HPE Storage dHCI and VMware vSphere
New Servers Deployment Guide
HPE Alletra 6000 Series
HPE Nimble Storage Flash Arrays
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EXECUTIVE SUMMARY

The HPE Nimble Storage dHCI solution from Hewlett Packard Enterprise is a disaggregated hyperconverged infrastructure (HCI) platform that delivers the flexibility of converged infrastructure and the simplicity of HCI. This scalable solution is designed, tested, and documented to address the business requirements, workloads, and applications of Hewlett Packard Enterprise customers. The solution incorporates a wide range of products into a portfolio of repeatable, scalable, and composable technologies that are supported by Hewlett Packard Enterprise.

This guide describes how the HPE Nimble Storage dHCI solution combines industry-leading HPE ProLiant Gen10 servers with HPE Nimble Storage arrays and HPE and Cisco switches to reliably deploy and run a VMware vSphere® environment. Customers can leverage this solution to support a wide variety of enterprise workloads:

- Datacenter server consolidation and cloud solutions
- Business-critical applications, such as Oracle, Microsoft®, and SAP® databases and applications
- Workforce-enablement applications, such as virtual desktop infrastructure (VDI), Microsoft Exchange Server, SharePoint Server, and Lync® Server

The solution is robust, fault-tolerant, and scalable, and it is designed to deliver high performance and high availability. Extensive lab testing was conducted to validate that it meets those criteria. Customers can purchase and deploy their specified configuration with confidence in the quality of both the solution and the support they will receive from Hewlett Packard Enterprise.

The solution is intended for small or midsize businesses, large enterprises, and IT service providers who are looking for, and who understand the value of, the combination of consolidation, efficiency, and consistency that it offers.

The configuration covered in this deployment guide includes the following components:

- **Storage:** HPE Alletra 6000 and HPE Nimble Storage all-flash or adaptive flash storage (for iSCSI only)
- **Computing resources:** New HPE ProLiant servers in one of the following models:
  - HPE ProLiant DL380 Gen10
  - HPE ProLiant DL360 Gen10
  - HPE ProLiant DL325 Gen10
  - HPE ProLiant DL325 Gen10 Plus
  - HPE ProLiant DL385 Gen10
  - HPE ProLiant DL385 Gen10 Plus
  - HPE ProLiant DL560 Gen10
  - HPE ProLiant DL580 Gen10
- **Hypervisor:** VMware vSphere Hypervisor (VMware ESXi™) 6.7

**Target audience:** The target audience for this deployment guide includes HPE Authorized Partner solution engineers, distributors, and value-added resellers, as well as customers.

**Document purpose:** Readers can use this document to achieve the following goals:

- Gain insight into the value proposition for the HPE Nimble Storage dHCI solution.
- Better understand the requirements of HPE Nimble Storage dHCI components.
- Better understand the recommended software and features that are part of the HPE Nimble Storage dHCI solution.
- Leverage design guidance to architect an HPE Nimble Storage dHCI solution to fit a particular set of business cases.
- Better understand the design considerations related to fault tolerance, performance, and scalability when architecting the solution.
TERMS AND ABBREVIATIONS

**Command line interface (CLI):** The CLI provides text-based access to a software or firmware component that enables a user to enter and execute commands. Connectivity is usually provided through Secure Shell (SSH), telnet, or a direct serial connection.

**Fully qualified domain name (FQDN):** An FQDN is a detailed domain name that specifies its precise location in the DNS hierarchy.

**HPE Integrated Lights-Out (iLO):** The embedded HPE iLO server management technology provides out-of-band management capabilities.

**Intelligent Resilient Framework (IRF):** IRF technology in HPE Comware-based switches allows multiple network devices (up to nine) to converge into a single fabric (both management and control planes) through physical IRF ports. All devices that participate in the IRF configuration are configured through a single IP address, and all network switches in the IRF configuration look like one device to all components in the network.

**Multi-active detection (MAD):** If an IRF failure occurs, the MAD mechanism detects other switches in the IRF stack that come online as masters and keeps only the switch with the lowest IRF ID master online. The other switches shut down their interfaces, effectively removing them from the network and preventing loops from developing in the network.

**Multi-chassis link aggregation (MLAG):** Link aggregation (LAG) is a way of bonding multiple physical links into a combined logical link. MLAG extends this capability, allowing a network and access devices to see both switches as a single device. With MLAG, you can create an active-active and redundant LAG connection to other network and access devices across the MLAG switch pair without using Spanning Tree Protocol (STP) or layer 3 routing protocols.

**ROM-Based Setup Utility (RBSU):** This HPE utility is both a menu-driven interface and a BIOS Serial Command Console CLI interface that enables users to perform configuration activities on the server.

**Virtual local area network (VLAN):** VLANs provide a method of segmenting a network into related groups, improving the efficiency of traffic flow, and limiting the propagation of multicast and broadcast messages. Traffic between VLANs is blocked unless the VLANs are connected by a router, which increases security.

**USING THIS DOCUMENT**

This document provides examples of how you can set up your dHCI configuration. It includes information about setting up switches; however, these are basic examples and overviews. They are not definitive examples because different configurations can require different setup steps. You should always consult the documentation specific to your switches and other components.

**CONFIGURATION MATRIX AND ADDITIONAL HPE STORAGE DOCUMENTATION**

HPE Storage provides documentation and resources on HPE InfoSight to assist you as you set up and use dHCI.

**Use the Validated Configuration Matrix to verify your configuration**

Before you set up dHCI, it is a good practice to verify your configuration.

The HPE Storage Validated Configuration Matrix on HPE InfoSight contains information about supported configurations and the infrastructure components used in the solution and described in this document, including specific software and firmware versions.

After you install dHCI, you can use its Unified Update feature to automatically update the array OS, ESXi, HPE Storage Connection Manager for VMware, and Gen10 Service Pack for ProLiant (SPP) when new versions are available. The dHCI catalogs provide information about the supported software versions. Instructions for using Unified Update are in Getting Started with dHCI.

**Finding more information**

This document provides information about the dHCI steps required to set up your configuration. You can use this document in conjunction with the HPE Nimble Storage dHCI Solution Network Considerations Guide. The Getting Started with dHCI provides additional information about running the dHCI Stack wizard and using dHCI.

The HPE Alletra 6000, Nimble Storage Documentation Portal on HPE InfoSight (Infosight.hpe.com) contains these documents and other documents that provide information for setting up and working with the array OS and HPE Storage arrays.

The dHCI Network Considerations Guide contains information about dHCI requirements. It is available for downloading from InfoSight.

There are instructions and reference materials for HPE Aruba switches, HPE FlexFabric switches, and Cisco Nexus switches on the HPE Support Center website.

If you need additional information for using dHCI components, such as switches or servers, refer to the vendor documentation provided for those components.

**SETTING UP THE SYSTEM**

To prepare for deployment and then deploy the solution, you must complete the following tasks:

- Understand the physical infrastructure layout.
- Fill out the configuration worksheets.
- Configure the network.
- Deploy the HPE Nimble Storage dHCI solution:
  - Initialize and configure the HPE Storage arrays.
  - Deploy a new VMware vCenter Server instance or use an existing one.
  - Add HPE ProLiant servers into the HPE Storage dHCI environment.
  - Create VMware vSphere Virtual Machine File System (VMFS) or VMware vSphere Virtual Volumes (vVols).

**DEPLOYING THE COMPUTE PHYSICAL COMPONENTS**

**HPE ProLiant servers**

For site requirements, installation instructions, and other general reference materials, see the HPE Support site.

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**NOTE**

Although this guide does not cover iLO shared connections, HPE supports the use of an iLO shared connection instead of an iLO dedicated port. For more information, see HPE Integrated Lights Out (iLO 4) – Configuring the NIC Settings.

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**DEPLOYING THE NETWORK PHYSICAL COMPONENTS**

**HPE M-Series switches**

For site requirements, installation instructions, and reference materials, see the information about the HPE M-Series Switch Series on the HPE Support Center website.

**HPE Aruba 83xx or 6300 switches**

For site requirements, installation instructions, and reference materials, see the information about the HPE Aruba Switch Series on the HPE Support Center website.

**HPE FlexFabric 57x0 or 594x Series switches**

For site requirements, installation instructions, and reference materials, see the information about the HPE FlexFabric 5700 Switch Series on the HPE Support Center website.

**Cisco Nexus switches**

For site requirements, installation instructions, and reference materials, see the information about the Cisco Nexus Series on the Cisco Nexus website.

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**DEPLOYING THE STORAGE PHYSICAL COMPONENTS**

**HPE Storage arrays**

For site requirements, installation instructions, and other general reference materials, see the HPE Alletra 6000, Nimble Storage documentation page of the HPE InfoSight portal (login required).

If you are using an HPE Alletra 6000 array and Data Services Cloud Console, you will need to set up a cloud account. For instructions, see the Installation Guide for HPE Alletra 6000, which is posted in the documentation section.
CABLING THE NETWORK, STORAGE, AND SERVER COMPONENTS

This section describes the cabling methodology to use with the HPE Nimble Storage dHCI solution.

HPE ProLiant network card configuration

Any of the following HPE ProLiant server models can be part of the configuration:

- DL360/380 Gen10
- HPE ProLiant DL325/385 Gen10
- HPE ProLiant DL325/385 Gen10 Plus
- HPE ProLiant 560/580 Gen10.

The HPE Nimble Storage dHCI solution does not support the use of 1 Gbps ports, nor does it use the four 1 Gbps ports that are embedded in the HPE ProLiant series. These ports must remain unused for the deployment.

During HPE Storage dHCI deployment on an array running release 6.0.0.0 or later, the deployment tool uses ports 1 and 3 for vSwitch 0 (MGMT). It uses ports 2 and 4 for iSCSI 1 and iSCSI 2.

NOTE

If your array is running an earlier version of the array OS, the deployment tool uses ports 1 and 2 for vSwitch 0 (MGMT) and ports 3 and 4 for iSCSI 1 and iSCSI 2.

If your server has more than four 10 Gbps ports, dHCI uses only the first four. As long as the remaining ports are not on a vSwitch set up by dHCI, you can configure them for other uses.

NOTE

If you have only one NIC card, the first two ports must be cabled to switch 1. The next two ports must be cabled to switch 2.

If your network card configuration differs from the one described in the next section, HPE Storage network card configuration, keep in mind that, when the ports are discovered in VMware ESXi, ports 1 and 3 must be used for management (MGMT) and network (VM Network). Port 2 must be used for iSCSI 1, and port 4 must be used for iSCSI 2.

The following figures show the MGMT and iSCSI ports in configurations using release 6.0.0.0 or later.
FIGURE 2. HPE ProLiant DL360/DL325 Gen10 with four 10 Gbps ports in a configuration using release 6.0.0.0 or later

FIGURE 4. HPE ProLiant DL385 Gen10 with two 10 Gbps ports in a configuration using release 6.0.0.0 or later
HPE Storage network card configuration
The ports shown in the following figures are the MGMT and iSCSI ports. These ports are used in Appendix F: HPE FlexFabric 5700 Ethernet networking cabling. Your array might differ from the ones shown. The Array Installation guide for your array provides instructions for cabling. These guides are available on HPE Infosight.

HPE Alletra 6000

HPE Nimble Storage HF or AF
Cabling example
Use the methodology shown in the following figure to cable your HPE ProLiant server, HPE Storage array, and network switch.

FIGURE 8. Cabling example: HPE ProLiant server with four 10 Gbps ports
CONFIGURING THE ETHERNET SWITCH – NETWORK REQUIREMENTS

MTU
Many switches define maximum transmission unit (MTU) differently from the way the initiator or target defines it. Switches often define MTU as the frame size. End hosts almost universally define MTU as the packet size. The configured frame size on the switch might need to be larger than the packet size or the MTU value defined on the host and the array. For example, a value of 9000 on the host might require a value of 9014 or higher on the switch. This difference might vary by manufacturer.

Setting the switch MTU value to a number that is higher than the MTU value on the host or initiator does not cause problems. The switch MTU setting causes problems only when the MTU value on the intermediate device (the switch) is set to a number that is lower than the MTU value on one or both of the end devices.

Flow control
Flow control provides a mechanism for temporarily pausing the transmission of data on Ethernet networks if a sending node transmits data faster than the receiving node can accept it. Whenever possible, you should enable flow control on all host, switch, and array ports to ensure graceful communication between network nodes. HPE Storage array network interface cards (NICs) support flow control by default.

Jumbo frame
Ethernet frames that transport data are typically 1500 bytes in size. Anything over 1514 bytes (or 1518 with VLAN tagging) in the Ethernet frame is typically referred to as a jumbo frame. Jumbo frames are generally better suited to handle the flow of iSCSI SAN traffic. They typically consist of 9000-byte frames. Enabling jumbo frames can help to improve storage throughput and reduce latency.

Hewlett Packard Enterprise recommends using jumbo frames with HPE Storage dHCI new servers deployments.

VLAN
To work properly, the HPE Nimble Storage dHCI solution requires at least three VLANs. Two iSCSI VLANs—one per switch—must be configured in access mode only. The management VLAN must be the native VLAN in the trunk port (untagged). Table 1 lists the requirements.

A dedicated VLAN for iLO is recommended depending on the deployment option.

<table>
<thead>
<tr>
<th>VLAN description</th>
<th>VLAN ID</th>
<th>VLAN mode</th>
<th>Note</th>
</tr>
</thead>
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<tr>
<td>Management/vMotion</td>
<td>mgmt_vlan</td>
<td>mgmt_vlan = native</td>
<td>Management/vMotion VLAN must be the native VLAN.</td>
</tr>
<tr>
<td>iSCSI 1 IP address range</td>
<td>iscsi1_vlan</td>
<td>iscsi1_vlan = access</td>
<td>Native VLAN only</td>
</tr>
<tr>
<td>iSCSI 2 IP address range</td>
<td>iscsi2_vlan</td>
<td>iscsi2_vlan = access</td>
<td>Native VLAN only</td>
</tr>
<tr>
<td>VM network</td>
<td>vm_network</td>
<td>vm_network = trunk</td>
<td>VM Network can be trunked on the Management interface.</td>
</tr>
<tr>
<td>ILO Network</td>
<td>ilo_vlan</td>
<td>ilo_vlan = access</td>
<td>Optional VLAN. Only required if Split Management is selected during deployment; that is a separate management network for ILO.</td>
</tr>
</tbody>
</table>

LLDP
Link Layer Discovery Protocol (LLDP) must be enabled on each switch. HPE Storage dHCI uses LLDP during deployment to verify your environment.

CONFIGURATION EXAMPLES
This section documents sample setups of HPE M-Series, HPE Aruba, HPE FlexFabric, and Cisco Nexus switches.

HPE M-Series configuration example
This section describes how to configure HPE M-Series ONYX switches for use in an HPE Storage dHCI environment. Before configuring the switches, make sure that they are running the version of HPE ONYX (ONYX-3.8.2204 or later revisions) that is specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model. The example described in this section is based on use of two HPE M-series SN2010M switches.

To configure the HPE M-Series switches for HPE Storage dHCI, you must complete the following tasks.
**NOTE**
In addition to two switch MGMT0 IP addresses, a third IP address for the MLAG VIP is required in the same subnet as the MGMT0 ports. MLAG requires that the MGMT0 ports on the switches communicate and will not work if you use MGMT1. For more information about the HPE M-Series Switch Series, see the HPE Support Center website.

