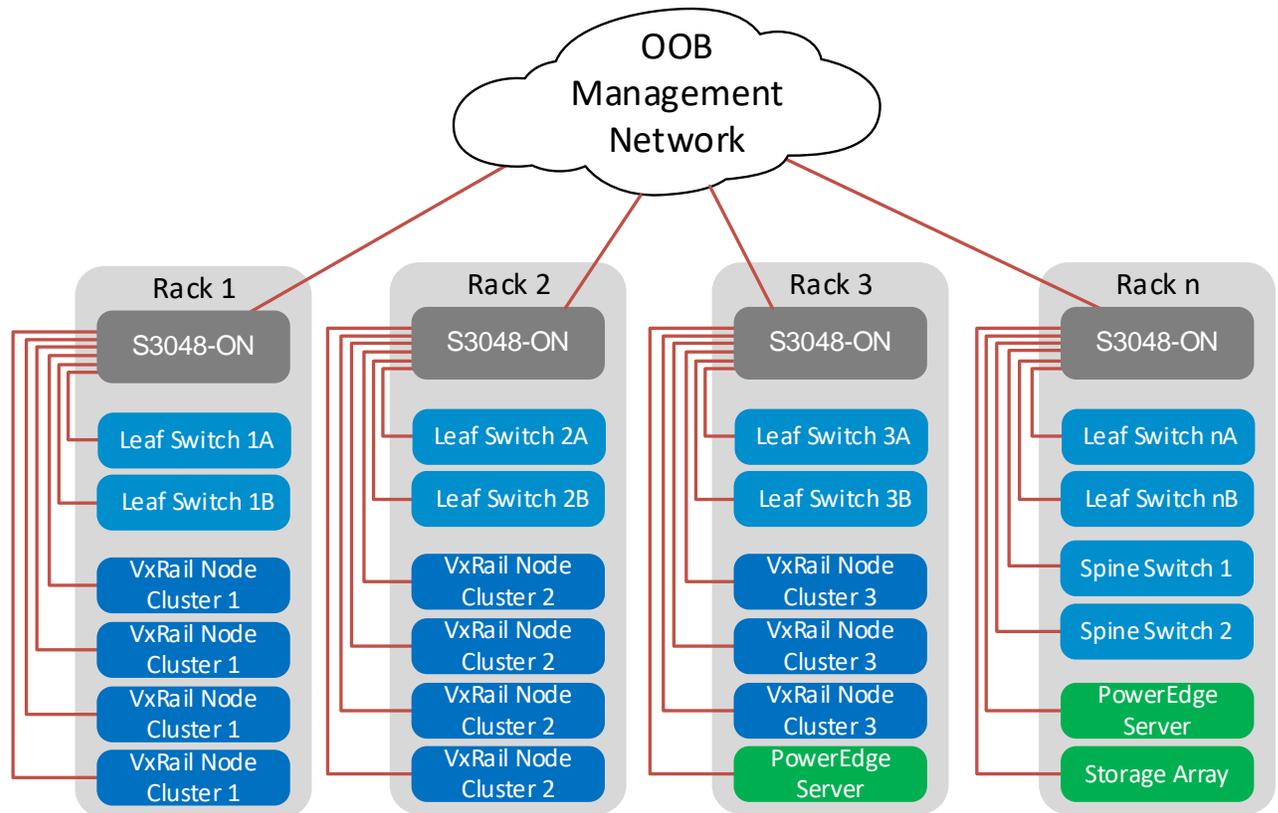


Figure 11    OOB management network connections

**Note**: This guide focuses on the devices in Rack 1. Devices shown in other racks are for illustration 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:** This is not to be confused with the in-band management network which runs on the same physical network as other VxRail and end-user traffic. In-band connections are covered in Section 3.

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 four or more VLANs as shown in Table 1.

Table 1     VLANs used for VxRail nodes

| VLAN | Purpose |
|---|---|
| Management | Single VLAN for in-band management traffic used for VxRail node-to-node, ESXi host management, vCenter server, NTP, DNS, and VxRail management traffic |
| vMotion | Single VLAN for virtual machine (VM) migration |
| vSAN | Single VLAN for vSAN storage traffic |
| VM Network(s) | One or more VLANs for VM data traffic |

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

Table 2     VLANs and IP addresses

| VLAN ID | Description | Network | Gateway | VLAN Traffic |
|---|---|---|---|---|
| 1611 | In-Band 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 |

**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.

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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.

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. | **1611 (untagged)** |
| 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. | **Dell!234** |
| 32 | | | VxRail Manager and VxRail vCenter Server "administrator@vsphere.local" | **P3ll!234** |
| 33 | vMotion | | Starting address for IP pool | **172.16.12.1** |
| 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** |

| Row | | Category | Description | Values used |
|-----|--|----------|-------------|-------------|
| 39 | | | Subnet mask | **255.255.255.0** |
| 40 | | | VLAN ID | **1613** |
| 41 | VM | … (unlimited | VM Network name and VLAN ID | **VM_Network_A, 1614** |
| 42 | Networks | number) | 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) | |

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.

**Note:** For additional information on the VxRail network configuration table, see the *Dell EMC VxRail Network Guide.*

## 5.3 Using a jump box or laptop computer

For VxRail deployment, VxRail Manager is accessed via 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 for remote access.

Reserve at least one interface on a leaf switch for this connection. This interface is configured on the in-band management VLAN during switch configuration.

**Note**: More information on jump box connections is provided in Section 9.

## 5.4 DNS and NTP servers

VxRail nodes must be able to reach a correctly configured DNS server from the in-band management network 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.

Forward and reverse lookup records are created 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 |
| 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 ESXi host #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).

