## Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Authors</th>
</tr>
</thead>
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<tr>
<td>June 2017</td>
<td>Release 2.0 general updates and the addition of network facing uplink information.</td>
<td>Ed Blazek, Dennis Dadey</td>
</tr>
<tr>
<td>January 2017</td>
<td>Release 1.1 Update to include E Series nodes</td>
<td>Ed Blazek</td>
</tr>
<tr>
<td>December 2016</td>
<td>Initial release</td>
<td>Ed Blazek, Colin King</td>
</tr>
</tbody>
</table>

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### 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 that delivers compelling economics, faster time-to-value, linear scaling over time, and operational simplicity.

To take full advantage of the value of a 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 almost all cases, clusters connect to a pre-existing IP network at the customer site. The inclusion of dedicated switches for a VxRail cluster can massively simplify this process and avoid many of the pitfalls associated with the deployment of a hyper-converged solution that originates in network connectivity.

The audience for this deployment guide is professional services personnel responsible for the deployment of the VxRail cluster when a pair of dedicated Dell EMC Networking S4048-ON switches is purchased along with the cluster. The deployment guide covers the process of connecting a cluster of VxRail nodes (minimum of three nodes, maximum of 64 nodes) to the pair of Dell EMC Networking S4048-ON switches in a high-availability configuration, and configuring those switches to connect to the customer’s IP network. An overview of a VxRail node with dual S4048-ON Top-of-Rack (ToR) leaf switches shown in Figure 1.

![VxRail cluster with dual S4048-ON Top-of-Rack switches](image)

**Figure 1** VxRail cluster with dual S4048-ON Top-of-Rack switches
1.1 S4048-ON or S4048T-ON switch

The Dell EMC Networking S4048-ON is a 1RU (Rack-Unit) high-density 10/40GbE, leaf switch with 48 dual-speed, 1/10GbE SFP+ (S4048T-ON with BaseT) ports and six, 40GbE (QSFP+) uplinks. This switch uses a non-blocking and cut-through switching architecture to provide ultra-low-latency performance for applications.

This deployment guide walks you through the steps to add a single cluster of VxRail nodes to either one or two S4048-ON, ToR switches.

Most customers install unique VxRail clusters in separate racks. If you are adding more than one cluster in the same rack, print out copies of the VLAN worksheets and fill them out separately for each cluster. For the additional clusters, refer to the S4048-ON port assignments shown in Table 1 and use the next available ports for each additional cluster.

1.2 Z9100-ON switch

The Z9100-ON is a 1RU Layer 2/3 switch with 32 ports supporting 10/25/40/50/100GbE. Two Z9100-ON switches are used as upstream spine switches in this deployment guide.
1.3 **S3048-ON switch**

The S3048-ON is a 1RU Layer 2/3 switch with 48, 1GbE Base-T ports. One S3048-ON switch is used for management traffic in this deployment guide.

![S3048-ON front view](image)

**Figure 5**  S3048-ON front view

1.4 **VxRail P Series Nodes**

The VxRail P Series is a single or dual socket 2RU node. The VxRail P Series nodes are optimized for heavy workloads such as databases. P Series nodes can be configured with up to four disk groups and offer high-power, high core count, and high clock speed processors.

![VxRail P Series Node front view](image)

**Figure 6**  VxRail P Series Node front view

1.5 **VxRail V Series Nodes**

The VxRail V Series is a dual socket 2RU node. The VxRail V Series nodes are graphics ready nodes with support for up to 2 graphics accelerators which may be added later, allowing clients to buy and scale. These nodes are best suited for specialized use cases such as high-end 2D/3D visualization.

![VxRail V Series Node front view](image)

**Figure 7**  VxRail V Series Node front view

1.6 **VxRail S Series Nodes**

The VxRail S Series is a single or dual socket 2RU node. The VxRail S Series nodes are capacity-optimized nodes with expanded storage for use cases such as virtualized Microsoft SharePoint, Microsoft Exchange, big data, and analytics. S Series nodes utilize 3.5-inch drives, allowing for a maximum capacity of 48 TB.
The VxRail P, V and S Series supports SFP+ or BaseT network adapters. All VxRail nodes come with one onboard network daughter card (NDC). There are two supported NDCs as follows:

- Intel X520/I350T quad-port NDC - 2 x 10GbE SFP+ ports and 2 x 1GbE BaseT ports
- Intel X520/I350T quad-port NDC - 2 x 10GbE BaseT ports and 2 x 1GbE BaseT ports

The VxRail 4.0 nodes use two 10GbE NDC ports for system traffic.

1.7 VxRail E Series Nodes

The VxRail E Series low-profile node is a single or dual-socket 1RU node. The VxRail E Series nodes are best suited for remote office, stretch cluster or entry-level workloads. E Series nodes have two disk groups, providing the capacity and performance to handle a wide variety of use cases.
1.8 Basic requirements

- The customer's IP gateway address and subnet mask.
- Whether switch management is to be in-band or out-of-band.
- The IP addresses for switch management.
- The number and type of Ethernet ports required for VxRail node connectivity in a single or dual-switch configuration.
- The number and type of Ethernet ports for the S4048-ON inter-switch links (ISLs) used to interconnect the switches.
- The number and type of Ethernet ports for the S4048-ON network uplinks used to connect the switches to the customer's existing network.