1. Set up the initial configuration on new and factory-default HPE M-Series switches, and update both switches to the latest ONYX release.
2. Set up the inter-peer link (IPL) port-channel and the MLAG configuration.
4. Create the VLANs needed.
5. Assign the VLANs and configure jumbo frames and flow control.
6. Configure spanning tree.
7. Set up the inter-peer link (IPL) port-channel and the MLAG configuration.
8. Configure an MLAG port-channel uplink for the VM hosts. (one 2x40 Gbps MLAG port-channel is illustrated as an example).
9. Secure the remaining interfaces.

**Task 1: Set up the initial configuration on the HPE M-Series switches**

1. Configure the switches (which in this process are assumed to be factory-default configured):
   a. Verify that at initial boot and connection to the serial or console port on the switch, the HPE M-Series setup wizard automatically started and attempted to enter automatic configuration.
   b. Log in as admin and use admin as the password.
      You must enter a password even if reusing the default password.
   c. In configuration-terminal mode, run the following commands on HPE M-Series switch 1.
      
      Note: The following example uses [0.0.0.0/0] for the IPv4 address and the mask len. You must supply the correct value for your system.

      Do you want to use the wizard for initial configuration? y
      
      Step 1: Hostname? [switch-5256F0] netswitch1_mgmt
      Step 2: Use DHCP on mgmt0 interface? [yes] no
      Step 3: Use zeroconf on mgmt0 interface? [no]
      Step 4: Primary IPv4 address and masklen? [0.0.0.0/0]
      Step 5: Default gateway? mgmt_net_gw_IP
      Step 6: Primary DNS server? mgmt_net_DNSA_IP
      Step 7: Domain name? mgmt_net_domain_name
      Step 8: Enable IPv6? [yes]
      Step 9: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no]
      Step 10: Enable DHCPv6 on mgmt0 interface? [yes]
      Step 11: Admin password [Must be typed]? net_switch_admin_password
      Step 11: Confirm admin password? net_switch_admin_password
      Step 12: Monitor password [Must be typed]? net_switch_admin_password
      Step 12: Confirm monitor password? net_switch_admin_password

      The startup wizard should prompt you; if it does not, consider performing a factory reset.
   d. In configuration-terminal mode, run the following commands on HPE M-Series switch 2.
      
      Note: The following example uses [0.0.0.0/0] for the IPv4 address and the mask len. You must supply the correct value for your system.
Do you want to use the wizard for initial configuration? y

Step 1: Hostname? [switch-525710] net_switch2_mgmt
Step 2: Use DHCP on mgmt0 interface? [yes] no
Step 3: Use zeroconf on mgmt0 interface? [no]
Step 4: Primary IPv4 address and masklen? [0.0.0.0/0]
Step 5: Default gateway? mgmt_net_gw_IP
Step 6: Primary DNS server? mgmt_net_DNSA_IP
Step 7: Domain name? mgmt_net_domain_name
Step 8: Enable IPv6? [yes]
Step 9: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no]
Step 10: Enable DHCPv6 on mgmt0 interface? [yes]
Step 11: Admin password (Must be typed)? net_switch_admin_password
Step 11: Confirm admin password? net_switch_admin_password
Step 12: Monitor password (Must be typed)? net_switch_admin_password
Step 12: Confirm monitor password? net_switch_admin_password

The startup wizard should prompt you; if it does not, consider performing a factory reset.
Task 2: Set up the IPL port-channel and the MLAG configuration

1. Set up the IPL port-channel and configure the MLAG and buffer traffic pools to segregate iSCSI data from other network data.

**NOTE**
In addition to two switch MGMT0 IP addresses, a third IP address for the MLAG VIP is required in the same subnet as the MGMT0 port s. MLAG requires that the MGMT0 ports on the switches communicate.

a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

```plaintext
[HPE] enable
[HPE] configuration terminal
[HPE] ping net_switch2_mgmt     ##– verify responses and enter <ctrl> c
[HPE] ip routing vrf default
[HPE] ip igmp snooping
[HPE] protocol mlag
[HPE] lACP
[HPE] lldp
[HPE] logging monitor events notice
[HPE] cli default auto-logout 60
[HPE] traffic pool TCP type lossless
[HPE] traffic pool iscsi type lossless
[HPE] traffic pool TCP map switch-priority 0
[HPE] traffic pool iscsi map switch-priority 4
[HPE] interface ethernet 1/21-1/22 shutdown
[HPE] interface ethernet 1/21-1/22 speed 40G force     #speed 100G is the default
[HPE] interface ethernet 1/21 description mlag ipl
[HPE] interface ethernet 1/22 description mlag ipl
[HPE] dcb priority-flow-control enable force
[HPE] dcb application-priority tcp iscsi 4
[HPE] dcb priority-flow-control priority 4 enable
[HPE] interface ethernet 1/15-1/16 qos trust port
[HPE] interface ethernet 1/15-1/16 qos default switch-priority 4
[HPE] interface ethernet 1/15-1/16 qos rewrite pcp
[HPE] interface ethernet 1/2 qos trust port
[HPE] interface ethernet 1/2 qos default switch-priority 4
[HPE] interface ethernet 1/2 qos rewrite pcp
[HPE] interface ethernet 1/4 qos trust port
[HPE] interface ethernet 1/4 qos default switch-priority 4
[HPE] interface ethernet 1/4 qos rewrite pcp
[HPE] interface port-channel 10 ipl 1
[HPE] interface ethernet 1/21-1/22 channel-group 10 mode active
[HPE] interface port-channel 10 dcb priority-flow-control mode on force
[HPE] vlan 4094 name "MLAG ipl VLAN"
[HPE] exit
[HPE] interface vlan 4094 ip address mlag_private_ip1/mlag_private_netmask
[HPE] interface vlan 4094 ipl 1 peer-address mlag_private_ip2
[HPE] mlag-vip MLAG-F001 ip mlag-vip /mgmt_net_netmask force
[HPE] interface ethernet 1/21-1/22 no shutdown
[HPE] no mlag shutdown
[HPE] write memory
[HPE] show interface port-channel summary
[HPE] show mlag
[HPE] show traffic pool
[HPE] show buffer pool
```
e. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

```
[HPE] enable
[HPE] configuration terminal
[HPE] ip routing vrf default
[HPE] ip igmp snooping
[HPE] protocol mlag
[HPE] lacp
[HPE] lldp
[HPE] logging monitor events notice
[HPE] cli default auto-logout 60
[HPE] traffic pool TCP type lossless
[HPE] traffic pool iscsi type lossless
[HPE] traffic pool TCP map switch-priority 0
[HPE] traffic pool iscsi map switch-priority 4
[HPE] interface ethernet 1/21-1/22 shutdown
[HPE] interface ethernet 1/21-1/22 speed 40G force  #speed 100G is the default
[HPE] interface ethernet 1/21 description mlag ipl
[HPE] interface ethernet 1/22 description mlag ipl
[HPE] dcb priority-flow-control enable force
[HPE] dcb application-priority tcp iscsi 4
[HPE] dcb priority-flow-control priority 4 enable
[HPE] interface ethernet 1/15-1/16 qos trust port
[HPE] interface ethernet 1/15-1/16 qos default switch-priority 4
[HPE] interface ethernet 1/15-1/16 qos rewrite pcp
[HPE] interface ethernet 1/2 qos trust port
[HPE] interface ethernet 1/2 qos default switch-priority 4
[HPE] interface ethernet 1/2 qos rewrite pcp
[HPE] interface ethernet 1/4 qos trust port
[HPE] interface ethernet 1/4 qos default switch-priority 4
[HPE] interface ethernet 1/4 qos rewrite pcp
[HPE] interface port-channel 10 ipl 1
[HPE] interface ethernet 1/21-1/22 channel-group 10 mode active
[HPE] interface port-channel 10 dcb priority-flow-control mode on force
[HPE] vlan 4094 name "MLAG ipl VLAN"
[HPE] exit
[HPE] interface vlan 4094 ip address mlag_private_ip2/mlag_private_netmask
[HPE] interface vlan 4094 ip 1 peer-address mlag_private_ip1
[HPE] mlag-vip MLAG-FOO1 ip mlag-vip my-vipswitch
[HPE] interface ethernet 1/21-1/22 no shutdown
[HPE] write memory
[HPE] show interface port-channel summary
[HPE] show mlag
[HPE] show traffic pool
[HPE] show buffer pool
```

**NOTE**

Switch prompts are not displayed in the remaining steps of this configuration example.

---

**Task 3: Configure NTP**

1. Configure the local time and date, and enable NTP:

   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
enable
callout
ntpc
ntpd
write memory
ntps
```

```
**Task 4: Create the VLANs needed**

1. Create the required VLANs and the VLAN interfaces needed:

   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   enable
   configuration terminal
   vlan <<mgmt_net_vlan>> name MGMT-VLAN
   exit
   vlan <<iscsi_san_a_vlan>> name iSCSI-SAN-A-VLAN  # Both iSCSI VLANS should be defined in both M-Series switches
   exit
   vlan <<iscsi_san_b_vlan>> name iSCSI-SAN-B-VLAN  # Both iSCSI VLANS should be defined in both M-Series switches
   quit
   vlan <<vm.production_net_1_vlan>> name VM-Production-VLAN1
   exit
   vlan <<dead_net_vlan>> name Dead-Network  # Dead-Network for unused ports
   exit
   write memory
   ```

**Task 5: Add individual port descriptions for troubleshooting**

1. Add individual port descriptions for troubleshooting activity and verification:

   a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

   ```
   enable
   configuration terminal
   interface ethernet 1/15 description <<nimble1_system_name>>-CA-tg1a
   interface ethernet 1/16 description <<nimble1_system_name>>-CB-tg1a
   interface Ethernet 1/21 description MLAG DO NOT MODIFY
   interface Ethernet 1/22 description MLAG DO NOT MODIFY
   interface ethernet 1/1 description <<mgmt_server_1_hostname>>-Port1
   interface ethernet 1/2 description <<mgmt_server_1_hostname>>-iSCSI-Port1
   interface ethernet 1/3 description <<mgmt_server_2_hostname>>-Port1
   interface ethernet 1/4 description <<mgmt_server_2_hostname>>-iSCSI-Port1
   interface ethernet 1/5 description <<mgmt_server_2_hostname>>-ILO
   interface ethernet 1/7 description <<nimble_system_name>>-MGMT-CA-Port1
   interface ethernet 1/8 description <<nimble_system_name>>-MGMT-CB-Port1
   write memory
   ```

   f. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

   ```
   enable
   configuration terminal
   interface ethernet 1/15 description <<nimble1_system_name>>-CA-tg1b
   interface ethernet 1/16 description <<nimble1_system_name>>-CB-tg1b
   interface Ethernet 1/21 description MLAG DO NOT MODIFY
   interface Ethernet 1/22 description MLAG DO NOT MODIFY
   interface ethernet 1/1 description <<mgmt_server_1_hostname>>-Port2
   interface ethernet 1/2 description <<mgmt_server_1_hostname>>-iSCSI-Port2
   interface ethernet 1/3 description <<mgmt_server_2_hostname>>-Port2
   interface ethernet 1/4 description <<mgmt_server_2_hostname>>-iSCSI-Port2
   interface ethernet 1/5 description <<mgmt_server_2_hostname>>-ILO
   interface ethernet 1/7 description <<nimble_system_name>>-MGMT-CA-Port2
   interface ethernet 1/8 description <<nimble_system_name>>-MGMT-CB-Port2
   write memory
   ```
Task 6: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the Management and VM Network VLANs for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   enable
   configuration terminal
   interface ethernet 1/1-1/18 speed 1G force       #speed 25G is the default
   interface ethernet 1/5 speed 1G force       #ilo speed is a 1G port

   interface ethernet 1/1 switchport mode hybrid
   interface ethernet 1/1 switchport hybrid allowed-vlan none
   interface ethernet 1/1 switchport hybrid allowed-vlan add <<vm_production_net_1_vlan>>
   interface ethernet 1/1 switchport access vlan <<mgmt_net_vlan>>

   interface ethernet 1/3 switchport mode hybrid
   interface ethernet 1/3 switchport hybrid allowed-vlan none
   interface ethernet 1/3 switchport hybrid allowed-vlan add <<vm_production_net_1_vlan>>
   interface ethernet 1/3 switchport access vlan <<mgmt_net_vlan>>
   write memory

   interface ethernet 1/7-1/8 switchport access vlan <<mgmt_net_vlan>>
   interface ethernet 1/5 switchport access vlan <<ilo_vlan>>       #ilo connection to M-series assumed
   write memory
   ```

2. Configure management VLANs for the HPE Storage management interface and server iLO VLAN (Management VLAN or iLO VLAN):
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   interface ethernet 1/7-1/8 switchport access vlan <<mgmt_net_vlan>>
   interface ethernet 1/5 switchport access vlan <<ilo_vlan>>       #ilo connection to M-series assumed
   write memory
   ```

3. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

   ```
   interface ethernet 1/2
   switchport access vlan <<iscsi_san_a_vlan>>
   flowcontrol receive on force
   flowcontrol send on force
   mtu 9216 force
   no shutdown
   exit

   interface ethernet 1/4
   switchport access vlan <<iscsi_san_a_vlan>>
   flowcontrol receive on force
   flowcontrol send on force
   mtu 9216 force
   no shutdown
   exit
   write memory
   ```
g. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

```plaintext
interface ethernet 1/2
switchport access vlan <iscsi_san_b_vlan>
flowcontrol receive on force
flowcontrol send on force
mtu 9216 force
no shutdown
exit

interface ethernet 1/4
switchport access vlan <iscsi_san_b_vlan>
flowcontrol receive on force
flowcontrol send on force
mtu 9216 force
no shutdown
exit

write memory
```

4. Configure iSCSI VLANs, flow control, and jumbo frames for each port on the HPE Storage array:
   a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

```plaintext
interface ethernet 1/15-1/16
switchport access vlan <iscsi_san_a_vlan>
flowcontrol receive on force
flowcontrol send on force
mtu 9216 force
no shutdown
exit
write memory
```

h. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

```plaintext
interface ethernet 1/15-1/16
speed 10G force
switchport access vlan <iscsi_san_b_vlan>
flowcontrol receive on force
flowcontrol send on force
mtu 9216 force
no shutdown
exit
write memory
```

**Task 7: Configure spanning tree**

1. Configure spanning tree for each HPE ProLiant and HPE Storage interface that is used for iSCSI:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```plaintext
spanning-tree mode cpvst
spanning-tree port type edge default
interface ethernet 1/1-1/5 spanning-tree port type edge
interface ethernet 1/7-1/8 spanning-tree port type edge
interface ethernet 1/15-1/16 spanning-tree port type edge
write memory
```

Setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports will transition directly to the forwarding state in the spanning tree topology.