# 6 Switch configuration prerequisites

## 6.1 Check switch OS version

S5048F-ON switches must be running OS version 9.12(1.0) or later. Run the `show version` command to check the OS version. Dell EMC recommends upgrading to the latest release available on the Dell Networking Customer Support Portal (account required).

```
Dell#show version
Dell EMC Real Time Operating System Software
Dell EMC Operating System Version:  2.0
Dell EMC Application Software Version:  9.12(1.0)
Copyright (c) 1999-2017 by Dell Inc. All Rights Reserved.
```

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

## 6.2 Factory default configuration

The configuration commands in the sections that follow begin with S5048F-ON switches at their factory default settings. Dell EMC Networking switches running OS9 can be reset to their default configuration as follows:

```
DellEMC#restore factory-defaults stack-unit unit# clear-all
Proceed with factory settings? Confirm [yes/no]:yes
```

Factory settings are restored, and the switch reloads. After reload, enter **A** at the [A/C/L/S]: prompt as shown below to exit Bare Metal Provisioning (BMP) mode.

```
This device is in Bare Metal Provisioning (BMP) mode.
To continue with the standard manual interactive mode, it is necessary to
abort BMP.

Press A to abort BMP now.
Press C to continue with BMP.
Press L to toggle BMP syslog and console messages.
Press S to display the BMP status.
[A/C/L/S]:A

% Warning: The bmp process will stop ...

DellEMC>
```

The switch is now ready for configuration.

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# 7 Configure switches

This section covers switch configuration for S5048F-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 below. Dell EMC recommends using this topology.
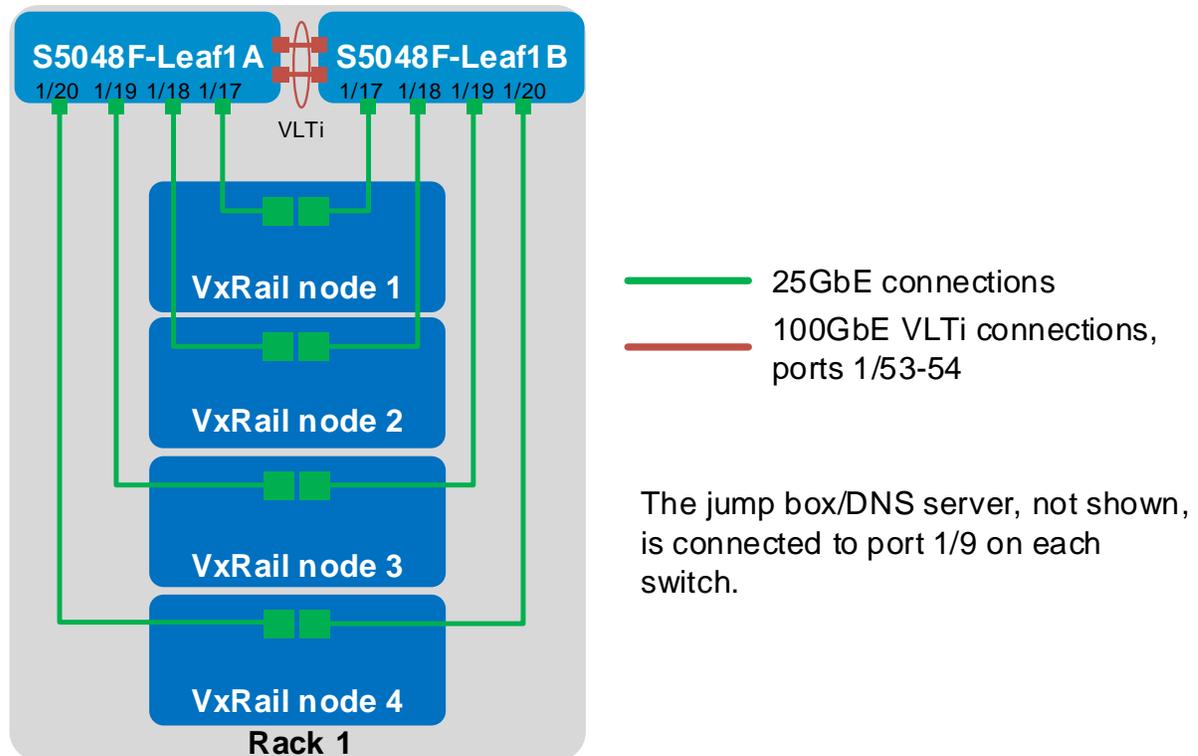


Figure 12    Four-node cluster connected to a pair of switches configured with VLT

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 **S5048F-1A-vlt.txt** and **S5048F-1B-vlt.txt**.

## 7.1.1 General settings

Configure the hostname, OOB management IP address and default gateway. Specify an NTP server accessible by the switch. Enable LLDP for troubleshooting. Enable RSTP as a precaution against loops. Configure S5048F-Leaf1A as the primary RSTP root bridge using the `bridge-priority 0` command and S5048F-Leaf1B as the secondary RSTP root bridge using the `bridge-priority 4096` command.

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Table 5    General settings – dual switch with VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| enable<br>configure terminal<br><br>hostname S5048F-Leaf1A<br><br>interface ManagementEthernet 1/1<br>ip address 100.67.172.36/24<br>no shutdown<br>management route 0.0.0.0/0<br>100.67.172.254<br><br>ntp server 100.67.10.20<br><br>protocol lldp<br>advertise management-tlv management-<br>address system-description system-name<br>advertise interface-port-desc<br><br>protocol spanning-tree rstp<br>no disable<br>bridge-priority 0 | enable<br>configure terminal<br><br>hostname S5048F-Leaf1B<br><br>interface ManagementEthernet 1/1<br>ip address 100.67.172.35/24<br>no shutdown<br>management route 0.0.0.0/0<br>100.67.172.254<br><br>ntp server 100.67.10.20<br><br>protocol lldp<br>advertise management-tlv management-<br>address system-description system-name<br>advertise interface-port-desc<br><br>protocol spanning-tree rstp<br>no disable<br>bridge-priority 4096 |

## 7.1.2    Configure interfaces

Configure the interfaces for the jump box or laptop computer connections to be used during VxRail deployment. This example uses interface twentyFiveGigE 1/9 on each switch. While only one connection is required, two are used for redundancy.

**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 switch interfaces connected to these services are configured in the same manner.