There are references to in-band and out-of-band management in this deployment guide. This refers to whether switch routed management traffic is sent to an out-of-band management port on the switch (Figure 3) or whether management traffic is routed in-band to one of the other switch ports.

This deployment guide describes using the serial console management port to configure the switch via a serial cable attached to a laptop. In this initial configuration, the switch will be configured for either in-band or out-of-band management.

This deployment guide requires no working knowledge of the S4048-ON switch; it walks the installer through all required steps. Even though some commands or terms may be unfamiliar to the installer, this deployment guide requires no working knowledge of the S4048-ON switch and walks the reader through the configuration step-by-step.

In addition, successful configuration requires connectivity to and basic knowledge of the customer’s network and connectivity to the management network.
2  Network topologies

A VxRail deployment can be deployed using a single-switch or with a dual-switch configuration. The single-switch provides the lowest cost option but creates a single point of failure. Dell EMC recommends two switches, as they provide redundancy for high availability. The following explain the difference between single-switch and dual-switch topologies and show upstream switches to highlight solution examples.

2.1  Single-switch topology

In the single-switch topology, all nodes connect to a single switch using their network ports. This topology has the advantage of lower cost, but does not protect against a switch failure. Network redundancy is only established at the link level.

![Example of a single-switch topology](image)

2.2  Dual-switch topology

This topology establishes network redundancy at both the link and the switch level. Failure of a single-switch or network link does not cause overall loss of communication.

In the dual-switch topology, each node connects to both switches in an active/standby capability. Refer to Table 6 for detailed uplink information. The two S4048-ON switches connect together with either a VLT
configuration or a port channel configuration. VLT is preferred and is a Dell EMC Networking layer 2 multipathing technology, which allows for running a loop-free layer 2 (L2) multipath network without any blocked ports. VLT synchronizes layer 2-table information between the switches and makes the switches appear as one logical unit.

Usually a server connects to the a pair of VLT switches with a LACP LAG, however LACP is not used with VxRail nodes as the nodes are configured with a virtual switch with active and standby adapters. Other non-VxRail devices can utilize LACP LAG to the pair of VLT switches, for an active/active L2 multipathing scenario.

![Diagram of a dual-switch topology](image)

**Figure 13**  Example of a dual-switch topology

As the customer’s environment grows and VxRail nodes are added, a basic topology can easily scale up to 32 server nodes while utilizing only 64 x 10GbE ToR ports (32 x 10GbE ToR ports per switch) for connecting to the server nodes. The 6 x 40GbE ports on the S4048-ON are used for ISL ports and upstream connectivity for a potential 2:1 oversubscription ratio.

### 2.3 Dual-switch topology with Z9100-ON switches

In this setup, the Dell EMC S4048-ON switches are the ToR switches and the Z9100s are the upstream switches. This topology provides connectivity for multiple VxRail clusters utilizing L2 at the Z9100 switches.
Figure 14  Example of a VxRail cluster with upstream Z9100-ON switches
2.4 Dual-switch topology with Cisco Nexus 7004 upstream switches

In this setup, the Dell EMC S4048-ON switches are the ToR switches and the Cisco Nexus 7004s are the upstream switches.

![Diagram of dual-switch topology with Cisco Nexus 7004 upstream switches]

Figure 15 Example of a VxRail cluster with Cisco 7004 upstream switches

2.5 Management network

If the VxRail nodes are located at a data center that cannot be accessed easily, Dell EMC recommends setting up an out-of-band management switch to facilitate direct communication with each switch and node. One Dell EMC S3048-ON switch is recommended in each rack to provide connectivity for access to the
management network. Out-of-band (OOB) ports on switches and iDRAC ports on VxRail nodes connected to the S3048-ON switch for the management network.

Figure 16  Management network
3 Configuration

This deployment guide assumes that the installer has a basic familiarity with the VxRail node requirements, including the number of nodes for installation, whether the VxRail deployment uses VLANs or if all network traffic resides in a single broadcast domain. The installer should also know how many ports are available on the upstream switches from the S4048-ON and whether they are 10GbE or 40GbE ports.

- Installer laptop prerequisites:
  - Serial console port: The laptop needs to connect to the serial console port of the S4048-ON (Figure 17). A serial cable with an RJ-45 connector is provided with the S4048-ON switch for connecting to the console port of the switch. The laptop may require an adaptor.
  - Serial console software: The installer must perform the configuration via the serial port. Console access requires a terminal emulator program such as PuTTY.
  - Installer laptop rights must allow setting up and using the serial console port and terminal emulator program.
  - For more detail on configuring the serial connection to the serial console port, refer to Appendix D.

Figure 17  S4048-ON rear view

- S4048-ON configuration prerequisites:
  - DNOS 9.11(0.0) or later must be installed
  - The S4048-ON switch should be in the factory default configuration. If not, reset the switch as follows:
    - From enable mode:
      
      ```
      switch# restore factory-defaults stack-unit unit# clear-all
      Proceed with factory settings? Confirm [yes/no]: yes
      ```

    - Factory settings are restored and the switch reloads.
    - Once the switch reloads, enter A at the [A/C/L/S] prompt as shown below to exit Bare Metal Provisioning 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.
3.1  **Network configuration information**

Use the information in this section to assist in filling out the worksheets in Appendix A and Appendix B.