**Task 8: Uplink into the existing network infrastructure**

Depending on your network infrastructure and connectivity requirements, you might use various layer 2 or layer 3 methods to connect the HPE Nimble Storage dHCI solution to the network. This section provides an example of how to create an MLAG port-channel to uplink the HPE M-Series switch to your existing switch environment.
1. Configure one uplink per HPE M-series switch to be aggregated in an MLAG port-channel:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   interface mlag-port-channel 80
   interface ethernet 1/20 speed 40G force
   interface ethernet 1/20 lacp rate fast "no lacp rate fast" is slow and depends on upstream switch
   interface ethernet 1/20 mlag-channel-group 80 mode active "mode on" depends on upstream switch
   interface mlag-port-channel 80 switchport mode hybrid
   interface mlag-port-channel 80 switchport hybrid allowed-vlan none
   interface mlag-port-channel 80 switchport hybrid allowed-vlan add <<vm_production_net_1_vlan>>
   interface mlag-port-channel 80 switchport access vlan <<mgmt_net_vlan>>
   interface mlag-port-channel 80 switchport mode active
   interface mlag-port-channel 80 flowcontrol send on force
   interface mlag-port-channel 80 flowcontrol receive on force
   interface mlag-port-channel 80 mtu 9216 force #mtu 1520 is the default; depends on upstream switch
   interface mlag-port-channel 80 no shutdown
   show interfaces mlag-port-channel summary
   ```

Task 9: Secure the remaining interfaces
1. Secure the rest of the switch by shutting down the unused ports and putting them in your <<dead_net_vlan>>:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   interface ethernet 1/6 shutdown
   interface ethernet 1/9-1/14 shutdown
   interface ethernet 1/17-1/19 shutdown
   interface ethernet 1/6 switchport mode access
   interface ethernet 1/9-1/14 switchport mode access
   interface ethernet 1/17-1/19 switchport mode access
   interface ethernet 1/6 switchport access vlan <<dead_net_vlan>>
   interface ethernet 1/9-1/14 switchport access vlan <<dead_net_vlan>>
   interface ethernet 1/17-1/19 switchport access vlan <<dead_net_vlan>>
   write memory
   ```

**NOTE**
Save a copy of the configuration file or capture a `show run` output to a text file from each switch for future reference.

**HPE Aruba 8320 or 8325 configuration example to prepare for network automation**
If you are creating a new cluster, you can use the dHCI network automation feature to complete your switch setup. This feature uses the dHCI Stack wizard to gather information from your array about the connected HPE Aruba 8320 or 8325 switches and then prompts you for information to complete the setup.

To use the network automation feature, you must have:

- Made sure that the switches are running the HPE firmware version specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.
- Created a new cluster. This feature does not work with existing clusters.
- Provided a password for the dHCI switch administrator, which has the user name switch_admin.
- Completed the following manual steps before starting the dHCI setup using the the deployment tool's Stack wizard.

**NOTE**
If you do not set up the initial cabling correctly, you will not be able to use the dHCI network automation feature. The dHCI Stack wizard checks to see that you have a management port and data port connected to one switch and a second management port and data port connected to another switch.
Complete the following tasks to perform the initial configuration of the HPE Aruba 83xx switches for HPE Storage dHCI. When you set up your dHCI configuration, the Stack wizard will use this information for the dHCI network automation feature.

1. Set up the initial configuration on Aruba 83xx switches 1 and 2.
2. Set up the virtual switching extension (VSX) configuration.
3. Configures a management network VLAN on all remaining ports under access (do not configure tag or trunk ports)
4. Interconnect Aruba 83xx switches with the customer network.
Task 1: Set up the initial configuration on the HPE Aruba 83xx switches

1. Configure HPE Aruba 83xx switch 1:
   a. If you are using serial cable to connect to the console, specify the required speed of 115,200 baud.
   b. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   c. Specify three ports at minimum: two for VSX and one for the VSX keepalive mechanism.

2. Log in as admin. When prompted for a password, press Enter:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   8325#config
   8325(config)#user admin password
   8325(config)# interface mgmt
   8325(config)# interface mgmt
   8325(config-if-mgmt)# no shutdown
   8325(config-if-mgmt)# ip static net_switch1_mgmt_ip/mgmt_net_netmask
   8325(config-if-mgmt)# default-gateway mgmt_net_gw
   8325(config-if-mgmt)# exit
   8325(config)# write memory
   ```

3. Configure HPE Aruba 83xx switch 2:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.

4. Log in as admin. When prompted for a password, press Enter:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   8325#config
   8325(config)#user admin password
   8325(config)# interface mgmt
   8325(config)# interface mgmt
   8325(config-if-mgmt)# no shutdown
   8325(config-if-mgmt)# ip static net_switch2_mgmt_ip/mgmt_net_netmask
   8325(config-if-mgmt)# default-gateway mgmt_net_gw
   8325(config-if-mgmt)# exit
   8325(config)# write memory
   ```

5. Enable an interface group:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   8325#config
   8325(config)# system interface-group 1 speed 10g
   8325(config)# system interface-group 2 speed 10g
   8325(config)# system interface-group 3 speed 10g
   8325(config)# system interface-group 4 speed 10g
   8325(config)# write memory
   ```

   Your interface group might differ from what is shown in the example. For more information, see the user guide for your HPE Aruba switch.

6. Set the management address to IPv4 on both switches.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   8325#config terminal
   8325(config)# lldp management-ipv4-address <<switch_ip_address>>
   8325(config)# write memory
   ```

**NOTE**

Switch prompts are not displayed in the remaining steps of this configuration example.
Task 2: Set up the VSX configuration

1. Configure the link aggregation group (LAG) that will be used for VSX:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```plaintext
   config
   interface lag 99
   no shutdown
   no routing
   lACP mode active
   vlan trunk native 1 tag
   vlan trunk allowed all
   int 1/1/48
   lag 99
   int 1/1/49
   lag 99
   ```

7. Configure an interface to be used for the VSX keepalive connection:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```plaintext
   interface 1/1/43
   no routing
   ip address net_switch1_vsx_ip/vsx_net_netmask
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```plaintext
   interface 1/1/43
   no routing
   ip address net_switch2_vsx_ip/vsx_net_netmask
   ```

8. Configure the VSX role:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```plaintext
   config
   vsx
   role primary exit
   write memory
   ```

   i. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```plaintext
   config
   vsx
   role secondary exit
   write memory
   ```

9. Enable the VSX keepalive interface:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```plaintext
   config
   vsx
   keepalive peer net_switch2_vsx_ip source net_switch1_vsx_ip
   exit
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```plaintext
   config
   vsx
   keepalive peer net_switch1_vsx_ip source net_switch2_vsx_ip
   exit
   write memory
   ```
10. Verify that VSX is enabled and configured:
   a. In configuration-terminal mode, run the `sh vsx status` command to request a status report:

   ```
   config
   sh vsx status
   VSX Operational State
   ---------------------
   ISL channel        : In-Sync
   ISL mgmt channel   : operational
   Config Sync Status : in-sync
   NAE                 : peer_reachable
   HTTPS Server       : peer_reachable
   
   Attribute       | Local          | Peer          |
   ---------------|----------------|---------------|
   ISL link        | lag99          | lag99         |
   ISL version     | 2              | 2             |
   Platform        | 8325           | 8325          |
   Software Version| GL.10.02.0001  | GL.10.02.0001 |
   Device Role     | secondary      | primary       |
   ```

   **Task 3: Configure a management network VLAN on all remaining ports in access**

1. Create the required management network VLAN. When you create the VLANs on switch 1, the `vsx-sync` command syncs them to switch 2.
   a. In configuration-terminal mode, run the following commands on switch 1:

   ```
   config terminal
   vlan <<mgmt_net_vlan>>
   description MGMT-VLAN
   vsx-sync
   exit
   ```

2. Configure all remaining ports (except VSX ports) in access mode with the VLAN ID the same as the management network VLAN. Adjust the ports as needed.
   a. In configuration-terminal mode, run the following commands on both switches:

   ```
   configure terminal
   int 1/1/1-1/1/44,1/1/49-1/1/56
   -if-<1/1/1-1/1/44,1/1/49-1/1/56># vlan access 3530
   -if-<1/1/1-1/1/44,1/1/49-1/1/56># end
   write memory
   ```
Task 4: Interconnect the Aruba Switches with the Customer Network

If you do not perform this task, the switches will not be able to reach the customer environment, including the DNS, NTP, vCenter plugin, and so on.

1. Create MC-LAG interface. Adjust the lag ID as required.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch:

   ```
   configure terminal
   interface lag 1 multi-chassis
   vsx-sync vlans
   description MC-LAG
   no shutdown
   no routing
   vlan trunk native <<mgmt_net_vlan>>
   vlan trunk allowed all (or Trunk only VLANs you want)
   lACP mode active
   ```

2. Add physical interfaces into the multichassis interface.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch:

   ```
   configure terminal
   interface 1/1/<<MC_LAG_PORT_ID>>
   no routing
   no shutdown
   lag 1
   ```

3. Repeat these steps for the second Aruba 83xx switch.

HPE Aruba 8320 or 8325 configuration example using manual steps

The following procedures describe how to configure the HPE Aruba 8320 or 8325 switches for use in an HPE Storage dHCI environment. Before configuring the switches, make sure that they are running the HPE firmware version specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

To configure the HPE Aruba 83xx switches for HPE Storage dHCI, you must complete the following tasks:

1. Set up the initial configuration on Aruba 83xx switches 1 and 2.
2. Set up the virtual switching extension (VSX) configuration.
3. Configure NTP.
4. Create the VLANs needed.
5. Add individual port descriptions for troubleshooting.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Configure spanning tree.
8. Interconnect Aruba 83xx switches with the customer network.
9. Secure the remaining interfaces.
Task 1: Set up the initial configuration on the HPE Aruba 83xx switches

1. Configure HPE Aruba 83xx switch 1:
   a. If you are using serial cable to connect to the console, specify the required speed of 115,200 baud.
   b. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   c. Specify three ports at minimum: two for VSX and one for the VSX keepalive mechanism.

2. Log in as admin. When prompted for a password, press Enter:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   8325#config
   8325(config)#user admin password
   8325(config)# interface mgmt
   8325(config)# interface mgmt
   8325(config-if-mgmt)# no shutdown
   8325(config-if-mgmt)# ip static net_switch1_mgmt_ip/mgmt_net_netmask
   8325(config-if-mgmt)# default-gateway mgmt_net_gw
   8325(config-if-mgmt)# exit
   8325(config)# write memory
   ```

3. Configure HPE Aruba 83xx switch 2:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.

4. Log in as admin. When prompted for a password, press Enter:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   8325#config
   8325(config)#user admin password
   8325(config)# interface mgmt
   8325(config)# interface mgmt
   8325(config-if-mgmt)# no shutdown
   8325(config-if-mgmt)# ip static net_switch2_mgmt_ip/mgmt_net_netmask
   8325(config-if-mgmt)# default-gateway mgmt_net_gw
   8325(config-if-mgmt)# exit
   8325(config)# write memory
   ```

5. Enable an interface group:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   8325#config
   8325(config)# system interface-group 1 speed 10g
   8325(config)# system interface-group 2 speed 10g
   8325(config)# system interface-group 3 speed 10g
   8325(config)# system interface-group 4 speed 10g
   8325(config)# write memory
   ```

   Your interface group might differ from what is shown in the example. For more information, see the user guide for your HPE Aruba switch.

**NOTE**

Switch prompts are not displayed in the remaining steps of this configuration example.
Task 2: Set up the VSX configuration

1. Configure the link aggregation group (LAG) that will be used for VSX:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   config
   interface lag 99
   no shutdown
   no routing
   lacp mode active
   vlan trunk native 1 tag
   vlan trunk allowed all
   int 1/1/48
   lag 99
   int 1/1/49
   lag 99
   ```

2. Configure an interface to be used for the VSX keepalive connection:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   interface 1/1/43
   no routing
   ip address net_switch1_vsx_ip/vsx_net_netmask
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   interface 1/1/43
   no routing
   ip address net_switch2_vsx_ip/vsx_net_netmask
   ```

3. Configure the VSX role:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   vsx
   role primary exit
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   config
   vsx
   role secondaryexit
   write memory
   ```

4. Enable the VSX keepalive interface:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   vsx
   keepalive peer net_switch2_vsx_ip source net_switch1_vsx_ip
   exit
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   config
   vsx
   keepalive peer net_switch1_vsx_ip source net_switch2_vsx_ip
   exit
   write memory
   ```
5. Verify that VSX is enabled and configured:
   
a. In configuration-terminal mode, run the `sh vsx status` command to request a status report:

```
config

sh vsx status

VSX Operational State
---------------------
ISL channel : In-Sync
ISL mgmt channel : operational
Config Sync Status : in-sync
NAE : peer_reachable
HTTPS Server : peer_reachable

Attribute       Local               Peer
------------      --------            --------
ISL link         lag99               lag99
ISL version      2                   2
Platform         8325                8325
Software Version GL.10.02.0001      GL.10.02.0001
Device Role      secondary           primary
```

Task 3: Configure NTP
1. Configure the local time and date, and enable NTP:
   
a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
config

ntp server <<mgmt_net_ntp1>>
ntp enable
write memory
```
Task 4: Create the VLANs needed

1. Create the required VLANs and the VLAN interfaces needed.

   When you create the VLANs on switch 1, the `vsx-sync` command syncs them to switch 2.

   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   vlan <<mgmt_net_vlan>>
   description MGMT-VLAN
   vsx-sync
   exit

   vlan <<iscsi_san_a_vlan>>
   description iSCSI-SAN-A-VLAN
   vsx-sync
   exit

   vlan <<iscsi_san_b_vlan>>
   description iSCSI-SAN-B-VLAN
   vsx-sync
   exit

   vlan <<vm_production_net_1_vlan>>
   description VM-Production-VLAN
   vsx-sync
   exit

   vlan <<ilo_vlan>>
   description ILO-VLAN
   vsx-sync
   exit

   vlan <<dead_net_vlan>>
   description Dead-Network for unused ports
   vsx-sync
   exit

   write memory
   ```
Task 5: Add individual port descriptions for troubleshooting

1. Add individual port descriptions for troubleshooting activity and verification:

   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   interface 1/1/15
description <<nimble1_system_name>>-CA-tg1a
exit
interface 1/1/16
description <<nimble1_system_name>>-CB-tg1a
exit
interface 1/1/43
description VSX Keep Alive DO NOT MODIFY
exit
interface 1/1/48
description VSX DO NOT MODIFY
exit
interface 1/1/49
description VSX DO NOT MODIFY
exit
interface 1/1/1
description <<mgmt_server_1_hostname>>-Port1
exit
interface 1/1/2
description <<mgmt_server_1_hostname>>-iSCSI-Port1
exit
interface 1/1/3
description <<mgmt_server_2_hostname>>-Port1
exit
interface 1/1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port1
interface 1/1/7
description <<nimble_system_name>>-MGMT-CA-Port1
exit
interface 1/1/8
description <<nimble_system_name>>-MGMT-CB-Port1
exit
interface 1/1/5
description <<mgmt_server_1_hostname>>-ILO
exit
write memory
```
b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