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

Use the `portmode hybrid` command to enable ports to carry both untagged (in-band management) and tagged (all other) traffic. Put the ports in Layer 2 mode with the `switchport` command. Configure ports directly connected to nodes, servers, or other endpoints as RSTP edge ports. Set flow control to "rx on tx off" on node-connected ports as a best practice.

**Note:** Flow control is enabled on all network interfaces in ESXi by default.

Table 6    Configure interfaces – dual switch with VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| interface twentyFiveGigE 1/9<br>description JumpBox_DNS<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port | interface twentyFiveGigE 1/9<br>description JumpBox_DNS<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port |

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| `no shutdown`<br><br>`interface twentyFiveGigE 1/17`<br>`description Node1_Port1`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown`<br><br>`interface twentyFiveGigE 1/18`<br>`description Node2_Port1`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown`<br><br>`interface twentyFiveGigE 1/19`<br>`description Node3_Port1`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown`<br><br>`interface twentyFiveGigE 1/20`<br>`description Node4_Port1`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown` | `no shutdown`<br><br>`interface twentyFiveGigE 1/17`<br>`description Node1_Port2`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown`<br><br>`interface twentyFiveGigE 1/18`<br>`description Node2_Port2`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown`<br><br>`interface twentyFiveGigE 1/19`<br>`description Node3_Port2`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown`<br><br>`interface twentyFiveGigE 1/20`<br>`description Node4_Port2`<br>`no ip address`<br>`portmode hybrid`<br>`switchport`<br>`spanning-tree rstp edge-port`<br>`flowcontrol rx on tx off`<br>`no shutdown` |

## 7.1.3    Configure VLT

Use hundredGigE interfaces for the VLTi between the two leaf switches. This example uses hundredGigE 1/53 and 1/54. Create a port channel for the VLTi, 127 in this example, and add the interfaces using the `channel-member` command.

Create the VLT domain and add the VLTi port channel to the domain. The backup destination is the OOB management IP address of the VLT peer switch. Configure a different unit ID (0 or 1) on each switch and enable peer routing.

**Note:** Dell EMC Networking recommends that the VLTi is configured as a static LAG, without LACP, per the commands shown. For more information on VLT, see the *Dell Networking OS Configuration Guide for the S5048F-ON System*.

Table 7    Configure VLT – dual switch with VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| `interface hundredGigE 1/53`<br>`description VLTi`<br>`no ip address`<br>`no shutdown`<br><br>`interface hundredGigE 1/54`<br>`description VLTi`<br>`no ip address`<br>`no shutdown`<br><br>`interface Port-channel 127`<br>`description VLTi`<br>`no ip address`<br>`channel-member hundredGigE 1/53-1/54`<br>`no shutdown`<br><br>`vlt domain 127`<br>`peer-link port-channel 127`<br>`back-up destination 100.67.172.35`<br>`unit-id 0`<br>`peer-routing` | `interface hundredGigE 1/53`<br>`description VLTi`<br>`no ip address`<br>`no shutdown`<br><br>`interface hundredGigE 1/54`<br>`description VLTi`<br>`no ip address`<br>`no shutdown`<br><br>`interface Port-channel 127`<br>`description VLTi`<br>`no ip address`<br>`channel-member hundredGigE 1/53-1/54`<br>`no shutdown`<br><br>`vlt domain 127`<br>`peer-link port-channel 127`<br>`back-up destination 100.67.172.36`<br>`unit-id 1`<br>`peer-routing` |

## 7.1.4    Configure VLANs

In this section, VLANs are configured per Table 2.

Assign an IP address to the in-band management VLAN. Add the interfaces connected to the VxRail nodes and jump box as untagged members of the in-band management VLAN. Configure VRRP to provide gateway redundancy and assign the same virtual address to both switches. The switch with the largest priority value becomes the master VRRP router.

**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 switch interfaces connected to these services are also added to the in-band management VLAN.

Add the VxRail node interfaces as tagged members of the vMotion, vSAN, and VM Network VLANs.

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

Table 8    Configure VLANs – dual switch with VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| `interface Vlan 1611`<br>`description InBand_Mgmt`<br>`ip address 172.16.11.253/24`<br>`untagged twentyFiveGigE 1/9,1/17-1/20`<br>`vrrp-group 11`<br>`virtual-address 172.16.11.254`<br>`priority 150`<br>`no shutdown` | `interface Vlan 1611`<br>`description InBand_Mgmt`<br>`ip address 172.16.11.252/24`<br>`untagged twentyFiveGigE 1/9,1/17-1/20`<br>`vrrp-group 11`<br>`virtual-address 172.16.11.254`<br>`priority 100`<br>`no shutdown` |

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| `interface Vlan 1612`<br>`description vMotion`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`interface Vlan 1613`<br>`description vSAN`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`interface Vlan 1614`<br>`description VM_Network_A`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`interface Vlan 1615`<br>`description VM_Network_B`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`end`<br>`write memory` | `interface Vlan 1612`<br>`description vMotion`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`interface Vlan 1613`<br>`description vSAN`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`interface Vlan 1614`<br>`description VM_Network_A`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`interface Vlan 1615`<br>`description VM_Network_B`<br>`no ip address`<br>`tagged twentyFiveGigE 1/17-1/20`<br>`no shutdown`<br><br>`end`<br>`write memory` |