1. How many VxRail nodes will be deployed?
   a. Minimum of three nodes per cluster maximum or 64 nodes per cluster.
   b. Maximum node capacity varies according to optional utilization of redundant appliance NICs, support for multiple clusters, and the number of uplinks required.

2. Determine the customer’s VLAN addressing scheme. If the VLANs have not been determined, use the defaults listed below. If the network uses a single broadcast domain, skip to Step 3.
   a. **Management VLAN ID** (default = 1, the Native VLAN)
      Assign the name Management for this VLAN. The Appliance Management VLAN must be VLAN ID 1 because VxRail Appliance management traffic is untagged by default and must be forwarded on the S4048-ON Native VLAN, which is VLAN ID 1. Traffic forwarded on S4048-ON VLAN ID 1 is also untagged by default.
   b. **vSphere vMotion VLAN ID** (default = 110)
      Assign the name “vMotion” to this VLAN.
   c. **Virtual SAN VLAN ID** (default = 120)
      Assign the description “VSAN” to this VLAN.
   d. **VM Network VLANs**
      i. How many VM networks are required? (Optional, default = 1, range = 1 - 4K)
      ii. If available, use the VLAN naming and numbering defined by the customer.
      iii. If not defined, use VLAN names such as “VM Network A”, “VM Network B”, and continuing alphabetically. The VLAN IDs can start with 130, then increment by 10s. So the second is 140, third is 150, etc. If a conflict should exists with Management, vMotion or Virtual SAN VLANs, then skip to next VLAN ID number.

3. How many S4048-ON switches are going to be provisioned (1 or 2 switches)? Each switch needs uplink ports to connect to upstream switches. When using a two-switch deployment you will require ports to interconnect using ISL ports.
   a. For single-switch, go to Step 4.
   b. For dual-switch, use 40GbE ISLs. How many ports are in the trunk group (default = 2)?

4. What type and number of uplink ports are needed to connect to the upstream network?
   a. Are the ports 10GbE or 40GbE ports?
   b. How many network ports are needed?
      i. 10GbE (default = 2, range 1-6)
      ii. 40GbE (default = 2, range 1-4)

5. Will out-of-band or in-band management be used? The out-of-band Ethernet Management on the S4048-ON shown in Figure 17. You will need to ask the network administrator for the IP address, subnet mask and gateway information. The out-of-band management port is used when the customer deploys a separate out-of-band management network.
a. Management IP address (in-band or out-of-band management)
b. Management network's IP default gateway and subnet mask. (For example, 10.1.1.1/24)

3.2 Management network and initial setup

1. You will now configure the switch or switches using the parameters and values chosen and recorded in the Appendix A and Appendix B worksheets.
   a. Power-on the switch and connect the laptop's serial cable to the S4048-ON console port. No passwords or login accounts are required for console access in factory default configuration.
   b. Optional: To set an enable password, use the following command:

   ```
   Dell>enable
   Dell#configure
   Dell(conf)#enable sha256-password password
   ```

2. Enter a hostname for the switch using the following command:
   ```
   Dell#configure
   Dell(conf)#hostname name
   ```

3. Set-up out-of-band S4048-ON management as follows:
   a. If using in-band S4048-ON switch management, skip to step 4.
   b. Enter the following commands to configure out-of-band S4048-ON management as follows:

   ```
   interface managementethernet 1/1
   ip address ip-address /subnet mask
   no shutdown
   exit

   management route ip-address /subnet mask gateway-address
   ```

4. Set-up In-band S4048-ON management as follows:
   a. Skip this step if you did the previous step 3.
   b. Enter the following commands to configure In-band S4048-ON management as follows:

   ```
   feature vrf
   ip vrf InBandManagement
   exit

   interface te1/33
   ip vrf forwarding InBandManagement
   ip address ip-address /subnet mask
   no shutdown
   exit

   ip route vrf InBandManagement ip-address /mask forwarding-router-address
   ```
3.3 VxRail node facing interface configuration

5. Configure VxRail node-facing Ethernet ports based on the number of nodes and switches selected. The table below defines the S4048-ON ports for single-switch and dual-switch topologies.

<table>
<thead>
<tr>
<th>Number of VxRail Nodes</th>
<th>Port Numbers</th>
<th>Single S4048-ON switch</th>
<th>Port Numbers used on each TOR switch (odd ports)</th>
<th>Dual S4048-ON switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1-6</td>
<td>1,3,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1-8</td>
<td>1,3,5,7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1-10</td>
<td>1,3,5,7,9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1-12</td>
<td>1,3,5,7,9,11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Configure the ports on each switch connecting to the VxRail nodes based on the values in Table 1 for a single-switch or dual-switch topology.
b. Enter the commands:

```
interface tengigabitethernet slot/port
description desc_text
portmode hybrid
switchport
no shutdown
exit
```

3.4 VLAN configuration

For the following steps, refer to the worksheets in Appendix A and Appendix B for the VLAN IDs and names, and to Table 1 for the port assignments.