```bash
config
interface 1/1/15
  description <<nimble1_system_name>>-CA-tg1b
  exit
interface 1/1/16
  description <<nimble1_system_name>>-CB-tg1b
  exit
interface 1/1/43
  description VSX Keep Alive DO NOT MODIFY
  exit
interface 1/1/48
  description VSX DO NOT MODIFY
  exit
interface 1/1/49
  description VSX DO NOT MODIFY
  exit
interface 1/1/1
  description <<mgmt_server_1_hostname>>-Port2
  exit
interface 1/1/2
  description <<mgmt_server_1_hostname>>-iSCSI-Port2
  exit
interface 1/1/3
  description <<mgmt_server_2_hostname>>-Port2
  exit
interface 1/1/4
  description <<mgmt_server_2_hostname>>-iSCSI-Port2
interface 1/1/7
  description <<nimble_system_name>>-MGMT-CA-Port2
  exit
interface 1/1/8
  description <<nimble_system_name>>-MGMT-CB-Port2
  exit
interface 1/1/5
  description <<mgmt_server_2_hostname>>-ILO
  exit
write memory
```

Task 6: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the **Management** and **VM Network** VLANs for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```bash
config
interface 1/1/1
  no routing
  vlan trunk native <<mgmt_net_vlan>>
  vlan trunk allowed <<vm_production_net_1_vlan>>
  exit
interface 1/1/3
  no routing
  vlan trunk native <<mgmt_net_vlan>>
  vlan trunk allowed <<vm_production_net_1_vlan>>
  exit
write memory
```
2. Configure management VLANs for the HPE Storage management interface for each management port on your HPE Storage array:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
config
interface 1/1/7
no routing
vlan access <<mgmt_net_vlan>>
exit
interface 1/1/8
no routing
vlan access <<mgmt_net_vlan>>
exit
write memory
```

3. Configure management or ILO VLANs for the HPE ProLiant server iLO interface for each iLO port in your environment:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
config
interface 1/1/5
no routing
  vlan access <<mgmt_net_vlan>> or <<ilo_vlan>>
exit
write memory
```

4. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

```
config
interface 1/1/2
no routing
  vlan access <<iscsi_san_a_vlan>>
  flow-control rx
  mtu 9198
interface 1/1/4
no routing
  vlan access <<iscsi_san_a_vlan>>
  flow-control rx
  mtu 9198
exit
```
   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:
5. Configure iSCSI VLANs, flow control, and jumbo frames for each port on your HPE Storage array:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   config
   interface 1/1/2
   no routing
   vlan access <<iscsi_san_b_vlan>>
   flow-control rx
   mtu 9198
   
   interface 1/1/4
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rx
   mtu 9198
   
   exit
   write memory
   ```

   ```
   config
   interface 1/1/15
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rx
   mtu 9198
   
   interface 1/1/16
   no routing
   vlan access <<iscsi_san_b_vlan>>
   flow-control rx
   mtu 9198
   
   exit
   write memory
   ```

**Task 7: Configure spanning tree**

Setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports directly transition to the forwarding state in the spanning tree topology.

1. Configure spanning tree for each HPE ProLiant server and HPE Storage interface that is used for iSCSI:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:
spanning-tree mode rpvst
interface 1/1/2
  spanning-tree port-type admin-edge
interface 2/1/2
  spanning-tree port-type admin-edge
interface 1/1/4
  spanning-tree port-type admin-edge
interface 2/1/4
  spanning-tree port-type admin-edge
interface 1/1/15
  spanning-tree port-type admin-edge
interface 2/1/15
  spanning-tree port-type admin-edge
interface 1/1/16
  spanning-tree port-type admin-edge
interface 2/1/16
  spanning-tree port-type admin-edge
write memory
Task 8: Interconnect the Aruba Switches with the Customer Network

If you do not perform this task, the switches will not be able to reach the customer environment, including the DNS, NTP, vCenter plugin, and so on.

1. Create MC-LAG interface. Adjust the lag ID as required.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch:

   ```
   8325# configure terminal
   8325(config)#interface lag 1 multi-chassis
   8325(config)#vsx-sync vlans
   8325(config)#description MC-LAG
   8325(config)#no shutdown
   8325(config)#no routing
   8325(config)#vlan trunk native <<mgmt_net_vlan>>
   8325(config)#vlan trunk allowed all (or Trunk only VLANs you want)
   8325(config)#lacp mode active
   ```

2. Add physical interfaces into the multichassis interface.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch:

   ```
   8325# configure terminal
   8325(config)#interface 1/1/<<MC_LAG_PORT_ID>>
   8325(config)#no routing
   8325(config)#no shutdown
   8325(config)#lag 1
c
   8325(config)#interface 1/1/9-1/1/14
   8325(config)#no routing
   8325(config)#vlan access <<dead_net_vlan>>

   write memory
   ```

3. Repeat these steps for the second Aruba 83xx switch.

Task 9: Secure the remaining interfaces

1. Secure the rest of the switch by shutting down the unused ports and putting them into your <<dead_net_vlan>>:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   config
   interface 1/1/9-1/1/14
   no routing
   vlan access <<dead_net_vlan>>

   write memory
   ```
HPE Aruba 6300 configuration example

The following procedures describe how to configure the HPE Aruba 6300 switches for use in an HPE Storage dHCI environment. Before configuring the switches, make sure that they are running the HPE firmware version specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

To configure the HPE Aruba 6300 switches for HPE Storage dHCI you must complete the following tasks:

1. Set up the initial configuration on Aruba 6300 switches 1 and 2.
2. Set up the virtual switching framework (VSF) configuration.
3. Configure NTP.
4. Create the VLANs needed.
5. Add individual port descriptions for troubleshooting.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Configure spanning tree.
8. Secure the remaining interfaces.

Task 1: Set up the initial configuration on HPE Aruba 6300 switches

1. Configure HPE Aruba 6300 switch 1:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.
   j. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   k. Specify two ports for VSF.

2. Log in as admin and use admin as the password:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   6300(config)#user admin password
   6300(config)#interface mgmt
   6300(config-if-mgmt)#no shutdown
   6300(config-if-mgmt)#ip static net_switch1_mgmt_ip/mgmt_net_netmask
   6300(config-if-mgmt)#default-gateway mgmt_net_gw
   6300(config-if-mgmt)#exit
   6300(config)#write memory
   ```

3. Configure HPE Aruba 6300 switch 2:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.

4. Log in as admin and use admin as the password:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 2:

   ```
   6300(config)#user admin password
   6300(config)#interface mgmt
   6300(config)#interface mgmt
   6300(config-if-mgmt)#no shutdown
   6300(config-if-mgmt)#ip static net_switch2_mgmt_ip/mgmt_net_netmask
   6300(config-if-mgmt)#default-gateway mgmt_net_gw
   6300(config-if-mgmt)#exit
   6300(config)#write memory
   ```

**NOTE**
Switch prompts are not displayed in the remaining steps of this configuration example.
**Task 2: Set up the VSF configuration**

1. Configure the ports that will be used for VSF:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   configure
   vsf member 1
   link 1 1/1/25
   link 2 1/1/26
   ```

   1. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 2:

   ```
   configure
   vsf member 2
   link 1 1/1/25
   link 2 1/1/26
   exit
   vsf renumber-to 2
   This will save the VSF configuration and reboot the switch.
   Do you want to continue [y/n] ? y
   ```

   The switch reboots after it executes the `renumber` command. This action causes the second switch (member 2) to join the stack if VSF link cables are connected, with the first switch (member 1) as the master.

2. Verify that the second switch (member 2) is now linked, with the first switch (member 1) as the master:
   a. In configuration-terminal mode, run the `show vsf` command on the first switch (member 1):

   ```
   switch# show vsf
   MAC Address               : 38:21:c7:5d:d0:c0
   Secondary                 :
   Topology                  : Ring
   Status                    : No Split
   Split Detection Method    : None
   Mbr Mac Address          type          Status
   ID
   ----------------------- -------------- ---------------
   1 38:21:c7:5d:d0:c0     JL668A         Master
   2 38:21:c7:6a:10:c0     JL668A         Member
   ```

**NOTE**

Because the two switches were linked in step 1, the remaining configuration tasks are performed only on HPE Aruba 6300 switch 1.

3. Configure VSF split detection:
   a. In configuration-terminal mode, run the following command on HPE Aruba 6300 switch 1:

   ```
   vsf split-detect mgmt
   ```

**Task 3: Configure NTP**

1. Configure the local time and date, and enable NTP:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   config
   ntp server <<mgmt_net_ntp1>>
   ntp enable
   write memory
   ```
**Task 4: Create the VLANs needed**

1. Create the required VLANs and the VLAN interfaces needed:
   
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   vlan <<mgmt_net_vlan>>
   description MGMT-VLAN
   exit

   vlan <<iscsi_san_a_vlan>>
   description iSCSI-SAN-A-VLAN
   exit

   vlan <<iscsi_san_b_vlan>>
   description iSCSI-SAN-B-VLAN
   exit

   vlan <<vm_production_net_1_vlan>>
   description VM-Production-VLAN1
   exit

   vlan <<dead_net_vlan>>
   description Dead-Network for unused ports
   exit

   write memory
   ```

**Task 5: Add individual port descriptions for troubleshooting**

1. Add individual port descriptions for troubleshooting activity and verification:
   
   a. In configuration-terminal mode, run the following commands on Aruba 6300 switch 1:

   ```
   interface 1/1/15
   description <<nimble1_system_name>>-CA-tg1a
   exit

   interface 2/1/15
   description <<nimble1_system_name>>-CA-tg1a
   exit

   interface 1/1/16
   description <<nimble1_system_name>>-CB-tg1b
   exit

   interface 2/1/16
   description <<nimble1_system_name>>-CB-tg1b
   exit

   interface 1/1/25
   description VSF DO NOT MODIFY
   exit

   interface 1/1/26
   description VSF DO NOT MODIFY
   exit

   interface 2/1/25
   description VSF DO NOT MODIFY
   exit

   interface 2/1/26
   description VSF DO NOT MODIFY
   exit

   interface 1/1/1
   description <<mgmt_server_1_hostname>>-Port1
   exit

   interface 1/1/2
   description <<mgmt_server_1_hostname>>-iSCSI-Port1
   exit

   interface 2/1/1
   description <<mgmt_server_1_hostname>>-Port2
   exit
   ```
interface 2/1/2
description <<mgmt_server_1_hostname>>-iSCSI-Port2
exit
interface 1/1/3
description <<mgmt_server_2_hostname>>-Port1
exit
interface 1/1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port1
exit
interface 2/1/3
description <<mgmt_server_2_hostname>>-Port2
exit
interface 2/1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port2
exit
interface 1/1/5
description <<mgmt_server_1_hostname>>-ILO
exit
interface 2/1/5
description <<mgmt_server_2_hostname>>-ILO
exit
interface 1/1/7
description <<nimble_system_name>>-MGMT-CTRLA-Port1
exit
interface 2/1/7
description <<nimble_system_name>>-MGMT-CTRLB-Port1
exit
interface 1/1/8
description <<nimble_system_name>>-MGMT-CTRLA-Port2
exit
interface 2/1/8
description <<nimble_system_name>>-MGMT-CTRLB-Port2
exit
Task 6: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure Management and VM Network VLANs for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

   ```
   config
   interface 1/1/1
   no routing
   vlan trunk native <<mgmt_net_vlan>>
   vlan trunk allowed <<vm_production_net_1_vlan>>
   exit
   interface 1/1/3
   no routing
   vlan trunk native <<mgmt_net_vlan>>
   vlan trunk allowed <<vm_production_net_1_vlan>>
   write memory
   interface 2/1/1
   no routing
   vlan trunk native <<mgmt_net_vlan>>
   vlan trunk allowed <<vm_production_net_1_vlan>>
   exit
   interface 2/1/3
   no routing
   vlan trunk native <<mgmt_net_vlan>>
   vlan trunk allowed <<vm_production_net_1_vlan>>
   exit
   write memory
   ```

2. Configure management VLANs for the HPE Storage management interface for each management port on your HPE Storage array:

   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

   ```
   config
   interface 1/1/7
   no routing
   vlan access <<mgmt_net_vlan>>
   exit
   interface 2/1/7
   no routing
   vlan access <<mgmt_net_vlan>>
   exit
   interface 1/1/8
   no routing
   vlan access <<mgmt_net_vlan>>
   exit
   interface 2/1/8
   no routing
   vlan access <<mgmt_net_vlan>>
   exit
   write memory
   ```
3. Configure management or iLO VLANs for the HPE ProLiant server iLO interface for each iLO port in your environment:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

   ```shell
   config
   interface 1/1/5
   no routing
   vlan access <<mgmt_net_vlan>> or <<ilo_vlan>>
   exit
   interface 2/1/5
   no routing
   vlan access <<mgmt_net_vlan>> or <<ilo_vlan>>
   exit
   write memory
   ```

4. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

   ```shell
   config
   interface 1/1/2
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rxtx
   mtu 9198
   exit
   interface 2/1/2
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rxtx
   mtu 9198
   interface 2/1/4
   no routing
   vlan access <<iscsi_san_b_vlan>>
   flow-control rxtx
   mtu 9198
   interface 2/1/4
   no routing
   vlan access <<iscsi_san_b_vlan>>
   flow-control rxtx
   mtu 9198
   write memory
   ```
5. Configure iSCSI VLANs, flow control, and jumbo frames for each port on your HPE Storage array:
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

```
config
interface 1/1/15
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rxtx
mtu 9198
exit

interface 2/1/15
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rxtx
mtu 9198

config
interface 1/1/16
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rxtx
mtu 9198
exit

interface 2/1/16
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rxtx
mtu 9198

write memory
```

**Task 7: Configure spanning tree**

1. Configure spanning tree on each HPE ProLiant and HPE Storage interface that is used for iSCSI:
   a. In configuration-terminal mode, run the following commands on Aruba 6300 switch 1:

```
spanning-tree mode cpvst
interface 1/1/2
spanning-tree port-type admin-edge
interface 2/1/2
spanning-tree port-type admin-edge
interface 1/1/4
spanning-tree port-type admin-edge
interface 2/1/4
spanning-tree port-type admin-edge
interface 1/1/15
spanning-tree port-type admin-edge
interface 2/1/15
spanning-tree port-type admin-edge
interface 1/1/16
spanning-tree port-type admin-edge
interface 2/1/16
spanning-tree port-type admin-edge

write memory
```

Setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports directly transition to the forwarding state in the spanning tree topology.
Task 8: Secure the remaining interfaces