## 7.2     Dual switch without VLT

This example uses a four-node VxRail cluster connected to a switch pair without VLT as shown below.
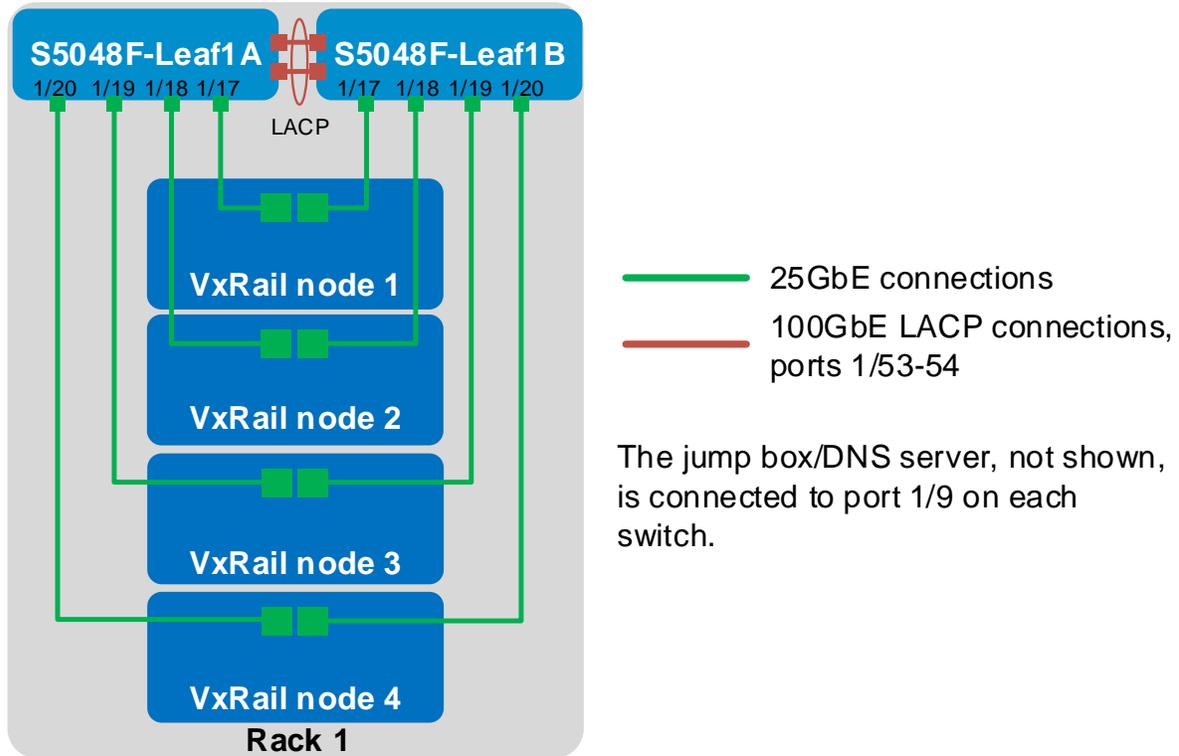


Figure 13     Four-node cluster connected to a switch pair without VLT

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 **S5048F-1A-no-vlt.txt** and **S5048F-1B-no-vlt.txt**.

### 7.2.1     General settings

Configure the hostname, OOB management IP address and default gateway. Specify an NTP server accessible by the switch. Enable LLDP for troubleshooting. Enable RSTP as a precaution against loops. Configure S5048F-Leaf1A as the primary RSTP root bridge using the `bridge-priority 0` command and S5048F-Leaf1B as the secondary RSTP root bridge using the `bridge-priority 4096` command.

Table 9     General settings - dual switch without VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| enable<br>configure terminal<br><br>hostname S5048F-Leaf1A | enable<br>configure terminal<br><br>hostname S5048F-Leaf1B |

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| interface ManagementEthernet 1/1<br>ip address 100.67.172.36/24<br>no shutdown<br>management route 0.0.0.0/0<br>100.67.172.254<br><br>ntp server 100.67.10.20<br><br>protocol lldp<br>advertise management-tlv management-<br>address system-description system-name<br>advertise interface-port-desc<br><br>protocol spanning-tree rstp<br>no disable<br>bridge-priority 0 | interface ManagementEthernet 1/1<br>ip address 100.67.172.35/24<br>no shutdown<br>management route 0.0.0.0/0<br>100.67.172.254<br><br>ntp server 100.67.10.20<br><br>protocol lldp<br>advertise management-tlv management-<br>address system-description system-name<br>advertise interface-port-desc<br><br>protocol spanning-tree rstp<br>no disable<br>bridge-priority 4096 |

## 7.2.2    Configure interfaces

Configure the interfaces for the jump box or laptop computer connections to be used during VxRail deployment. This example uses interface twentyFiveGigE 1/9 on each switch. While only one connection is required, two are used for redundancy.

**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 switch interfaces connected to these services are configured in the same manner.

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

Use the `portmode hybrid` command to enable ports to carry both untagged (in-band management) and tagged (all other) traffic. Put the ports in Layer 2 mode with the `switchport` command. Configure ports directly connected to nodes, servers, or other endpoints as RSTP edge ports. Set flow control to "rx on tx off" on node-connected ports as a best practice.

**Note:** Flow control is enabled on all network interfaces in ESXi by default.

Table 10    Configure interfaces – dual switch without VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| interface twentyFiveGigE 1/9<br>description JumpBox_DNS<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>no shutdown<br><br>interface twentyFiveGigE 1/17<br>description Node1_Port1<br>no ip address<br>portmode hybrid | interface twentyFiveGigE 1/9<br>description JumpBox_DNS<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>no shutdown<br><br>interface twentyFiveGigE 1/17<br>description Node1_Port2<br>no ip address<br>portmode hybrid |

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| ```<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br><br>interface twentyFiveGigE 1/18<br>description Node2_Port1<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br><br>interface twentyFiveGigE 1/19<br>description Node3_Port1<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br><br>interface twentyFiveGigE 1/20<br>description Node4_Port1<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br>``` | ```<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br><br>interface twentyFiveGigE 1/18<br>description Node2_Port2<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br><br>interface twentyFiveGigE 1/19<br>description Node3_Port2<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br><br>interface twentyFiveGigE 1/20<br>description Node4_Port2<br>no ip address<br>portmode hybrid<br>switchport<br>spanning-tree rstp edge-port<br>flowcontrol rx on tx off<br>no shutdown<br>``` |

## 7.2.3 Configure the switch interconnect

Use hundredGigE interfaces for the port channel between the two leaf switches. This example uses hundredGigE 1/53 and 1/54. Configure the interfaces for LACP and add them to the same port channel. 127 is used in this example. Put the port channel in hybrid mode to carry both untagged (in-band management) and tagged (all other) traffic.