6. Configure the Management VLAN interface, which uses the switch’s default native VLAN ID, using the following commands:

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

7. If the network is flat using a single broadcast domain, skip to step 8. If using VLANs, begin configuring VLAN interfaces using the following command:

```
interface vlan vlan-id
description desc_text
tagged tengigabitethernet slot/port-range
no shutdown
```
The commands above are common for all VLAN interfaces. Repeat the steps above for each VLAN. For a complete example, see the running configurations in section 4.

8. VxRail Management VLANs requires enabling IPv6 Multicast Listener Discovery (MLD) snooping. (This is a default setting on the switch and no action is required). IGMP snooping is enabled on the VSAN VLAN in this example configuration. Do this with the following global command:

   ip igmp snooping enable

9. Enable the snooping querier function on the VSAN VLAN interfaces through the VLAN interface mode command:

   ip igmp snooping querier

3.5 Inter switch links (ISL) configuration

Two 40GbE ports from each Dell EMC Networking S4048-ON switch are connected to create an inter-switch link. This provides 80GbE bandwidth between the ToR switches.

The two examples for configuring ISL ports are:

- ISL Port-Channel without VLT (Section 3.5.1)
- ISL Port-Channel with VLT (Section 3.5.2)

ISL Port-Channel with VLT is the preferred high availability option and a best practice.

3.5.1 ISL port channel without VLT configuration

If using ISL port channel with VLT, refer to section 3.5.2

Static link aggregation groups (LAGs) are used to establish ISL links between switches. This requires the addition of the port channel created for the ISL to all interface VLANs defined for the network.

This topology establishes network redundancy at both the link and the switch level. Failure of a single-switch or network link does not cause overall loss of communication.

10. Configure the Inter-Switch Links (ISLs) for dual-switch topologies.

   a. Configure the Inter-Switch Links (ISLs) for dual-switch topologies using the following commands:

   (recommended port values shown)

   interface fortyGigE 1/53
   description ISL to Switch2
   no ip address
   no shutdown
   exit

   interface fortyGigE 1/54
3.5.2 ISL port channel with VLT configuration

If using ISL port channel without VLT, refer to section 3.5.1

In this example, two Dell EMC S4048-ON switches are connected together with a VLTi port-channel. VLT is a layer 2 multipathing technology that allows for running a loop-free L2 multipath network without any blocked ports. The VLTi synchronizes layer 2 table information between the switches and makes the switch appear as one logical unit. Usually a server connects to the a pair of VLT switches with a LACP LAG, however LACP is not used with VxRail nodes as the nodes are configured with a virtual switch with active and standby adapters. Other non-VxRail devices can utilize LACP LAG to the pair of VLT switches, for an active/active L2 multipathing scenario.

11. Configure the Inter-Switch Links (ISLs) for dual-switch topologies.
   a. Configure the Inter-Switch Links (ISLs) port channel with VLT for dual-switch topologies on Switch 1 using the following commands in the first column: (recommended port values shown)
   b. Configure Switch 2 using the commands in column 2 for Switch-2

Table 2 ISL port channel with VLT configuration

<table>
<thead>
<tr>
<th>Switch-1 (S4048-ON)</th>
<th>Switch-2 (S4048-ON)</th>
</tr>
</thead>
<tbody>
<tr>
<td>vlt domain 1</td>
<td>vlt domain 1</td>
</tr>
<tr>
<td>peer-link port-channel 100</td>
<td>peer-link port-channel 100</td>
</tr>
<tr>
<td>back-up destination 100.67.171.32</td>
<td>back-up destination 100.67.171.33</td>
</tr>
<tr>
<td>primary-priority 5000</td>
<td>primary-priority 10000</td>
</tr>
<tr>
<td>exit</td>
<td>exit</td>
</tr>
<tr>
<td>interface fortyGigE 1/53</td>
<td>interface fortyGigE 1/53</td>
</tr>
<tr>
<td>description ISL to Switch2</td>
<td>description ISL to Switch1</td>
</tr>
<tr>
<td>no ip address</td>
<td>no ip address</td>
</tr>
<tr>
<td>no shutdown</td>
<td>no shutdown</td>
</tr>
<tr>
<td>exit</td>
<td>exit</td>
</tr>
<tr>
<td>interface fortyGigE 1/54</td>
<td>interface fortyGigE 1/54</td>
</tr>
</tbody>
</table>
### Network facing uplink configurations

This section contains multiple configurations and only one is required based on your environment.

If configuring 10GbE ports go to 3.6.1

If configuring 40GbE ports on a Z9100 or Cisco 7004, go to 3.6.2

#### 3.6.1 Network facing uplink configuration - 10GbE

Configuring the network-facing upstream ports as LAGs was done in the ISLs port configuration section. The examples show both 10GbE and 40GbE interfaces. LAGs can connect to multiple upstream switches if they support multi-chassis LAG features such as vPC, or VLT.

The example shows 10GbE port configurations for reference information.