1. Secure the rest of the switch by shutting down the unused ports and putting them into your `<<dead_net_vlan>>`:

   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   config
   interface 1/1/9-1/1/14
   no routing
   vlan access <<dead_net_vlan>>
   write memory
   ```

HPE FlexFabric configuration example

This section describes how to configure HPE FlexFabric switches for use in the HPE Storage dHCI environment. Before configuring the switches, make sure that they are running the version of HPE Comware that is specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

Although the following example uses HPE FlexFabric 5700, it can easily be adapted to a different HPE FlexFabric model by adjusting the ports accordingly.

To configure the HPE FlexFabric switches for HPE Storage dHCI, you must complete the following tasks:

1. Set up the initial configuration on HPE FlexFabric switches 1 and 2.
2. Set up the IRF configuration.
3. Configure multi-active detection (MAD) and remote access to the switch.
4. Configure the IRF priority.
5. Configure a local user and enable SSH.
6. Configure NTP.
7. Create the VLANs needed.
8. Configure the management interface.
9. Specify the switch name.
10. Convert the chassis working mode.
11. Add individual port descriptions for troubleshooting.
12. Assign the VLANs and configure jumbo frames and flow control.
13. Configure spanning tree.
14. Secure the remaining interfaces.
15. Uplink into the existing network infrastructure.

Task 1: Set up the initial configuration on HPE FlexFabric switches

1. Set up the initial configuration on HPE FlexFabric switches 1 and 2 through the serial port:

   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.

   b. Interconnect the two switches by using QSFP+ or SFP+, depending on the switch model.

   c. Verify that at initial boot and connection to the serial or console port on the switch, the HPE Comware setup automatically started and attempted to enter automatic configuration.

   m. When the instructions call for network configuration in the system-view context, if you are at the `<<HPE>>` prompt, run the `system-view` command to get to the `[HPE]` prompt.
n. Run automatic configuration on both HPE FlexFabric switches.

Startup configuration file does not exist.
Started automatic configuration, press CTRL C or CTRL D to break.

Automatic configuration attempt: 1.
Not ready for automatic configuration: no interface available.
Waiting for the next...

Automatic configuration attempt: 2.
Interface used: M-GigabitEthernet0/0/0.
Enable DHCP client on M-GigabitEthernet0/0/0.
Automatic configuration is aborted.

Line aux0 is available. Press ENTER to get started. <HPE> system-view
System View: return to User View with Ctrl+Z.

Task 2: Set up the IRF configuration
Set up the initial IRF configuration for the HPE FlexFabric switches 1 and 2 through the serial port.

1. Configure the IRF ports on HPE FlexFabric switch 1.

[HPE] interface range FortyGigE 1/0/41 to FortyGigE 1/0/42
[HPE-if-range] shutdown
[HPE-if-range] quit

[HPE] irf
[HPE-irf-port1/1] port group interface FortyGigE 1/0/41
[HPE-irf-port1/1] port group interface FortyGigE 1/0/42
[HPE-irf-port1/1] quit
[HPE] save
The current configuration will be written to the device. Are you sure? [Y/N]: y
Please input the file name (*.cfg)[flash:/startup.cfg]
(To leave the existing filename unchanged, press the Enter key):

2. On HPE FlexFabric switch 2, change the IRF member ID and reboot the switch.

[HPE] irf member 1 renumber 2
Renumbering the member ID may result in configuration change or loss. Continue? [Y/N]: y

[HPE] save
The current configuration will be written to the device. Are you sure? [Y/N]: y
Please input the file name (*.cfg)[flash:/startup.cfg]
(To leave the existing filename unchanged, press the enter key):
Validating file. Please wait...
Saved the current configuration to mainboard device successfully.

[HPE] quit
HPE: reboot
Start to check configuration with next startup configuration file, please wait........DONE!
This command will reboot the device. Continue? [Y/N]: y
Now rebooting, please wait...
3. When the switch reboot is complete, configure the IRF ports on HPE FlexFabric switch 2.

   ```
   <HPE> system-view
   [HPE] interface range FortyGigE 2/0/41 to FortyGigE 2/0/42
   [HPE-if-range] shutdown
   [HPE-if-range] quit
   [HPE] irf-port 2/2
   [HPE-irf-port2/2] port group interface FortyGigE 2/0/41
   [HPE-irf-port2/2] port group interface FortyGigE 2/0/42
   [HPE-irf-port2/2] quit
   [HPE] irf-port-configuration active
   [HPE] interface range FortyGigE 2/0/41 to FortyGigE 2/0/42
   [HPE-if-range] undo shutdown
   [HPE-if-range] quit
   [HPE] save
   The current configuration will be written to the device. Are you sure? [Y/N]: y
   
   Please input the file name[* .cfg][flash:/startup.cfg]
   [To leave the existing filename unchanged, press the enter key]:
   flash:/startup.cfg exists, overwrite? [Y/N]: y
   Validating file. Please wait...
   Saved the current configuration to mainboard device successfully.
   [HPE]
   
   <HPE> system-view
   [HPE] irf-port-configuration active
   [HPE] interface range FortyGigE 1/0/41 to FortyGigE 1/0/42
   [HPE-if-range] undo shutdown
   [HPE-if-range] quit
   
   <HPE> interface M-GigabitEthernet 0/0/0 mad bfd enable
   mad ip address <<net_switch1_mad_ip>> <<mad_net_netmask>> member 1
   mad ip address <<net_switch2_mad_ip>> <<mad_net_netmask>> member 2
   quit
   ip route-static 0.0.0.0 0.0.0.0 <<mgmt_net_gw>>
   save
   ```

4. Back on HPE FlexFabric switch 1, enable the IRF ports and allow switch 2 to reboot to merge into the IRF fabric.

5. Wait for HPE FlexFabric switch 2 to reboot.

**NOTE**
From this point on, all configuration is performed only on switch 1. No further configuration is needed on switch 2 because the control and management planes have been merged as a part of the IRF configuration.

### Task 3: Configure MAD and remote access to the switch

Hewlett Packard Enterprise recommends that you implement a MAD mechanism to detect the presence of multiple identical IRF fabrics, handle collisions, and recover from faults in the unlikely event of an IRF split or failure. For more information, see the HPE FlexFabric 5700 IRF Configuration Guide. This guide uses the management links to configure the MAD Bidirectional Forwarding Detection (BFD) network protocol.

1. In system-view, run the following commands on HPE FlexFabric switch 1, substituting the values from the configuration worksheet:

   ```
   interface M-GigabitEthernet 0/0/0 mad bfd enable
   mad ip address <<net_switch1_mad_ip>> <<mad_net_netmask>> member 1
   mad ip address <<net_switch2_mad_ip>> <<mad_net_netmask>> member 2
   quit
   ip route-static 0.0.0.0 0.0.0.0 <<mgmt_net_gw>>
   save
   ```

   MAD IP addresses must be in a different subnet from the rest of the solution management. You cannot assign IP addresses for MAD or management by using the management port on the same subnet as the rest of the solution.

**NOTE**
Switch prompts are not displayed in the remaining steps of this configuration example.
Task 4: Configure the IRF priority
1. Configure the domain and IRF parameters.
   
   The <<net_switch_domain_id>> value is an arbitrary number, but it must be unique from other IRF domains.
   
   a. In system-view, run the following IRF commands on HPE FlexFabric switch 1:

   ```
   irf domain <<net_switch_domain_id>>
   irf member 1 priority 32
   irf member 2 priority 30
   irf mac-address persistent always
   ```

Task 5: Configure a local user and enable SSH
To secure access to the switch and provide remote access, you must create a local user and enable SSH.

1. Create the local administrator user and configure the virtual console and physical console ports for user name and password authentication:
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   local-user admin
   password simple <<net_switch_admin_password>>
   authorization-attribute user-role network-admin
   service-type ssh terminal
   quit
   
   user-interface vty 0 63
   authentication-mode scheme
   protocol inbound ssh
   quit
   
   user-interface aux 0 1
   authentication-mode scheme
   quit
   save
   ```

2. Create the public keys and enable SSH on the switch:
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   public-key local create rsa
   Input the modulus length [default = 1024]:2048
   
   public-key local create dsa
   Input the modulus length [default = 1024]:2048
   
   public-key local create ecdsa secp256r1
   ssh server enable
   save
   ```

Task 6: Configure NTP
1. Configure the local time and date, and enable NTP:
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   clock protocol none
   return
   
   clock datetime time<formatted as hh:mm:ss> date<formatted as MM/DD/YYYY>
   system-view
   
   ntp-service unicast-server <<mgmt_net_ntp1>> priority
   clock protocol ntp
   save
   ```
Task 7: Create the VLANs needed
1. Create the required VLANs and the VLAN interfaces needed:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```text
   vlan <<mgmt_net_vlan>>
   name MGMT-VLAN
   quit

   vlan <<iscsi_san_a_vlan>>
   name iSCSI-SAN-A-VLAN
   quit

   vlan <<iscsi_san_b_vlan>>
   name iSCSI-SAN-B-VLAN
   quit

   vlan <<vm_production_net_1_vlan>>
   name VM-Production-VLAN
   quit

   vlan <<dead_net_vlan>>
   name Dead-Network For unused ports
   quit
   ```

Task 8: Configure the management interface
1. Configure the management interface to enable you to use SSH to manage the switch:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```text
   interface M-GigabitEthernet0/0/0
   ip address <<net_switch1_mgmt_ip>><<mgmt_net_netmask>>
   ip route-static 0.0.0.0 0.0.0.0 <<mgmt_net_gw>>
   save
   ```

Task 9: Specify the switch name
You must set the switch name of the compute switch IRF to uniquely identify it. Changing the switch name changes the prompt from HPE to <<net_switch1_hostname>>.
1. SSH to the switch by using <<net_switch1_mgmt_ip>>, the user name admin, and the password <<net_switch_admin_password>>.
2. Set the switch name:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```text
   sysname <<net_switch1_hostname>>
   save
   ```

Task 10: Convert the chassis working mode
To configure the interfaces and the switch to use iSCSI, you must convert the system working mode. Before running the commands, make sure that both switches are merged into the IRF fabric.
1. Convert the chassis working mode:
   a. In system-view, run the following command on HPE FlexFabric switch 1:

   ```text
   system-working-mode advance
   Do you want to change the system working mode? [Y/N]: y
   ```

   The system working mode is changed, please save the configuration and reboot the system to make it effective.

   ```text
   return
   save
   reboot
   ```
Task 11: Add individual port descriptions for troubleshooting

1. Add individual port descriptions for troubleshooting activity and verification:

   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface Ten-GigabitEthernet 1/0/15
   description <<nimble1_system_name>>-CA-tg1a
   quit
   interface Ten-GigabitEthernet 1/0/16
   description <<nimble1_system_name>>-CB-tg1a
   quit
   interface Ten-GigabitEthernet 2/0/15
   description <<nimble1_system_name>>-CA-tg1b
   quit
   interface Ten-GigabitEthernet 2/0/16
   description <<nimble1_system_name>>-CB-tg1b
   quit
   interface range FortyGigE 1/0/41 to FortyGigE 1/0/42 FortyGigE 2/0/41 to FortyGigE 2/0/42
   description IRF DO NOT MODIFY
   quit
   interface Ten-GigabitEthernet 1/0/1
   description <<mgmt_server_1_hostname>>-Port1
   quit
   interface Ten-GigabitEthernet 1/0/2
   description <<mgmt_server_1_hostname>>-iSCSI-Port1
   quit
   interface Ten-GigabitEthernet 2/0/1
   description <<mgmt_server_1_hostname>>-Port2
   quit
   interface Ten-GigabitEthernet 2/0/2
   description <<mgmt_server_1_hostname>>-iSCSI-Port2
   quit
   interface Ten-GigabitEthernet 1/0/3
   description <<mgmt_server_2_hostname>>-Port1
   quit
   interface Ten-GigabitEthernet 1/0/4
   description <<mgmt_server_2_hostname>>-iSCSI-Port1
   quit
   interface Ten-GigabitEthernet 2/0/3
   description <<mgmt_server_2_hostname>>-Port2
   quit
   interface Ten-GigabitEthernet 2/0/4
   description <<mgmt_server_2_hostname>>-iSCSI-Port2
   quit
   interface Ten-GigabitEthernet 1/0/5
   description <<mgmt_server_1_hostname>>-ILO
   quit
   interface Ten-GigabitEthernet 2/0/5
   description <<mgmt_server_2_hostname>>-ILO
   quit
   interface Ten-GigabitEthernet 1/0/7
   description <<nimble_system_name>>-MGMT-CA-Port1
   quit
   interface Ten-GigabitEthernet 1/0/8
   description <<nimble_system_name>>-MGMT-CA-Port1
   quit
   interface Ten-GigabitEthernet 2/0/7
   description <<nimble_system_name>>-MGMT-CA-Port2
   quit
   interface Ten-GigabitEthernet 2/0/8
   description <<nimble_system_name>>-MGMT-CA-Port2
   quit
   ```
Task 12: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the **Management** and **VM network** VLANs on each HPE ProLiant server in your environment:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface ethernet Ten-GigabitEthernet 1/0/18
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   interface ethernet Ten-GigabitEthernet 1/0/3
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   interface ethernet Ten-GigabitEthernet 2/0/18
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   interface ethernet Ten-GigabitEthernet 2/0/3
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   save
   ```

   ```
   interface range Ten-GigabitEthernet 1/0/7 to Ten-GigabitEthernet 1/0/8
   port access vlan <<mgmt_net_vlan>>
   quit
   ```

   ```
   interface range Ten-GigabitEthernet 2/0/7 to Ten-GigabitEthernet 2/0/8
   port access vlan <<mgmt_net_vlan>>
   quit
   ```

   save

2. Configure management VLANs for the HPE Storage management interface:
   a. In system-view, run the following commands on HPE FlexFabric switch 1 for each management port on your HPE Storage array:

   ```
   interface range Ten-GigabitEthernet 1/0/7 to Ten-GigabitEthernet 1/0/8
   port access vlan <<mgmt_net_vlan>>
   quit
   ```

   ```
   interface range Ten-GigabitEthernet 2/0/7 to Ten-GigabitEthernet 2/0/8
   port access vlan <<mgmt_net_vlan>>
   quit
   ```

   save
3. Configure iSCSI VLANs and flow control for each HPE ProLiant server in your environment:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface ethernet Ten-GigabitEthernet 1/0/2
   port link-type access
   port access vlan <<iscsi_san_a_vlan>>
   flow-control
   quit
   interface ethernet Ten-GigabitEthernet 1/0/4
   port link-type access
   port access vlan <<iscsi San_a_vlan>>
   flow-control
   quit
   interface ethernet Ten-GigabitEthernet 2/0/2
   port link-type access
   port access vlan <<iscsi_san_b_vlan>>
   flow-control
   quit
   interface ethernet Ten-GigabitEthernet 2/0/4
   port link-type access
   port access vlan <<iscsi_san_b_vlan>>
   flow-control
   quit
   save
   ```

4. Configure iSCSI VLANs and flow control for each port on your HPE Storage array:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface range Ten-GigabitEthernet 1/0/15 to Ten-GigabitEthernet 1/0/16
   port link-type access
   port access vlan <<iscsi_san_a_vlan>>
   flow-control
   quit
   interface range Ten-GigabitEthernet 2/0/15 to Ten-GigabitEthernet 2/0/16
   port link-type access
   port access vlan <<iscsi_san_b_vlan>>
   flow-control
   quit
   save
   ```

**Task 13: Configure spanning tree**

To optimize the flow of storage traffic through the switches, it is best to configure flow control on the switch. Also, setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports directly transition to the forwarding state in the spanning tree topology.

1. Configure spanning tree on each HPE ProLiant server and HPE Storage interface that is used for iSCSI:
   a. In system-view, run the following commands on HPE FlexFabric switch 1:
burst-mode enable
interface range Ten-GigabitEthernet 1/0/15 to Ten-GigabitEthernet 1/0/16 Ten-GigabitEthernet 2/0/15 to Ten-GigabitEthernet 2/0/16
stp edged-port
interface ethernet Ten-GigabitEthernet 1/0/2
stp edged-port
interface ethernet Ten-GigabitEthernet 1/0/4
stp edged-port
interface ethernet Ten-GigabitEthernet 2/0/2
stp edged-port
interface ethernet Ten-GigabitEthernet 2/0/4
stp edged-port
quit
save
**Task 14: Secure the remaining interfaces**

1. Secure the rest of the switch by shutting down the unused ports and putting them into your `<<dead_net_vlan>>`:
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface range Ten-GigabitEthernet 1/2/9 Ten-GigabitEthernet 1/2/9 to Ten-GigabitEthernet 1/2/14
   port access vlan <<dead_net_vlan>>
   shutdown
   quit
   save
   ```

**Task 15: Uplink into the existing network infrastructure**

Depending on your network infrastructure and connectivity requirements, you might use various layer 2 or layer 3 methods to connect the HPE Nimble Storage dHCI solution to the network. If you have layer 2 connectivity, Hewlett Packard Enterprise recommends that you use bridge aggregations to uplink the HPE FlexFabric Series switches in the HPE Nimble Storage dHCI solution environment into the network infrastructure.