Table 11   Configure switch interconnect - dual switch without VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| ```<br>interface hundredGigE 1/53<br>description To Leaf1B<br>no ip address<br>port-channel-protocol lacp<br>port-channel 127 mode active<br>no shutdown<br><br>interface hundredGigE 1/54<br>description To Leaf1B<br>no ip address<br>port-channel-protocol lacp<br>port-channel 127 mode active<br>no shutdown<br>``` | ```<br>interface hundredGigE 1/53<br>description To Leaf1A<br>no ip address<br>port-channel-protocol lacp<br>port-channel 127 mode active<br>no shutdown<br><br>interface hundredGigE 1/54<br>description To Leaf1A<br>no ip address<br>port-channel-protocol lacp<br>port-channel 127 mode active<br>no shutdown<br>``` |

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| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| ```
interface Port-channel 127
description To Leaf1B
no ip address
portmode hybrid
switchport
no shutdown
``` | ```
interface Port-channel 127
description To Leaf1A
no ip address
portmode hybrid
switchport
no shutdown
``` |

## 7.2.4    Configure VLANs

In this section, VLANs are configured per Table 2.

Assign an IP address to the in-band management VLAN. Add the interfaces connected to the VxRail nodes and jump box as untagged members of the in-band management VLAN. Also add the port channel connecting the two switches. Configure VRRP to provide gateway redundancy and assign the same virtual address to both switches. The switch with the largest priority value becomes the master VRRP router.

**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 switch interfaces connected to these services are also added to the in-band management VLAN.

Add the VxRail node interfaces and the port channel as tagged members of the vMotion, vSAN, and VM Network VLANs.

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

Table 12    Configure VLANs - dual switch without VLT

| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| ```
interface Vlan 1611
description InBand_Mgmt
ip address 172.16.11.253/24
untagged twentyFiveGigE 1/9,1/17-1/20
untagged Port-channel 127
vrrp-group 11
virtual-address 172.16.11.254
priority 150
no shutdown

interface Vlan 1612
description vMotion
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown

interface Vlan 1613
description vSAN
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown
``` | ```
interface Vlan 1611
description InBand_Mgmt
ip address 172.16.11.252/24
untagged twentyFiveGigE 1/9,1/17-1/20
untagged Port-channel 127
vrrp-group 11
virtual-address 172.16.11.254
priority 100
no shutdown

interface Vlan 1612
description vMotion
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown

interface Vlan 1613
description vSAN
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown
``` |

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| S5048F-Leaf1A | S5048F-Leaf1B |
|---|---|
| ```
interface Vlan 1614
description VM_Network_A
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown

interface Vlan 1615
description VM_Network_B
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown

end
write memory
``` | ```
interface Vlan 1614
description VM_Network_A
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown

interface Vlan 1615
description VM_Network_B
no ip address
tagged twentyFiveGigE 1/17-1/20
tagged Port-channel 127
no shutdown

end
write memory
``` |

## 7.3 Single switch

This example uses a four-node VxRail cluster connected to a single switch as shown below.



25GbE connections

The jump box/DNS server, not shown, is connected to ports 1/9 and 1/10.

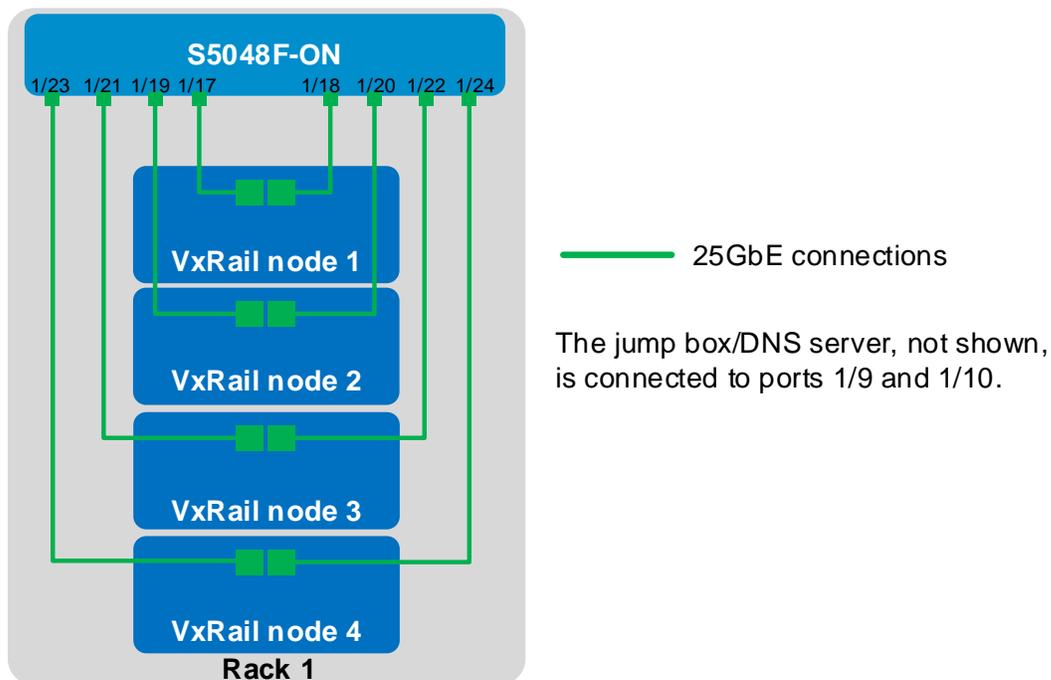Figure 14    Four-node cluster connected to a single switch

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 **S5048F-single-switch.txt**.

## 7.3.1 General settings

Configure the hostname, OOB management IP address and default gateway. Specify an NTP server accessible by the switch. Enable LLDP for troubleshooting. Enable RSTP as a precaution against loops.