**Table 3** Uplink ports

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Use Ports in Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GbE</td>
<td>43-48</td>
</tr>
<tr>
<td>40GbE (recommended)</td>
<td>49-52</td>
</tr>
</tbody>
</table>

a. Configure the network facing uplinks on Switch 1 using the following commands: (10GbE recommended port values shown)
### 3.6.2 Network facing uplink configuration – 40GbE

12. The examples show 40GbE interfaces to the upstream Z9100 or Cisco 7004 switches.

a. Configure each switch using the following commands: (40GbE example using two ports)

<table>
<thead>
<tr>
<th>Table 4</th>
<th>10GbE Network facing uplink configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch-1 (S4048-ON)</td>
<td>Switch-2 (S4048-ON)</td>
</tr>
<tr>
<td>interface tengigabitethernet 1/47</td>
<td>interface tengigabitethernet 1/47</td>
</tr>
<tr>
<td>description 10Gb Network uplinks</td>
<td>description 10Gb Network uplinks</td>
</tr>
<tr>
<td>port-channel-protocol LACP</td>
<td>port-channel-protocol LACP</td>
</tr>
<tr>
<td>port-channel 1 mode active</td>
<td>port-channel 1 mode active</td>
</tr>
<tr>
<td>no shutdown</td>
<td>no shutdown</td>
</tr>
<tr>
<td>exit</td>
<td>exit</td>
</tr>
<tr>
<td>interface tengigabitethernet 1/48</td>
<td>interface tengigabitethernet 1/48</td>
</tr>
<tr>
<td>description 10Gb Network uplinks</td>
<td>description 10Gb Network uplinks</td>
</tr>
<tr>
<td>port-channel-protocol LACP</td>
<td>port-channel-protocol LACP</td>
</tr>
<tr>
<td>port-channel 1 mode active</td>
<td>port-channel 1 mode active</td>
</tr>
<tr>
<td>no shutdown</td>
<td>no shutdown</td>
</tr>
<tr>
<td>exit</td>
<td>exit</td>
</tr>
<tr>
<td>interface port-channel 1</td>
<td>interface port-channel 1</td>
</tr>
<tr>
<td>description LAG to Uplink switch</td>
<td>description LAG to Uplink switch</td>
</tr>
<tr>
<td>portmode hybrid</td>
<td>portmode hybrid</td>
</tr>
<tr>
<td>switchport</td>
<td>switchport</td>
</tr>
<tr>
<td>vlt-peer-lag port-channel 1</td>
<td>vlt-peer-lag port-channel 1</td>
</tr>
<tr>
<td>no shutdown</td>
<td>no shutdown</td>
</tr>
<tr>
<td>exit</td>
<td>exit</td>
</tr>
</tbody>
</table>

b. Configure Switch 2 using the commands in column 2 for Switch-2

<table>
<thead>
<tr>
<th>Table 5</th>
<th>40GbE Network facing uplink configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch-1 (S4048-ON)</td>
<td>Switch-2 (S4048-ON)</td>
</tr>
<tr>
<td>interface fortyGigE 1/49</td>
<td>interface fortyGigE 1/49</td>
</tr>
<tr>
<td>description 40Gb Network uplinks</td>
<td>description 40Gb Network uplinks</td>
</tr>
<tr>
<td>no ip address</td>
<td>no ip address</td>
</tr>
<tr>
<td>port-channel-protocol LACP</td>
<td>port-channel-protocol LACP</td>
</tr>
<tr>
<td>port-channel 2 mode active</td>
<td>port-channel 2 mode active</td>
</tr>
<tr>
<td>no shutdown</td>
<td>no shutdown</td>
</tr>
<tr>
<td>interface fortyGigE 1/50</td>
<td>interface fortyGigE 1/50</td>
</tr>
<tr>
<td>description 40Gb Network uplinks</td>
<td>description 40Gb Network uplinks</td>
</tr>
<tr>
<td>no ip address</td>
<td>no ip address</td>
</tr>
<tr>
<td>port-channel-protocol LACP</td>
<td>port-channel-protocol LACP</td>
</tr>
</tbody>
</table>
b. Save the configuration using the following command:

`write`

### 3.7 Network I/O control predefined shares (VxRail 4.0)

Network I/O control allows users to allocate network bandwidth to business-critical application and to resolve situations where several types of traffic compete for common resources. Network teaming policies for both 10Gb and 1Gb network adapters along with predefined shares.

#### Table 6 Network traffic on E, P, S and V series 10GbE ports

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>Requirement</th>
<th>Uplink 1 (10Gb) VMNIC0</th>
<th>Uplink 2 (10Gb) VMNIC1</th>
<th>Uplink 3 (1Gb) No VMNIC</th>
<th>Uplink 4 (1Gb) No VMNIC</th>
<th>NIOC Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>IPv6 multicast</td>
<td>Active</td>
<td>Standby</td>
<td>Unused</td>
<td>Unused</td>
<td>20</td>
</tr>
<tr>
<td>vSphere VMotion</td>
<td>Active</td>
<td>Standby</td>
<td>Unused</td>
<td>Unused</td>
<td>Active</td>
<td>50</td>
</tr>
<tr>
<td>vSAN</td>
<td>IPv4 multicast</td>
<td>Standby</td>
<td>Active</td>
<td>Unused</td>
<td>Unused</td>
<td>100</td>
</tr>
<tr>
<td>Virtual Machines</td>
<td>Active</td>
<td>Standby</td>
<td>Unused</td>
<td>Unused</td>
<td>Unused</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Table 7 Network traffic on E and S series 1GbE ports