**Cisco Nexus configuration example**

This section describes how to configure the Cisco Nexus switches for use in the HPE Storage dHCI environment. Before configuring the switches, make sure they are running the version of Cisco Nexus OS that is specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

The following example uses Cisco Nexus 3000 Series switches. It can easily be adapted to a different model of Cisco Nexus by adjusting the ports accordingly.

To configure the Cisco Nexus switches for HPE Storage dHCI, you must complete the following tasks:

1. Set up the initial configuration on Cisco Nexus switches 1 and 2.
2. Enable the license.
3. Configure NTP.
4. Create the VLANs needed.
5. Add individual port descriptions for troubleshooting.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Create port-channels.
8. Configure virtual port-channels (vPCs).
9. Confirm that the vPC is active.
10. Secure the remaining interfaces.
11. Uplink into the existing network infrastructure.
**Task 1: Set up the initial configuration on Cisco Nexus switches**

1. Set up the initial configuration for Cisco Nexus switches 1 and 2 through the serial port:
   
a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.
   
o. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   
p. Verify that at initial boot and connection to the serial or console port on the switch, the NX-OS setup automatically starts and attempts to enter **Power on Auto Provisioning**.
   
q. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

```
Abort Auto Provisioning and continue with normal setup? [yes/no] [n]: yes
Disabling POAP

---- System Admin Account Setup ----
Do you want to enforce secure password standard [yes/no] [y]: yes
Enter the password for "admin": <<net_switch_admin_password>>
Confirm the password for "admin": <<net_switch_admin_password>>

---- Basic System Configuration Dialog VDC: 1 ----
This setup utility will guide you through the basic configuration of the system. Setup configures only enough connectivity for management of the system.

Would you like to enter the basic configuration dialog [yes/no]: yes
Create another login account [yes/no] [n]: Enter
Configure read-only SNMP community string [yes/no] [n]: yes

Enter the switch name: <<net_switch1_hostname>>
Continue with Out-of-band (mgmt0) management configuration? [yes/no] [y]: Enter
   Mgmt0 IPv4 address: <<net_switch1_mgmt_ip>>
   Mgmt0 IPv4 netmask: <<mgmt_net_netmask>>
   Configure the default gateway? [yes/no] [y]: Enter
   IPv4 address of the default gateway: <<mgmt_net_gw>>

Configure advanced IP options? [yes/no] [n]: Enter
   Enable the telnet service? [yes/no] [n]: Enter
   Enable the ssh service? [yes/no] [y]: Enter
   Type of ssh key you would like to generate (dsa/rsa): rsa
   Number of rsa key bits <1024-2048> [1024]: 2048

Configure the ntp server? [yes/no] [n]: y
   NTP server IPv4 address: mgmt_net_ntp1

Configure default interface layer [L3/L2] [L2]: Enter
   Configure default switchport interface state (shut/noshut) [noshut]: shut
   Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: strict
```
r. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```plaintext
Abort Auto Provisioning and continue with normal setup? (yes/no) [n]: yes
Disabling POAP

---- System Admin Account Setup ----
Do you want to enforce secure password standard (yes/no) [y]: yes
Enter the password for "admin": <<net_switch_admin_password>>
Confirm the password for "admin": <<net_switch_admin_password>>

---- Basic System Configuration Dialog VDC: 1 ----
This setup utility will guide you through the basic configuration of the system.
Setup configures only enough connectivity for management of the system.
Would you like to enter the basic configuration dialog [yes/no]: yes
Create another login account [yes/no] [n]: Enter
Configure read-only SNMP community string [yes/no] [n]: yes
Enter the switch name: <<net_switch2_hostname>>
Continue with Out-of-band [mgmt0] management configuration? [yes/no] [y]: Enter
  Mgmt0 IPv4 address: <<net_switch2_mgmt_ip>>
  Mgmt0 IPv4 netmask: <<mgmt_net_netmask>>
Configure the default gateway? [yes/no] [y]: Enter
  IPv4 address of the default gateway: <<mgmt_net_gw>>

Configure advanced IP options? [yes/no] [n]: Enter
Enable the telnet service? [yes/no] [n]: Enter
Enable the ssh service? [yes/no] [y]: Enter
  Type of ssh key you would like to generate {dsa/rsa}: rsa
  Number of rsa key bits <1024-2048> [1024]: 2048
Configure the ntp server? [yes/no] [n]: y
  NTP server IPv4 address: mgmt_net_ntp1

Configure default interface layer [L3/L2] [L2]: Enter
Configure default switchport interface state {shut/noshut} [noshut]: shut
Configure CoPP system profile {strict/moderate/lenient/dense} [strict]: strict
```

**NOTE**

Switch prompts are not displayed in the remaining steps of this configuration example.

---

**Task 2: Enable the license**

1. Log in and enable the license:

   a. Log in to both switches with the user name admin and the password <<net_switch_admin_password>>.
   b. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```plaintext
   feature lacp
   feature vpc
   feature lldp
   exit
   copy running-config startup-config
   ```
Task 3: Configure NTP
1. Configure the local time and date, and enable NTP:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   ntp server <<mgmt_net_ntp1>> prefer use-vrf management
   ntp source-interface mgmt 0
   clock protocol ntp vdc 1

   copy running-config startup-config
   ```

Task 4: Create the VLANs needed
1. Create the required VLANs and the interfaces needed:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   vlan <<mgmt_net_vlan>>
   name MGMT-VLAN
   exit

   vlan <<iscsi_san_a_vlan>>
   name iSCSI-SAN-A-VLAN
   exit

   vlan <<iscsi_san_b_vlan>>
   name iSCSI-SAN-B-VLAN
   exit

   vlan <<vm_production_net_1_vlan>>
   name VM-Production-VLAN1
   exit

   vlan <<dead_net_vlan>>
   name Dead-Network for unused ports
   exit

   copy running-config startup-config
   ```
Task 5: Add individual port descriptions for troubleshooting

1. Add individual port descriptions for troubleshooting activity and verification:

   a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

      ```
      interface Ethernet 1/15
      description <<nimble1_system_name>>-CA-tg1a
      exit

      interface Ethernet 1/16
      description <<nimble1_system_name>>-CB-tg1a
      exit

      interface Ethernet 1/30
      description Switch1-PeerLink-Switch2-PeerLink-1/30
      exit

      interface Ethernet 1/31
      description Switch1-PeerLink-Switch2-PeerLink-1/31
      exit

      interface Ethernet 1/1
      description <<mgmt_server_1_hostname>>-Port1
      exit

      interface Ethernet 1/2
      description <<mgmt_server_1_hostname>>-iSCSI-Port1
      exit

      interface Ethernet 1/3
      description <<mgmt_server_2_hostname>>-Port1
      exit

      interface Ethernet 1/4
      description <<mgmt_server_2_hostname>>-iSCSI-Port1
      exit
      interface Ethernet 1/5
      description <<mgmt_server_1_hostname>>-ILO
      exit

      interface Ethernet 1/7
      description <<nimble_system_name>>-MGMT-CA-Port1
      exit

      interface Ethernet 1/8
      description <<nimble_system_name>>-MGMT-CB-Port1
      exit
      ```

      copy running-config startup-config
1. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```
interface Ethernet 1/15
   description <<nimble1_system_name>>-CA-tg1b
   exit

interface Ethernet 1/16
   description <<nimble1_system_name>>-CB-tg1b
   exit

interface Ethernet 1/30
   description Switch1-PeerLink-Switch2-PeerLink-1/30
   exit

interface Ethernet 1/31
   description Switch1-PeerLink-Switch2-PeerLink-1/31
   exit

interface Ethernet 1/1
   description <<mgmt_server_1_hostname>>-Port2
   exit

interface Ethernet 1/2
   description <<mgmt_server_1_hostname>>-iSCSI-Port2
   exit

interface Ethernet 1/3
   description <<mgmt_server_2_hostname>>-Port2
   exit

interface Ethernet 1/4
   description <<mgmt_server_2_hostname>>-iSCSI-Port2
   exit

interface Ethernet 1/5
   description <<mgmt_server_2_hostname>>-ILO
   exit

interface Ethernet 1/7
   description <<nimble_system_name>>-MGMT-CA-Port2
   exit

interface Ethernet 1/8
   description <<nimble_system_name>>-MGMT-CB-Port2
   exit

copy running-config startup-config
```
Task 6: Assign the the VLANs and configure jumbo frames and flow control
Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the management and VM Network VLANs for each HPE ProLiant server in your environment:
   a. In configuration-mode, run the following commands on both switches, adjusting the ports as needed:

```
interface Ethernet 1/1
switchport mode trunk
switchport trunk allowed vlan <mgmt_net_vlan> <vm_production_net_1_vlan>
switchport trunk native vlan <mgmt_net_vlan>
exit

interface Ethernet 1/3
switchport mode trunk
switchport trunk allowed vlan <mgmt_net_vlan> <vm_production_net_1_vlan>
switchport trunk native vlan <mgmt_net_vlan>
exit

copy running-config startup-config
```

2. Configure management VLANs for the HPE Storage management interface for each management port on your HPE Storage array:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
interface Ethernet 1/7
switchport access vlan <mgmt_net_vlan>
exit

interface Ethernet 1/8
switchport access vlan <mgmt_net_vlan>
exit
```

3. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment:
   a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

```
interface Ethernet 1/2
switchport access vlan <iscsi_san_a_vlan>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown

interface Ethernet 1/4
switchport access vlan <iscsi_san_a_vlan>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown

exit

copy running-config startup-config
```
u. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```
interface Ethernet 1/2
switchport access vlan <<iscsi_san_b_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit

interface Ethernet 1/4
switchport access vlan <<iscsi_san_b_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit

copy running-config startup-config
```

4. Configure iSCSI VLANs for each port on your HPE Storage array:

a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

```
interface Ethernet 1/15
switchport access vlan <<iscsi_san_a_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit

interface Ethernet 1/16
switchport access vlan <<iscsi_san_a_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit

copy running-config startup-config
```

v. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```
interface Ethernet 1/15
switchport access vlan <<iscsi_san_b_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit

interface Ethernet 1/16
switchport access vlan <<iscsi_san_b_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit

copy running-config startup-config
```
Task 7: Create port-channels
1. Create the port-channels needed for vPC:
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   interface Ethernet 1/30-31
   channel-group 100 mode active
   no shutdown
   exit

   interface port-channel 100
   description vPC peer-link
   switchport mode trunk
   switchport trunk allowed vlan <<mgmt_net_vlan>>, <<vm_production_net_1_vlan>>
   spanning-tree port type network
   exit

   copy running-config startup-config
   ```

Task 8: Configure virtual port-channels
1. Set and configure the domain ID and the vPC:
   a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

   ```
   vpc domain <<net_switch_domain_id>>
   role priority 10
   peer-keepalive destination <<net_switch2_mgmt_ip>> source <<net_switch1_mgmt_ip>>
   delay restore 150
   auto-recovery
   exit

   interface port-channel 100
   vpc peer-link
   exit

   copy running-config startup-config
   ```

   w. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

   ```
   vpc domain <<net_switch_domain_id>>
   role priority 10
   peer-keepalive destination <<net_switch1_mgmt_ip>> source <<net_switch2_mgmt_ip>>
   delay restore 150
   auto-recovery
   exit

   interface port-channel 100
   vpc peer-link
   exit

   copy running-config startup-config
   ```
**Task 9: Confirm that the vPC is active**

1. Run the `show vpc` command on both switches to verify that the vPC peer link is active.

2. Review the following output from `<<net_switch1_hostname>>`. The key sections to notice are highlighted in yellow.

   ```
cisco# show vpc
Legend:  
    (*) - local vPC is down, forwarding via vPC peer-link
   
vPC domain id  : 1
Peer status : peer adjacency formed ok
vPC keep-alive status : peer is alive
Configuration consistency status : success
Pe2 vlan consistency status : success
Type-2 inconsistency reason : Consistency Check Not Performed
vPC role : primary
Number of vPCs configured : 3
Peer Gateway : Disabled
Dual-active excluded VLANs : -
Graceful Consistency Check : Enabled
Auto-recovery status : Enabled, timer is off.(timeout = 240s)
Delay-restore status : Timer is off.(timeout = 150s)
Delay-restore SVI status : Timer is off.(timeout = 10s)

vPC Peer-link status
-----------------------
 id  Port Status Active vlans
---------- -------- --------------
   --       --             
  1  Po100  up       210
   
Legend:  
    (*) - local vPC is down, forwarding via vPC peer-link
   
```

**Task 10: Secure the remaining interfaces**

1. Secure the rest of the switch by shutting down the unused ports and putting them into your `<<dead_net_vlan>>`:

   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   interface Ethernet 1/9
   switchport access vlan <<dead_net_vlan>>
   exit
   copy running-config startup-config
   ```

**Task 11: Uplink into the existing network infrastructure**

See the Cisco documentation to learn more about how to uplink the Cisco Nexus switches into your network infrastructure.

### INSTALLING AND CONFIGURING HPE STORAGE DHCI – BEFORE YOU BEGIN

The configuration worksheet contain lists of values that are required to complete the tasks described in this deployment guide. Before you begin to deploy an HPE Nimble Storage dHCI solution, ensure that the configuration worksheets are completed by the customer with the correct and validated values. You can expand the example worksheets in Appendix A: Configuration worksheets to suit your needs.

**NOTE:**

Before starting the deployment, use Appendix H: Checklist to review the requirements.

### FQDN versus IP addresses

In deploying an HPE Nimble Storage dHCI solution, it is important that all components being deployed have proper forward and reverse DNS entries entered in the network’s DNS server. This guide assumes that the site where the solution is being deployed already has a DNS server and that the existing server will be modified accordingly by the end user to accommodate the solution.

It is also acceptable to deploy and configure a DNS server just for the use of this solution if that is the preferred strategy; however, the deployment guide does not cover that option.
Throughout the guide, wherever you are asked to enter a component’s IP address, you can also enter a DNS name or a fully qualified domain name (FQDN) for the component. In general, Hewlett Packard Enterprise recommends that you use the FQDN of the components whenever possible.

NOTE
This information applies to setting up your vCenter. If you want to use an FQDN with your server, you must enter the FQDN instead of an IP address when you set up the server. You cannot go back later and change the server designation from an IP address to an FQDN.