Table 13    General settings – single switch

| S5048F-ON |
|---|
| ```
enable
configure terminal

hostname S5048F-ON

interface ManagementEthernet 1/1
ip address 100.67.172.36/24
no shutdown
management route 0.0.0.0/0 100.67.172.254

ntp server 100.67.10.20

protocol lldp
advertise management-tlv management-address
system-description system-name
advertise interface-port-desc

protocol spanning-tree rstp
no disable
``` |

## 7.3.2 Configure interfaces

Configure the interfaces for the jump box or laptop computer connections to be used during VxRail deployment. This example uses interfaces twentyFiveGigE 1/9 and 1/10. While only one connection is required, two are used for redundancy.

---

**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 switch interfaces connected to these services are configured in the same manner.

---

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

Use the `portmode hybrid` command to enable ports to carry both untagged (in-band management) and tagged (all other) traffic. Put the ports in Layer 2 mode with the `switchport` command. Configure ports directly connected to nodes, servers, or other endpoints as RSTP edge ports. Set flow control to "rx on tx off" on node-connected ports as a best practice.

---

**Note:** Flow control is enabled on all network interfaces in ESXi by default.

---

Table 14    Configure interfaces – single switch

| S5048F-ON |
|---|
| ```
interface twentyFiveGigE 1/9
description JumpBox_DNS
no ip address
``` |

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**S5048F-ON**

```
portmode hybrid
switchport
spanning-tree rstp edge-port
no shutdown

interface twentyFiveGigE 1/10
description JumpBox_DNS
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
no shutdown

interface twentyFiveGigE 1/17
description Node1_Port1
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown

interface twentyFiveGigE 1/18
description Node1_Port2
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown

interface twentyFiveGigE 1/19
description Node2_Port1
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown

interface twentyFiveGigE 1/20
description Node2_Port2
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown

interface twentyFiveGigE 1/21
description Node3_Port1
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
```

| S5048F-ON |
|---|
| ```
no shutdown

interface twentyFiveGigE 1/22
description Node3_Port2
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown

interface twentyFiveGigE 1/23
description Node4_Port1
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown

interface twentyFiveGigE 1/24
description Node4_Port2
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
flowcontrol rx on tx off
no shutdown
``` |

### 7.3.3    Configure VLANs

In this section, VLANs are configured per Table 2.

Assign an IP address to the in-band management VLAN. Add the interfaces connected to the nodes and jump box as untagged members of the in-band 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 switch interfaces connected to these services are also added to the in-band management VLAN.

Add the VxRail node interfaces as tagged members of the vMotion, vSAN, and VM Network VLANs.

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

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Table 15    Configure VLANs – single switch

| S5048F-ON |
|---|
| ```
interface Vlan 1611
description InBand_Mgmt
ip address 172.16.11.254/24
untagged twentyFiveGigE 1/9-1/10,1/17-1/24
no shutdown

interface Vlan 1612
description vMotion
no ip address
tagged twentyFiveGigE 1/17-1/24
no shutdown

interface Vlan 1613
description vSAN
tagged twentyFiveGigE 1/17-1/24
no shutdown

interface Vlan 1614
description VM_Network_A
no ip address
tagged twentyFiveGigE 1/17-1/24
no shutdown

interface Vlan 1615
description VM_Network_B
no ip address
tagged twentyFiveGigE 1/17-1/24
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 below are for S5048F-Leaf1A in the dual switch with VLT topology. The output of its peer, S5048F-Leaf1B, is similar. If the dual switch without VLT or single switch topologies are 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 the *Dell EMC Leaf-Spine Deployment and Best Practices Guide*.

### 8.1.1 show interfaces status

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

```
S5048F-Leaf1A#show interfaces status | grep Up
Tf 1/9            JumpBox_DNS  Up    10000 Mbit   Full   1611
Tf 1/17           Node1_Port1  Up    25000 Mbit   Full   1611-1615
Tf 1/18           Node2_Port1  Up    25000 Mbit   Full   1611-1615
Tf 1/19           Node3_Port1  Up    25000 Mbit   Full   1611-1615
Tf 1/20           Node4_Port1  Up    25000 Mbit   Full   1611-1615
Hu 1/53           VLTi         Up    100000 Mbit  Full   --
Hu 1/54           VLTi         Up    100000 Mbit  Full   --
```

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

### 8.1.2 show interfaces port-channel brief

The show interfaces port-channel brief command is used to view port channel numbers, interfaces used, and status. In this example, LAG 127 is the VLTi connecting the two leaf switches.

```
S5048F-Leaf1A#show interfaces port-channel brief
Codes: L - LACP Port-channel
       O - OpenFlow Controller Port-channel
       A - Auto Port-channel
       I - Internally Lagged

    LAG  Mode  Status        Uptime      Ports
    127  L2    up            00:00:50    Hu 1/53    (Up)
                                         Hu 1/54    (Up)
```

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**Note:** The command output for the dual switch without VLT topology is shown below. In this example, `LAG 127` is the LACP port channel used as the switch interconnect.

```
S5048F-Leaf1A#show interfaces port-channel brief
Codes: L - LACP Port-channel
       O - OpenFlow Controller Port-channel
       A - Auto Port-channel
       I - Internally Lagged


   LAG  Mode  Status        Uptime       Ports
L  127  L2L3  up            00:04:11     Hu 1/53    (Up)
                                         Hu 1/54    (Up)
```

## 8.1.3 show vlan

The `show vlan` command is used to view interfaces assigned to each VLAN and whether the interfaces are untagged (U), tagged (T), or VLT (V).

```
S5048F-Leaf1A#show vlan

Codes: * - Default VLAN, G - GVRP VLANs, R - Remote Port Mirroring VLANs, P -
Primary, C - Community, I - Isolated
       O - Openflow, Vx - Vxlan
Q: U - Untagged, T - Tagged
   x - Dot1x untagged, X - Dot1x tagged
   o - OpenFlow untagged, O - OpenFlow tagged
   G - GVRP tagged, M - Vlan-stack
   i - Internal untagged, I - Internal tagged, v - VLT untagged, V - VLT tagged


   NUM     Status     Description                      Q Ports
*  1       Active                                      U Po127(Hu 1/53,1/54)
   1611    Active     InBand_Mgmt                      V Po127(Hu 1/53,1/54)
                                                       U Tf 1/9,1/17-1/20
   1612    Active     vMotion                          V Po127(Hu 1/53,1/54)
                                                       T Tf 1/17-1/20
   1613    Active     vSAN                             V Po127(Hu 1/53,1/54)
                                                       T Tf 1/17-1/20
   1614    Active     VM_Network_A                     V Po127(Hu 1/53,1/54)
                                                       T Tf 1/17-1/20
   1615    Active     VM_Network_B                     V Po127(Hu 1/53,1/54)
                                                       T Tf 1/17-1/20
```

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