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>Requirement</th>
<th>Uplink 1 (1Gb) VMNIC2</th>
<th>Uplink 2 (1Gb) VMNIC3</th>
<th>Uplink 3 (1Gb) VMNIC0</th>
<th>Uplink 4 (1Gb) VMNIC1</th>
<th>NIOC Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>IPv6 multicast</td>
<td>Standby</td>
<td>Active</td>
<td>Unused</td>
<td>Unused</td>
<td>40</td>
</tr>
<tr>
<td>vSphere VMotion</td>
<td>Unused</td>
<td>Unused</td>
<td>Standby</td>
<td>Active</td>
<td>Standby</td>
<td>50</td>
</tr>
<tr>
<td>vSAN</td>
<td>IPv4 multicast</td>
<td>Unused</td>
<td>Unused</td>
<td>Active</td>
<td>Standby</td>
<td>100</td>
</tr>
<tr>
<td>Virtual Machines</td>
<td>Active</td>
<td>Standby</td>
<td>Unused</td>
<td>Unused</td>
<td>Unused</td>
<td>60</td>
</tr>
</tbody>
</table>
# Configuration examples

## 4.1 Single-switch example

The configuration below is the running configuration seen on the console from the `show running-config` command. Portions of the configuration have been removed that are repetitive or are not applicable to deployment of VxRail. Comments placed into the configuration for the purpose of clarification are distinguished by the following in bold:[comment- ]:

```plaintext
hostname Switch1

[comment-This configuration includes both in-band and out-of-band management interface configurations for the purpose of documentation. Only configure one method of management in the actual deployments]

interface TenGigabitEthernet 1/1
   description Node1_Port1
   no ip address
   portmode hybrid
   switchport
   no shutdown

interface TenGigabitEthernet 1/2
   description Node1_Port2
   no ip address
   portmode hybrid
   switchport
   no shutdown

interface TenGigabitEthernet 1/3
   description Node1_RESERVED
   no ip address
   portmode hybrid
   switchport
   shutdown

[comment-Ports with descriptions that include “_RESERVED” are for future use. For example, admins can use these ports to add additional NICs to each node for additional traffic types (VM Networks, Fault Tolerance, etc.)]

interface TenGigabitEthernet 1/4
   description Node1_RESERVED
   no ip address
   portmode hybrid
   switchport
   shutdown

interface TenGigabitEthernet 1/5
   description Node2_Port1
   no ip address
   portmode hybrid
   switchport
   no shutdown

interface TenGigabitEthernet 1/6
   description Node2_Port2
   no ip address
   portmode hybrid
   switchport
```

---

Dell EMC Switch Configuration Guide for VxRail | version 2.0
no shutdown

! interface TenGigabitEthernet 1/7
description Node2_RESERVED
no ip address
portmode hybrid
switchport
shutdown

! interface TenGigabitEthernet 1/8
description Node2_RESERVED
no ip address
portmode hybrid
switchport
shutdown

! interface TenGigabitEthernet 1/9
description Node3_Port1
no ip address
portmode hybrid
switchport
no shutdown

! interface TenGigabitEthernet 1/10
description Node3_Port2
no ip address
portmode hybrid
switchport
no shutdown

! interface TenGigabitEthernet 1/11
description Node3_RESERVED
no ip address
portmode hybrid
switchport
shutdown

! interface TenGigabitEthernet 1/12
description Node3_RESERVED
no ip address
portmode hybrid
switchport
shutdown

! interface TenGigabitEthernet 1/13
description Node4_Port1
no ip address
portmode hybrid
switchport
no shutdown

! interface TenGigabitEthernet 1/14
description Node4_Port2
no ip address
portmode hybrid
switchport
no shutdown

! interface TenGigabitEthernet 1/15
description Node4_RESERVED
no ip address
portmode hybrid
switchport
shutdown

! interface TenGigabitEthernet 1/16
description Node4_RESERVED
no ip address
donode mode hybrid
switchport
shutdown

![comment-Interfaces 17-32, 34-46, 51-54 not shown in this document]!

interface TenGigabitEthernet 1/33
ip vrf forwarding InBandManagement
ip address 10.0.0.1/24
no shutdown

![comment-Below is an example for 10GbE uplink ports]!
interface TenGigabitEthernet 1/47
description 10Gb Network uplinks
no ip address
port-channel-protocol LACP
port-channel 1 mode active
no shutdown
interface TenGigabitEthernet 1/48
description 10Gb Network uplinks
no ip address
port-channel-protocol LACP
port-channel 1 mode active
no shutdown

![comment-Below is an example for 40GbE uplink ports]!
interface fortyGigE 1/49
description 40Gb Network uplinks
no ip address
port-channel-protocol LACP
port-channel 2 mode active
no shutdown
interface fortyGigE 1/50
description 40Gb Network uplinks
no ip address
port-channel-protocol LACP
port-channel 2 mode active
no shutdown