DNS
Use the same DNS server across the servers and the HPE Storage array configuration to ensure that all relevant host names resolve to the same IP addresses.

NTP
Use the same NTP server across the servers and the HPE Storage array configuration to ensure that the time is set the same for all components.

DHCP server
In deploying an HPE Nimble Storage dHCI solution, Hewlett Packard Enterprise recommends that you include a DHCP server in the management VLAN for the initialization of the HPE Nimble Storage dHCI solution only. After the HPE Nimble Storage dHCI solution is deployed, you may remove the DHCP server from the management VLAN.

This guide assumes that the site where the HPE Nimble Storage dHCI solution is being deployed already has a DHCP server, which you will modify to accommodate the HPE Nimble Storage dHCI solution deployment.

NOTE
It is also acceptable not to use a DHCP server and to configure static IP addresses before deploying HPE Storage dHCI. For more information about the option of configuring static IP addresses, see Appendix C: Configure static IP addresses on the ESXi hypervisor. Both static IP addresses and IP addresses from DHCP servers are temporary. New IP addresses are assigned during deployment.

IP address ranges
During deployment, you must provide at least three different ranges of IP addresses. The number of servers in your environment determines the number of contiguous IP addresses that are needed in each range.

Use Table 2 to determine how many contiguous IP addresses are needed.

<table>
<thead>
<tr>
<th>IP address range description</th>
<th>Variable</th>
<th>VLAN</th>
<th>Number of contiguous IP addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management IP address range</td>
<td>&lt;&lt;mgmt_ip_range&gt;&gt;</td>
<td>mgmt_vlan</td>
<td>Each HPE ProLiant server requires two IP addresses: one for iLo and one for the ESXi management interface. (Depends on deployment mode.)</td>
</tr>
<tr>
<td>iSCSI 1 IP address range</td>
<td>&lt;&lt;iscsi1_ip_range&gt;&gt;</td>
<td>iscsi1_vlan</td>
<td>Each HPE ProLiant server requires one IP address.</td>
</tr>
<tr>
<td>iSCSI 2 IP address range</td>
<td>&lt;&lt;iscsi2_ip_range&gt;&gt;</td>
<td>iscsi2_vlan</td>
<td>Each HPE ProLiant server requires one IP address.</td>
</tr>
<tr>
<td>iLO IP address range</td>
<td>&lt;&lt;ilo_ip_range&gt;&gt;</td>
<td>ilo_vlan</td>
<td>Each HPE ProLiant server requires 1 IP addresses: one for iLo (Depends on deployment mode)</td>
</tr>
</tbody>
</table>

The following example shows how to determine the number of IP addresses needed for an HPE Nimble Storage dHCI solution with six HPE ProLiant servers, based on the rules provided in the table:

- **Management IP address range**: 6 HPE ProLiant servers × 2 IP addresses = 12 contiguous IP addresses in the management range
- **iSCSI 1 IP address range**: 6 HPE ProLiant servers × 1 IP address = 6 contiguous IP addresses in the iSCSI 1 range
- **iSCSI 2 IP address range**: 6 HPE ProLiant servers × 1 IP address = 6 contiguous IP addresses in the iSCSI 2 range
Firewall
If you plan to use an existing vCenter, make sure that all firewall ports are open for communication between your existing vCenter and your new vSphere ESXi servers. For more information, see the VMware KB [Required ports for configuring an external firewall to allow ESX/ESXi and vCenter Server traffic (1005189)](https://kb.vmware.com/h20140/v3/legal/redirect.html).

Make sure that your firewall allows communication in both directions:

- HPE Storage array communication to the vCenter instance through port 443
- VMware vCenter communication to the HPE Storage array through port 443
- HPE array to ESXi over SSH port 22
- iLO communication to the HPE Storage array through port 443

VMware license
The HPE Nimble Storage dHCI solution requires a minimum of a VMware vCenter Server Standard license and a VMware vSphere Standard license. If you want to use the dHCI One-Click catalog upgrade feature, you must have at a minimum a VMware vCenter Standard license and a VMware vSphere Enterprise Plus license.

ESXi servers discovery
The array uses Service Location Protocol (SLP) to discover the ESXi servers. By default, SLP should be running on all ESXi hosts. No user interaction is required. However, the capability for multicast might need to be enabled on switches. To enable multicast, use the following commands to disable IGMP snooping on the dHCI-management VLAN of the switch:

- **For Cisco:** By default, IGMP snooping is turned on.
  ```
  # configure terminal
  (config)# vlan 100
  (config-vlan)# no ip igmp snooping
  (config-vlan)# do write memory
  # system-view
  # display igmp-snooping
  # vlan 100
  # undo igmp-snooping enable
  # quit
  # save
  ```

- **For FlexFabric:** By default, IGMP snooping is turned off.
  ```
  # system-view
  # display igmp-snooping
  # vlan 100
  # undo igmp-snooping enable
  # quit
  # save
  ```

If no servers are discovered during deployment, take the following steps:

1. Make sure that IGMP snooping is turned off on the dHCI-management VLAN of the switches.
2. Make sure that each ESXi host has an IP address on the management VLAN.
3. Make sure you have not cabled any 1 Gb ports on ESXi hosts for the deployment. (They can be used after deployment.)
4. Make sure that the VMNIC selected for the management interface is the first port connected at 10 Gb:
   a. From the server console, press **F2** and log in as **root**, using **Prostack123!** as the password.
   b. Select the **Configure Management** network.
   c. Select **Network adapters**.
   d. Change the adapter to the first 10 Gb port (by pressing the space bar to add or remove adapters).
   e. Press **Enter**, press **ESC**, and apply the setting.
5. Restart the SLP server on each ESXi host:
   a. Log in as **root** and use **Prostack123!** as the password
   b. Run `/etc/init.d/slpd restart`.
Hardware iSCSI
HPE does not currently support using the iSCSI offload functionality on HPE FlexFabric adapters with HPE Storage arrays. To establish iSCSI communication, the HPE Nimble Storage dHCI solution creates the VMware iSCSI initiator as part of the deployment.

HPE Aruba 83xx Switch Setup
To use the network automation feature, you must perform certain manual steps first. See the section “HPE Aruba 8320 or 8325 configuration example to prepare for network automation.”
DEPLOYING THE HPE NIMBLE STORAGE DHCI SOLUTION

To deploy the solution, you must first discover the array by using DNS resolution and then configure the solution.

You must have Bonjour services installed on your Windows host before you connect to the dhCI-enabled array.

Discover the array

1. Connect the laptop or desktop to the management VLAN.

2. Open a browser and enter https://<Array Serial Number>.local in the address bar (for example, https://AF-123456.local).

3. Set up the HPE Storage array:
   a. Review the array's serial number to confirm that you are configuring the correct array.
   b. Select Set up this array (but do not join a group), and click Next.
   c. Set the following values:
      - **Array name**: <<system_name>>
      - **Group name**: <<group_name>>
      - **Management IP**: <<mgmt_ip>>
      - **Netmask**: <<mgmt_net_netmask>>
      - **Default gateway**: <<mgmt_net_gw>>
      - **Domain name**: <<mgmt_net_domain_name>>
      - **Create and confirm password**: <<admin_pwd>>

4. Click Finish and wait a few minutes for the array to initialize.

5. When initialization is complete, click Continue.

6. Log in to the array with the user name admin and the password <<admin_pwd>>.

7. Click Add and set the following values:
   - **Subnet label**: iSCSI-A
   - **Network**: <<iscsi1.network>>
   - **Netmask**: <<iscsi1.netmask>>
   - **Traffic type**: Data only
   - **Traffic assignment**: iSCSI + Group
   - **Discovery IP**: <<iscsi_a_discovery_ip>>
   - **IP address zone**: Single
   - **MTU**: Jumbo (if your switch supports jumbo frames)

8. Click Add again, set the following values, and then click Next:
   - **Subnet label**: iSCSI-B
   - **Network**: <<iscsi2.network>>
   - **Netmask**: <<iscsi2.netmask>>
   - **Traffic type**: Data only
   - **Traffic assignment**: iSCSI + Group
   - **Discovery IP**: <<iscsi_b_discovery_ip>>
   - **IP address zone**: Single
   - **MTU**: Jumbo (if your switch supports jumbo frames)
9. Select the traffic type **Mgmt only** for the management subnet.

10. On the **Network Settings** page, set the following values (adjusting these example values to your environment) and then click **Next**:
   - **Interface assignments**:
     
     | Interface | Subnet  | Data IP address |
     |-----------|---------|-----------------|
     | eth0      | Management | N/A             |
     | Eth1      | Management | N/A             |
     | tg1       | iSCSI-A   | <<1_iscsi_a_data_ip>> |
     | tg2       | iSCSI-B   | <<1_iscsi_b_data_ip>> |

   - **Controller A diagnostic IP address**: <<iscsi_a_data_ip>>
   - **Controller B diagnostic IP address**: <<iscsi_b_data_ip>>

11. On the **Domain** page, set the following values and then click **Next**:
   - **Domain name**: <<mgmt_net_domain_name>>
   - **DNS servers**: <<mgmt_net_dns1>>

12. Set the appropriate time zone and management network NTP server (<<mgmt_net_ntp1>>) and click **Next**.

13. On the **Support** page, set the appropriate values for the customer environment in which the array will be deployed and click **Finish**.

14. When setup is complete and the **Setup Complete** dialog box appears, click **Continue** to be redirected to the HPE Storage dHCI setup page.

**Configure the solution**

1. On the welcome page, carefully read the prerequisites and click **Next**

2. Choose the appropriate vCenter Server option:
   - **Option 1**: Create a new vCenter Server:
     a. Click **Create a new vCenter Server** and set the following values:
        - **vCenter host name**: <<vcenter_fqdn>>
        - **vCenter IP address**: <<vcenter_mgmt_ip>>
        - **vCenter root password**: <<vcenter_administrator_password>>
        - **SSO administrator password**: <<vcenter_sso_password>>
     b. Read and accept each EULA and then click **Next**
   - **Option 2**: Use an existing vCenter Server instance:
     a. Click **Use an existing vCenter Server** and set the following values:
        - **vCenter host name**: <<vcenter_fqdn>>
        - **Administrator user name**: [Specify the appropriate name.]
        - **Administrator password**: <<vcenter_administrator_password>>
     b. Read and accept each EULA and then click **Next**

3. Select **Create new cluster from the discovered ProLiant Server**

4. Choose the appropriate option for provisioning the HPE Nimble Storage dHCI solution in an existing VMware datacenter or for creating a new datacenter:
   - **Option 1**: If you use an existing datacenter, set the following value and then click **Next**
     - **New cluster**: <<dhci_new_cluster>>
   - **Option 2**: If you choose to create a new datacenter, set the following values and then click **Next**
5. When you create a new cluster and are using HPE Aruba 8320 and 8325 switches, you can use the dHCI network automation feature to complete the switch setup. To use this feature, you must have performed the initial setup manually. See the section “HPE Aruba 8320 or 8325 configuration example to prepare for network automation.”

Network automation prepopulates the Network Configuration screen with the switch IP addresses and VLAN management ID.

- Uncheck Skip Network Automation.
  
  If the cabling is incorrect, you cannot uncheck this box. The deployment tool checks to make sure the array is connected to a management port and data port on one switch and a different management port and data port on the second switch.
- To add another pair of either Aruba 8320 switches or Aruba 8325 switches, click Add a Switch Pair.
- Set the following values:
  - **Rack:** [Specify the appropriate switch path.]
  - **Username:** [Specify the appropriate name for each switch.]
  - **Password:** [Specify the current password for each switch]
- Validate the switches and ensure that the passwords work.
- Configure the VLAN IDs
  
  The deployment tool enters the VLAN ID. You cannot change this. Supply the following values:
  - **iLO:** To have ESXi and iLO on the same management network, enter the same ID as the VLAN ID. To have iLO on a different subnet, enter a different ID.
  - **iSCSI1:** [Specify the appropriate ID.]
  - **iSCSI2:** [Specify the appropriate ID]
  - **Dead-Network:** [Specify the appropriate VLAN ID]

**NOTE**
Adding Dead-Network IDs is optional; however, it adds security to your configuration.

- **New password:** [Specify the dHCI switch administrator password]

6. The deployment tool validates the servers against criteria that includes cabling and switch paths. It discovers all servers that can be used with the HPE Nimble Storage dHCI solution. Select each server you want to use with the solution and click **Next**.

7. Set following values and then click **Next**:

- **Management IP address range:** [mgmt_ip_range]
  
  You can specify whether to have ESXi and iLO on the same management subnet or different subnets. You specify this during network automation. If you did not use network automation, you can specify it here:
  - **ESXi and iLO on the same management subnet**
    
    You must provide two contiguous IP address ranges for each server (one for ESXi and one for iLO).
    
    iLO on a dedicated subnet (if the array is running release 5.3.1.0 or later)
    
    When you choose to have iLO on a different subnet than the ESXi management interface, you must provide one contiguous IP address range for each server on each subnet (one in the ESXi subnet and one in the iLO subnet)
    
    It is recommended to have a dedicated VLAN for iLO traffic
  - **iSCSI IP address range 1:** [iscsi1_ip_range]
  - **iSCSI IP address range 2:** [iscsi2_ip_range]
  - **ESXi root password:** [esxi_root_password]
  - **iLO HPE Storage dHCI admin password:** [ilo_dhci_admin_password]

8. In the Provision Datastores section, click **Add datastore**
9. Click Select a datastore type and select either VMFS or vVol.
   - **For VMFS:** Provide the following information and then click Next:
     a. Enter a datastore name.
     b. Specify the datastore size in MiB, GiB, or TiB.
     c. Select a protection template from the list available.
   - **For vVol:** Provide the following information and then click Next:
     a. Enter a datastore name.
     b. Specify the datastore size in MiB, GiB, or TiB.

10. Review the information and click Finish.

11. When deployment is complete, you can log in to vCenter and manage your solution.

**MANAGING THE HPE NIMBLE STORAGE DHCI SOLUTION**

After deployment is successfully completed, you can perform a number of tasks from the HPE Storage dHCI vCenter plugin:

- Add a new server.
- Create a new VMFS datastore.
- Grow a VMFS datastore.
- Clone a VMFS datastore.
- Create a snapshot of a VMFS datastore.
- Create a vVol datastore.

**Add a new server**

To prepare for adding a new server, complete the following tasks:

- Confirm that the cabling is set up correctly:
  - Review and complete the Cabling the network, storage, and server section in this guide.
- Configure the switch and assign the correct VLAN:
  - Review and complete the Configuring the Ethernet switch – Network requirements section in this guide.
- Assign an IP address to the ESXi management interface:
  - Review and complete the DHCP server section or Appendix C: Configure static IP addresses on the ESXi hypervisor in this guide.
  - Review and complete the IP address ranges section in this guide.
  - Review and complete the ESXi servers discovery section in this guide.

After you complete the procedures described in Deploying the HPE Nimble Storage dHCI solution, you can use the vCenter plugin to add your server.