```
    NUM    Status    Description                    Q Ports
*   1      Inactive
    1611   Active    InBand_Mgmt                    U Po127(Hu 1/53,1/54)
                                                    U Tf 1/9,1/17-1/20
    1612   Active    vMotion                        T Po127(Hu 1/53,1/54)
                                                    T Tf 1/17-1/20
    1613   Active    vSAN                           T Po127(Hu 1/53,1/54)
                                                    T Tf 1/17-1/20
    1614   Active    VM_Network_A                   T Po127(Hu 1/53,1/54)
                                                    T Tf 1/17-1/20
    1615   Active    VM_Network_B                   T Po127(Hu 1/53,1/54)
                                                    T Tf 1/17-1/20
```

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

```
    NUM    Status    Description                    Q Ports
*   1      Inactive
    1611   Active    InBand_Mgmt                    U Tf 1/9-1/10,1/17-1/24
    1612   Active    vMotion                        T Tf 1/17-1/24
    1613   Active    vSAN                           T Tf 1/17-1/24
    1614   Active    VM_Network_A                   T Tf 1/17-1/24
    1615   Active    VM_Network_B                   T Tf 1/17-1/24
```

## 8.1.4  show lldp neighbors

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

```
S5048F-Leaf1A#show lldp neighbors
Loc PortID     Rem Host Name     Rem Port Id               Rem Chassis Id
---------------------------------------------------------------------------
Tf 1/9         -                 00:0a:f7:38:ba:a0         00:0a:f7:38:ba:a0
Tf 1/17        Broadcom Adv. D...00:0a:f7:b6:15:d0         00:0a:f7:b6:15:d0
Tf 1/18        Broadcom Adv. D...00:0a:f7:b6:1a:80         00:0a:f7:b6:1a:80
Tf 1/19        Broadcom Adv. D...00:0a:f7:b6:11:c0         00:0a:f7:b6:11:c0
Tf 1/20        Broadcom Adv. D...00:0a:f7:b6:1c:10         00:0a:f7:b6:1c:10
Hu 1/53        S5048F-Leaf1B     hundredGigE 1/53          d8:9e:f3:bb:d6:20
Hu 1/54        S5048F-Leaf1B     hundredGigE 1/54          d8:9e:f3:bb:d6:20
Ma 1/1         Mgmt-Rack172      Gi1/0/42                  28:f1:0e:ef:dd:88
```

**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 1/53-54 are not used.

## 8.1.5 show vrrp brief

In this deployment, VRRP is configured on the in-band management VLAN, 1611, to provide gateway redundancy for management traffic. The output from the **show vrrp brief** command shows the local 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 `Pri` column, becomes the master.

```
S5048F-Leaf1A#show vrrp brief

Interface   Group    Pri Pre State  Master addr     Virtual addr(s)  Description
-----------------------------------------------------------------------------
Vl 1611     IPv4 11  150 Y    Master 172.16.11.253   172.16.11.254
```

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

## 8.2 VLT validation commands

The following commands are only applicable to the dual switch with VLT topology.

## 8.2.1 show vlt brief

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. The Inter-chassis link (`ICL`) `Link Status`, `Heart Beat Status` and `VLT Peer Status` must all be `Up`. Ensure `Peer-Routing` is `Enabled`.

```
S5048F-Leaf1A#show vlt brief
 VLT Domain Brief
 ------------------
 Domain ID:                   127
 Role:                        Primary
 Role Priority:               32768
 ICL Link Status:             Up
 HeartBeat Status:            Up
 VLT Peer Status:             Up
 Local Unit Id:               0
 Version:                     6(7)
 Local System MAC address:    d8:9e:f3:a7:26:20
 Remote System MAC address:   d8:9e:f3:bb:d6:20
 Remote system version:       6(7)
 Delay-Restore timer:         90 seconds
 Delay-Restore Abort Threshold: 60 seconds
 Peer-Routing :               Enabled
 Peer-Routing-Timeout timer:  0 seconds
 Multicast peer-routing timeout: 150 seconds
```

## 8.2.2 show vlt 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.

```
S5048F-Leaf1A#show vlt backup-link
 VLT Backup Link
 -----------------
 Destination:                 100.67.172.35
 Peer HeartBeat status:       Up
 Destination VRF:             default
 HeartBeat Timer Interval:    1
 HeartBeat Timeout:           3
 UDP Port:                    34998
 HeartBeat Messages Sent:     345
 HeartBeat Messages Received: 298
```

## 8.2.3 show vlt mismatch

This command highlights any potential configuration issues between VLT peers. Mismatch examples include incompatible VLT settings, VLAN differences, different switch operating system versions and STP inconsistencies. There should be no output to this command. If there is output, resolve the mismatch reported.