![comment-Management interfaces 2/1-6/1 are not shown in this document]!
interface ManagementEthernet 1/1
ip address 100.67.171.39/24
no shutdown
interface Port-channel 1
description LAG to uplink switch
no ip address
portmode hybrid
switchport
no shutdown
interface Port-channel 2
description LAG to uplink switch
no ip address
portmode hybrid
switchport
no shutdown
interface Vlan 1
description Management
4.2 Dual-switch example

The running configuration example below is seen on the console from the `show running-config` command. Portions of the configuration that are repetitive or that are not applicable to the deployment of VxRail have been removed. Comments placed into the configuration for the purpose of clarification are distinguished by the following in bold: ![comment- ]:

<table>
<thead>
<tr>
<th>S4048-ON Switch 1</th>
<th>S4048-ON Switch 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>hostname Switch1</td>
<td>hostname Switch2</td>
</tr>
<tr>
<td>protocol lldp</td>
<td>protocol lldp</td>
</tr>
<tr>
<td>![comment- Add the following command for VLT configuration] vlt domain 1</td>
<td>![comment- Add the following command for VLT configuration] vlt domain 1</td>
</tr>
<tr>
<td>peer-link port-channel 100</td>
<td>peer-link port-channel 100</td>
</tr>
<tr>
<td>back-up destination 100.67.171.32</td>
<td>back-up destination 100.67.171.33</td>
</tr>
</tbody>
</table>
primary-priority 5000
exit

![comment-The management interface configurations are not demonstrated in this example. See single-switch example in the prior section!]

interface TenGigabitEthernet 1/1
description Node1_Port1
no ip address
portmode hybrid
switchport
no shutdown

![comment-Ports with descriptions that include "_RESERVED" are for future use. For example, admins can use these ports to add additional NICs to each node for additional traffic types (VM Networks, Fault Tolerance, etc.)!]

interface TenGigabitEthernet 1/2
description Node1_RESERVED
no ip address
portmode hybrid
switchport
shutdown

interface TenGigabitEthernet 1/3
description Node2_Port1
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/4
description Node2_RESERVED
no ip address
portmode hybrid
switchport
shutdown

interface TenGigabitEthernet 1/5
description Node3_Port1
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/6
description Node3_RESERVED
no ip address
portmode hybrid
switchport
shutdown

interface TenGigabitEthernet 1/7
description Node4_Port1
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/8
description Node4_RESERVED
no ip address
portmode hybrid
switchport
shutdown

primary-priority 10000
exit

![comment-The management interface configurations are not demonstrated in this example. See single-switch example in the prior section!]

interface TenGigabitEthernet 1/1
description Node1_Port2
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/2
description Node1_RESERVED
no ip address
portmode hybrid
switchport
shutdown

interface TenGigabitEthernet 1/3
description Node2_Port2
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/4
description Node2_RESERVED
no ip address
portmode hybrid
switchport
shutdown

interface TenGigabitEthernet 1/5
description Node3_Port2
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/6
description Node3_RESERVED
no ip address
portmode hybrid
switchport
shutdown

interface TenGigabitEthernet 1/7
description Node4_Port2
no ip address
portmode hybrid
switchport
no shutdown

interface TenGigabitEthernet 1/8
description Node4_RESERVED
no ip address
portmode hybrid
switchport
shutdown
![comment-Interfaces 9-46, 51-52 are not shown in this deployment guide!]

![comment-Below is an example for 10GbE uplink ports!]
interface TenGigabitEthernet 1/47
  description 10Gb Network uplinks
  no ip address
  !
  port-channel-protocol LACP
  port-channel 1 mode active
  no shutdown

interface TenGigabitEthernet 1/48
  description 10Gb Network uplinks
  no ip address
  !
  port-channel-protocol LACP
  port-channel 1 mode active
  no shutdown

![comment-Below is an example for 10GbE uplink ports!]
interface fortyGigE 1/49
  description 40Gb Network uplinks
  no ip address
  !
  port-channel-protocol LACP
  port-channel 2 mode active
  no shutdown

interface fortyGigE 1/50
  description 40Gb Network uplinks
  no ip address
  !
  port-channel-protocol LACP
  port-channel 2 mode active
  no shutdown

![comment-Below is an example for 40GbE ISL ports!]
interface fortyGigE 1/53
  description ISL to Switch2
  no ip address
  no shutdown

interface fortyGigE 1/54
  description ISL to Switch2
  no ip address
  no shutdown

![comment-Management interfaces 1/1-6/1 are not shown in this deployment guide, see single-switch example in the previous section!]
interface Port-channel 1
  description LAG to uplink switch
  no ip address
  portmode hybrid
  switchport

![comment- Add the following command for VLT configuration]
vlt-peer-lag port-channel 1
  no shutdown

interface Port-channel 2
  description LAG to uplink switch
  no ip address
portmode hybrid
switchport

![comment- Add the following command for VLT configuration
vlt-peer-lag port-channel 2
no shutdown
]

interface Port-channel 100
description ISL to Switch2
no ip address
channel-member FortyGigE 1/53,1/54
no shutdown

interface Vlan 1
description Management
untagged TenGigabitEthernet 1/1-1/8
untagged Port-channel 1-2,100
no shutdown

interface Vlan 110
description vMotion
no ip address
tagged TenGigabitEthernet 1/1,1/3,1/5,1/7
tagged Port-channel 1-2,100
no shutdown

interface Vlan 120
description VSAN
ip address 10.10.10.1/24
tagged TenGigabitEthernet 1/1,1/3,1/5,1/7
tagged Port-channel 1-2,100
ip igmp snooping querier
no shutdown

interface Vlan 130
description VM_Network_A
no ip address
tagged TenGigabitEthernet 1/1,1/3,1/5,1/7
tagged Port-channel 1-2,100
no shutdown

interface Vlan 140
description VM_Network_B
no ip address
tagged TenGigabitEthernet 1/1,1/3,1/5,1/7
tagged Port-channel 1-2,100
no shutdown

![comment-Management route is not shown in this deployment guide, see single-switch example in the previous section]

ip ssh server enable
ip igmp snooping enable
end
## Basic configuration worksheet

<table>
<thead>
<tr>
<th>Workstation Setting</th>
<th>Required</th>
<th>Workstation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of VxRail Nodes</td>
<td>Yes (minimum 3)</td>
<td></td>
</tr>
<tr>
<td>Number of S4048-ON switches</td>
<td>Yes (minimum 1)</td>
<td></td>
</tr>
<tr>
<td>Number of 10GbE network-facing uplink ports</td>
<td>Yes (minimum 1)</td>
<td></td>
</tr>
<tr>
<td>Number of 40GbE network-facing uplink ports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of 40GbE inter-switch links (ISLs) (only used in a dual-switch configuration)</td>
<td>Yes (recommended 2)</td>
<td></td>
</tr>
<tr>
<td>Switch 1 Out-of-band management port IP address and mask.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Switch 2 Out-of-band management port IP address and mask.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Management port default gateway</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Switch 1 In-band Management IP address and mask.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Switch 2 In-band Management IP address and mask.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>In-band Management port default gateway</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
### VLAN worksheet

The table below shows entries for up to five VM Network VLANs. You can use VLAN ID values within the range of 2 to 4094.

Table 9 VLAN worksheet

<table>
<thead>
<tr>
<th>Worksheet Setting</th>
<th>Required</th>
<th>VLAN ID</th>
<th>VLAN Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>VxRail Manager VLAN</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vMotion VLAN</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vSAN VLAN</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VM Network VLAN A</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VM Network VLAN B</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VM Network VLAN C</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VM Network VLAN D</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VM Network VLAN E</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C Technical support and resources

Contacting Technical Support

Dell.com/support - focused on meeting customer needs with proven services and support.

Feedback for this deployment guide

We encourage readers of this publication to provide feedback on the quality and usefulness of this best practices guide by sending an email to Dell_Networking_Solutions@Dell.com

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

C.1 Dell EMC product manuals and technical guides

Manuals and documentation for Dell Networking S4048-ON

Manuals and documentation for Dell Networking Z9100-ON

Dell EMC VxRail support and documentation

Dell TechCenter Networking Guides

C.2 VxRail software versions

<table>
<thead>
<tr>
<th>VxRail Product</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>VxRail Manager</td>
<td>4.0.200-5234142</td>
</tr>
<tr>
<td>VMware vCenter Server Appliance</td>
<td>6.0.0 build-5183552</td>
</tr>
<tr>
<td>VMware ESXi</td>
<td>6.0.0 build-5224934</td>
</tr>
</tbody>
</table>
D Accessing the RS-232 console port

**Note:** Before starting, be sure that your PC has a 9-pin serial port and that you have a terminal emulation program already installed and running on the PC. If your PC does not have a DB-9 serial port connection, use a USB-to-Serial adapter.

![S4048-ON RS-232 Console Ports](image)

1. Install the RJ-45 connector side of the provided cable into the S4048-ON console port.
2. Install the DB-9 female side of the provided copper cable into your PC’s serial port (or into other data terminal equipment [DTE] server hardware that you intend to use).
3. Keep the default terminal settings on the console as follows:
   - 115200 baud rate (set the MicroUSB console port to 9600 baud rate)
   - No parity
   - 8 data bits
   - 1 stop bit
   - No flow control
E Configuring iDRAC

To perform out-of-band systems management using iDRAC, you must configure iDRAC for remote accessibility, setup the management station and managed system, and configure the supported Web browsers.

For VxRail, you must complete the following on each individual node in the cluster.

1. Connect a KVM to the proper ports on the system.
2. Power on the system
3. Press \(<F2>\) during Power-on Self-test (POST) to enter System Setup

![Figure 19  Power-on Self-test (POST)](image)

4. In the System Setup Main Menu page, click iDRAC Settings.

![Figure 20  System Setup Menu](image)

5. On the iDRAC Settings page, click Network
6. Set the following items as described here:
a. Set Enable NIC to Enabled
b. Set NIC Selection to Dedicated.

c. Set Enable IPMI Over LAN to Enabled

7. Specify the following settings:
   - Network Settings
   - Common Settings
   - IPv4 Setting
   - IPv6 Settings
- IPMI Settings
- VLAN Settings

8. Click **Back**, click Finish, and then click **Yes** to save the network information. The system will reboot.