```
S5048F-Leaf1A#show vlt mismatch
S5048F-Leaf1A#
```

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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 plugged into a leaf switch or able to logically reach the VxRail in-band 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 in-band 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 at the same time 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.
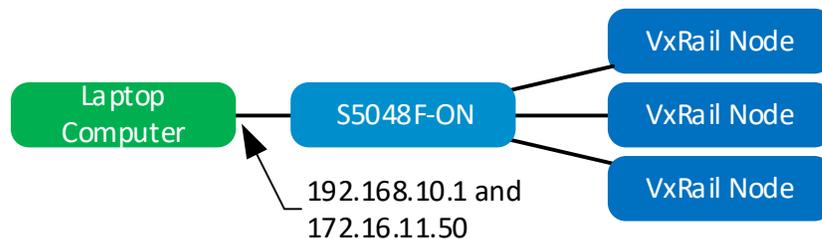
Figure 15    Use of a laptop computer for deployment

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 via the iDRAC virtual console.
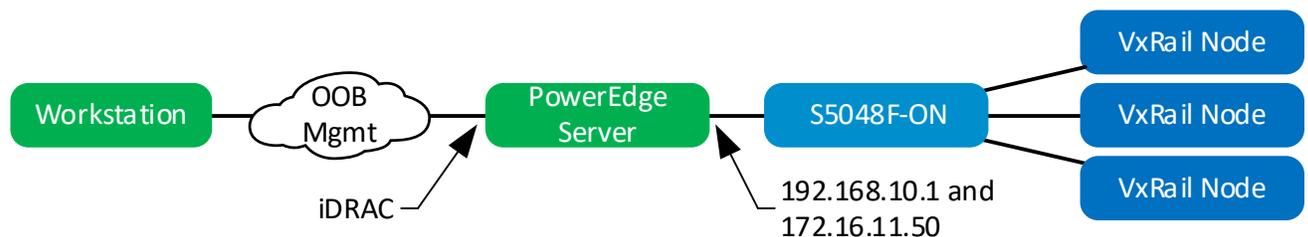
Figure 16    PowerEdge server as a jump box

**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.

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:** VxRail installation steps are beyond the scope of this guide.

# A      Validated components

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

## A.1      Dell EMC Networking Switches

Table 16      Switches and OS versions

| Qty | Item | OS Version |
|---|---|---|
| 2 | Dell EMC Networking S5048F-ON leaf switches | 9.12.1.0 |
| 1 | Dell EMC Networking S3048-ON management switch | 9.13.0.3 |

## A.2      VxRail P570 nodes

A cluster of four VxRail P570 nodes was used to validate the examples in this guide. The nodes were each configured as shown in the table below.

Table 17      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) | |
| 3 | 800GB SAS SSD | |
| 10 | 1.2TB SAS HDD | |
| 1 | Dell HBA330 Storage Controller | 13.17.03.05 |
| 1 | Boot Optimized Storage Solution (BOSS) Controller w/ 2x240GB SATA SSDs | 2.5.13.2008 |
| 1 | Broadcom 57414 rNDC –  2x25GbE SFP28 ports | 20.06.05.11 |
| - | BIOS | 1.2.11 |
| - | iDRAC with Lifecycle Controller | 3.15.17.15 |

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## A.3     VxRail Appliance software

This deployment guide was developed using VxRail Appliance software 4.5.200. It consists of the component versions shown in Table 18.

Table 18     VxRail Appliance software component versions

| Item | Version |
|---|---|
| VxRail Manager | 4.5.200.7769314 |
| VMware ESXi | 6.5.0 Update 1 Patch 36, build 7388607 |
| VMware vCenter Server Appliance | 6.5 Update 1e, build 7515524 |
| VMware vSAN | 6.6.1 Patch 02 |
| VMware vRealize Log Insight | 4.3, build 5084751 |

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# B VxRail network adapter traffic optimization

VxRail optimizes network traffic by splitting traffic across rNDC uplinks and by using NIOC shares. Based on traffic type, uplinks are configured as active or standby, and NIOC shares are used to allocate network bandwidth. Uplink load balancing and NIOC shares are automatically configured by VxRail.

Table 19    Network traffic on E, P, S and V Series 14G nodes with 2x10GbE or 2x25GbE ports

| Traffic Type | Requirement* | Uplink 1 (10 or 25GbE) VMNIC0 | Uplink 2 (10 or 25GbE) VMNIC1 | NIOC Shares |
|---|---|---|---|---|
| Management | IPv6 multicast | Active | Standby | 20 |
| vSphere VMotion | | Active | Standby | 50 |
| vSAN | IPv4 unicast | Standby | Active | 100 |
| Virtual Machines | | Active | Standby | 30 |

Table 20    Network traffic on E, P, S and V Series 14G nodes with 4x10GbE ports

| Traffic Type | Requirement* | Uplink 1 (10GbE) VMNIC0 | Uplink 2 (10GbE) VMNIC1 | Uplink 3 (10GbE) VMNIC2 | Uplink 4 (10GbE) VMNIC3 | NIOC Shares |
|---|---|---|---|---|---|---|
| Management | IPv6 multicast | Active | Standby | Unused | Unused | 40 |
| vSphere VMotion | | Unused | Unused | Standby | Active | 50 |
| vSAN | IPv4 unicast | Unused | Unused | Active | Standby | 100 |
| Virtual Machines | | Standby | Active | Unused | Unused | 60 |

Table 21    Network traffic on E and S Series 14G nodes with 4x1GbE ports

| Traffic Type | Requirement* | Uplink 1 (1GbE) VMNIC2 | Uplink 2 (1GbE) VMNIC3 | Uplink 3 (1GbE) VMNIC0 | Uplink 4 (1GbE) VMNIC1 | NIOC Shares |
|---|---|---|---|---|---|---|
| Management | IPv6 multicast | Standby | Active | Unused | Unused | 40 |
| vSphere VMotion | | Unused | Unused | Standby | Active | 50 |
| vSAN | IPv4 unicast | Unused | Unused | Active | Standby | 100 |
| Virtual Machines | | Active | Standby | Unused | Unused | 60 |

*Switches used must allow this traffic. Not explicitly configured on Dell EMC Networking switches.

**Note:** For additional VxRail nodes and rNDC configurations, see the *Dell EMC VxRail Network Guide*.

# C        Technical resources

Dell TechCenter is an online technical community where IT professionals have access to numerous resources for Dell EMC software, hardware, and services.

Dell EMC TechCenter Networking Guides

Manuals and documentation for Dell EMC Networking S3048-ON

Manuals and documentation for Dell EMC Networking S5048F-ON

*Dell EMC Leaf-Spine Deployment and Best Practices Guide*

*Dell EMC VxRail Network Guide*

Dell EMC VxRail support and documentation (account required)

*Dell EMC VxRail Support Matrix* (account required)

VMware Validated Design Documentation

# D    Support and feedback

**Contacting Technical Support**

Support Contact Information                    Web: http://www.dell.com/support

                                               Telephone: USA: 1-800-945-3355

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