1. Open a web browser and connect to vCenter (HTML5).
2. Click Menu and select HPE Storage.
3. Click Groups and select your group.
4. Click Inventory and select Servers.
5. Click the plus sign (+).
6. Configure the switches. If you are using HPE Aruba B3xx switches, the Add Server wizard pulls in the current switch information. You can have up to four racks. Each rack must have two switches. Click ADD A SWITCH PAIR to another pair of switches.
   - Enter passwords for the switches and click Next.
7. The plugin discovers the servers that are candidates for the HPE Nimble Storage dHCI solution. You can click Refresh to perform the discover operation again, click Add Server to manually add a server, or select the server from the list that is displayed. Click Next.
8. Provide the following information and then click Next:
   a. Specify the management IP address range.
   b. Set the values for iSCSI IP address range 1.
   c. Set the values for iSCSI IP address range 2.
   d. Provide an ESXi root password.
   e. Specify an administrator password for iLO HPE Storage dHCI user.
   f. Review the information and click Add to have the HPE Nimble Storage dHCI solution configure your server and add it to the vSphere cluster automatically.

Create a new VMFS datastore
You can use the HPE Storage dHCI vCenter plugin to create VMFS datastores that are mapped to volumes on an HPE Storage array. The vCenter plugin always uses the latest VMFS version available to provision a datastore.

1. Open a web browser and connect to vCenter (HTML5).
2. Click Menu and select HPE Storage.
3. Click Groups and select your group.
4. Click Datastores and select VMFS.
5. Click the plus sign (+) to add a new datastore.
6. In the Datastore dialog box, provide the following information and then click Next:
   a. Specify a name for the datastore.
   b. Provide a short description of the datastore.
   c. Select the datacenter where you want the VMFS datastore to be created.
   d. Under Protocol, select iSCSI.
   e. Under Host, select your HPE Storage dHCI cluster.
7. Specify a size for the VMFS datastore (leaving the other default parameters unchanged) and click Next.
8. Select from the following protection and synchronization options to use with this datastore and then click Next:
   - No volume collection. No protection schedule is set up for the datastore.
   - Join volume collection. Use the search option or the drop-down list to select an existing volume collection. When you select a volume collection, the wizard displays its protection schedule.
   - Create new volume collection. The dialog box expands to enable you to create a volume collection and a schedule for it. You must provide a name for the volume collection. You can then use that volume collection with another datastore, if you choose to. Next, complete the information in the Create Volume Collection section of the dialog box. You might need to use the scroll bar to see all the options:
     - Start from protection template. Decide whether to use one of the default protection templates as the basis for the volume collection you are creating. Otherwise, select No protection template.
     - Replication type. If you have a replication partner set up, you can select Periodic snapshot. The vCenter plugin takes snapshots of the datastore that can be used for a backup based on the schedule you specify.
     - Replication partner. If you select Periodic snapshot as the replication type, you must supply a value in this field.
     - Synchronization service. From the drop-down list, select the application that provides the synchronization. If you select VMware vCenter, you must provide a host IP address or a host name, the port number to be used for communication (default: 443), and a user name and password for the host.
     - Schedule name. Provide a name that you can use to identify the schedule. It is a good practice to include in the name a summary of the schedule; for example, Retain-30Daily indicates that backups are made daily and are retained for 30 days. In this section of the dialog box, you can specify when backups will be taken, how often they will be taken, and how long they will be retained. You can also specify how frequently to update the replication partner by using one of the backup snapshots.
- **Protect as standalone volume.** The dialog box expands to enable you to create a volume collection and a schedule that is specific to that datastore. You do not need to provide a name for this schedule; however, you must supply the other information that you would supply if you had selected Create a new volume collection.

9. Set limits for IOPS and MBps and click **Next**.
   
   You can select either **No Limit** or **Set Limit**, which allows you to enter a value for that option.

10. View the settings summary and click **Finish**.

**Grow a VMFS datastore**

You can use the HPE Storage dHCI vCenter plugin to grow or resize a traditional datastore. You must have the correct permissions to perform this task. It is a best practice to use the plugin to grow HPE Storage datastores because it prevents you from selecting the wrong device during a grow operation.

1. Open a web browser and connect to **vCenter (HTML5)**.
2. Click **Menu** and select **HPE Storage**.
3. Click **Groups** and select your group.
4. Click **Datastores** and select **VMFS**.
5. Select the datastore that you want to grow.
6. Click the **Grow** sign.
7. Type in the new size and select the unit type.
8. Click **Grow**.

**Clone a VMFS datastore**

You can use the HPE Storage dHCI vCenter plugin to clone VMFS datastores that reside on an HPE Storage array. Clones are created from snapshots.

1. Open a web browser and connect to **vCenter (HTML5)**.
2. Click **Menu** and select **HPE Storage**.
3. Click **Groups** and select your group.
4. Click **Datastores** and select **VMFS**.
5. Select the datastore you want to clone.
6. Click the **Clone** sign.
7. Specify a name for the clone.
8. Select the number of clones that you want to create.
9. Choose whether you want to use an existing snapshot or create a new one:
   - If you choose to use an existing snapshot, the wizard displays a list of existing snapshots.
   - If you choose to create a new one, enter the name for the new snapshot.
10. Click **Clone**.

**Create a snapshot of a VMFS datastore**

You can use the HPE Storage dHCI vCenter plugin to create snapshots of VMFS datastores that are mapped to volumes on an HPE Storage array.

1. Open a web browser and connect to **vCenter (HTML5)**.
2. Click **Menu** and select **HPE Storage**.
3. Click **Groups** and select your group.
4. Click **Datastores** and select **VMFS**.
5. Select the datastore for which you want to create a snapshot.
6. Click the **Snapshot** sign.
7. Provide a name for the snapshot.
8. Enter a description.
9. Click Create.

**Create a vVol datastore**
The Create Datastore wizard enables you to create a vVol datastore and map it to a folder on an HPE Storage array.

1. Open a web browser and connect to vCenter (HTML5).
2. Click **Menu** and select **HPE Storage**.
3. Click **Groups** and select your group.
4. Click **Datastores** and select **vVol**.
5. Click the green plus sign (+) to add a datastore.
6. Provide the following information and then click **Next**:
   a. Specify a name for the datastore.
   b. Provide a description of the datastore.
   c. Identify the datacenter where you want the vVol to be created.
   d. Under **Protocol**, select **iSCSI**.
   e. Under **Host**, select your HPE Storage dHCI cluster.
7. Set a space limit for your vVol folder and click **Next**.
8. Set limits for IOPS and MBps and click **Next**.
   You can select either **No Limit** or **Set Limit**, which allows you to enter a value for that option.
9. Click **Create**.

For other tasks related to vVols, see the appropriate VMware Integration Guide for your version of the array OS, available on HPE Infosight.

**USING HPE INFOSIGHT WITH HPE STORAGE DHCI**

HPE InfoSight is an artificial intelligence (AI) platform that is built on a unique approach to data collection and analysis, an approach that goes well beyond depending on the logs and obvious metrics that are used in traditional infrastructure. Every second, for almost a decade now, HPE InfoSight has been collecting and analyzing millions of sensors from its globally connected installed base. It collects thousands of embedded sensors that are built into every storage system and pulls in data from VMware for full-stack visibility.

This data is not analyzed in isolation. It is sent to the cloud, where HPE applies advanced machine learning to drive its predictive analytics and recommendation engines. The predictive analytics capabilities of HPE InfoSight extend across the lifecycle from planning to managing to expanding. Its recommendation engine tells IT administrators how to avoid issues, how to improve their environment, and how to get more out of their resources. The ability of HPE InfoSight to learn from every system enables it to identify ideal operating environments and to recognize abnormal patterns in infrastructure, configurations, and workloads.

This platform then drives predictive support automation, which goes far beyond proactive support. HPE InfoSight transforms the support experience by not only predicting problems but also preventing them from happening. The AI-driven approach to managing infrastructure through the HPE InfoSight cloud portal tells IT exactly how to improve their environment. In addition, it offers a unique product experience in which the infrastructure that is supported by HPE InfoSight continues to get smarter and more reliable.

Two HPE InfoSight dashboards provide quick and comprehensive insights into the health of your system:

- **The HPE Storage dHCI Overview Dashboard** offers views of HPE Storage dHCI solutions and shows CPU, memory, and capacity utilization for each HPE Storage dHCI solution you have. This is the ideal place to look for a quick health check across your HPE Storage dHCI environment.

- **The HPE Storage dHCI Cluster Dashboard** shows an overview of the environment. Each section of the dashboard offers a specialized view of the system:
  - **Virtualization section**: The virtualization section offers views of the host utilization from a CPU and memory perspective. It also shows which VMs are top-performing in terms of latency and IOPS.
Compute section: The compute section shows the CPU and memory utilization of your HPE Storage dHCI cluster. It also predicts when you will run out of CPU or memory.

Storage section: The storage section displays the used capacity and overall space savings that can be achieved through various data-savings techniques.

Wellness section: The wellness section summarizes problems related to the array, switches, and servers.

The following sections describe how to configure your HPE Infosight portal.

Create an HPE Passport account
By default, the first enrolled user of an HPE Passport account is given the superuser role. Subsequent enrolled users are given the standard user role. Only a superuser can associate a new email address with an account in HPE InfoSight. As a new user, you must create an HPE Passport account (if you do not already have one) to access the account on HPE InfoSight.

1. Go to HPE InfoSight.
2. Click Create Account to register for an HPE Passport account, which enables you to log into HPE InfoSight.
3. Complete the fields on the Create a new account page and click Create account.
4. Wait to receive an email with steps for you to verify your new Passport account.

NOTE
If you are a new customer and your email address is not recognized by the system, email support@nimblestorage.com for assistance.

Register your HPE Storage assets
Before you can register your HPE Storage assets, you must have created a Passport account. If you are not associated with any HPE Storage account, you must be invited by another member of your organization.

1. Sign in to HPE InfoSight.
2. If your account is not associated with any assets, a banner appears saying that you must register your systems with HPE InfoSight to associate those systems with your account.
3. Choose one of the following actions:
   - Click one of the links in the banner.
   - In the settings menu (the gear icon), under Nimble, click Register.
4. Follow the steps to complete the registration.

Enable streaming for HPE InfoSight and Cross-Stack Analytics
For data to be streamed over to HPE InfoSight, you must log in to the HPE InfoSight portal and make some modifications.

1. Log in to HPE InfoSight.
2. From the settings menu (the gear icon), select Telemetry Settings.
3. Locate the array you want to monitor and click the Streaming button to On.
   This button enables data streaming from the array.
4. In the same row, click the VMware button to On.
   This button allows data to be collected from VMware.
5. Wait for HPE InfoSight to process the vCenter registration and start streaming VMware and array data (up to 48 hours).

APPENDIX A: CONFIGURATION WORKSHEETS
The following configuration worksheets list the values that are required to complete the procedures in this deployment guide. Before beginning deployment of an HPE Nimble Storage dHCI solution, make sure that the customer has completed the configuration worksheets with correct and validated values. You can expand the example configuration worksheets as needed to suit your situation.

Certain products have naming or password character restrictions. Before you complete this chapter, refer to the documentation for each component to understand whether there are any restrictions.
TABLE 4. Global networking configuration worksheet

<table>
<thead>
<tr>
<th>Global networking description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management network VLAN</td>
<td>&lt;&lt;mgmt_net_vlan&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Management network netmask</td>
<td>&lt;&lt;mgmt_net_netmask&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Management network gateway</td>
<td>&lt;&lt;mgmt_net_gw&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Management network DNS server</td>
<td>&lt;&lt;mgmt_net_dns1&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Management network domain name</td>
<td>&lt;&lt;mgmt_net_domain_name&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Management network NTP server</td>
<td>&lt;&lt;mgmt_net_ntp1&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>VM production network VLAN</td>
<td>&lt;&lt;vm_production_net_1_vlan&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Dead VLAN</td>
<td>&lt;&lt;dead_net_vlan&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSI A VLAN</td>
<td>&lt;&lt;iscsia_vlan&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSI B VLAN</td>
<td>&lt;&lt;iscsib_vlan&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSI A network</td>
<td>&lt;&lt;iscsia_network&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSI B network</td>
<td>&lt;&lt;iscsib_network&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSI A netmask</td>
<td>&lt;&lt;iscsia_netmask&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSI B netmask</td>
<td>&lt;&lt;iscsib_netmask&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. HPE Storage configuration worksheet

<table>
<thead>
<tr>
<th>HPE Storage description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE Storage system name</td>
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<tr>
<td>HPE Storage group name</td>
<td>&lt;&lt;group_name&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage management IP address</td>
<td>&lt;&lt;mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage controller A diagnostic IP address</td>
<td>&lt;&lt;ctrl_a_diag_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage controller B diagnostic IP address</td>
<td>&lt;&lt;ctrl_b_diag_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage management FQDN</td>
<td>&lt;&lt;fqdn&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage admin password</td>
<td>&lt;&lt;admin_pwd&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage iSCSI A discovery IP address</td>
<td>&lt;&lt;iscsi_a_discovery_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage iSCSI B discovery IP address</td>
<td>&lt;&lt;iscsi_b_discovery_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage iSCSI A data IP address</td>
<td>&lt;&lt;iscsi_a_data_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>HPE Storage iSCSI B data IP address</td>
<td>&lt;&lt;iscsi_b_data_ip&gt;&gt;</td>
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</table>

TABLE 6. HPE FF switches configuration worksheet

<table>
<thead>
<tr>
<th>HPE FF switches description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch host name</td>
<td>&lt;&lt;net_switch1_hostname&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 1 MAD IP address</td>
<td>&lt;&lt;net_switch1_mad_ip&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 7. HPE M-Series switches configuration worksheet

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch MLAG VIP</td>
<td>&lt;&lt;mlag-vip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 1 MLAG IP address</td>
<td>&lt;&lt;mlag_private_ip1&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 MLAG IP address</td>
<td>&lt;&lt;mlag_private_ip2&gt;&gt;</td>
</tr>
<tr>
<td>MLAG network netmask</td>
<td>&lt;&lt;mlag_private_netmask&gt;&gt;</td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
</tr>
</tbody>
</table>

### TABLE 8. HPE Aruba 83xx switches configuration worksheet

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 1 VSX IP address</td>
<td>&lt;&lt;net_switch1_vsx_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 VSX IP address</td>
<td>&lt;&lt;net_switch2_vsx_ip&gt;&gt;</td>
</tr>
<tr>
<td>VSX network netmask</td>
<td>&lt;&lt;vsx_net_netmask&gt;&gt;</td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
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</table>

### TABLE 9. HPE Aruba 6300 switches configuration worksheet

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
</tr>
</tbody>
</table>

### TABLE 10. Cisco Nexus switches configuration worksheet

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 1 hostname</td>
<td>&lt;&lt;net_switch1_hostname&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 hostname</td>
<td>&lt;&lt;net_switch2_hostname&gt;&gt;</td>
</tr>
<tr>
<td>vPC domain id</td>
<td>&lt;&lt;net_switch_domain_id&gt;&gt;</td>
</tr>
<tr>
<td>HPE ProLiant IP address range description</td>
<td>Variable</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Management IP address range</td>
<td>&lt;&lt;mgmt_ip_range&gt;&gt;</td>
</tr>
<tr>
<td>iSCSI 1 IP address range</td>
<td>&lt;&lt;iSCSI1_ip_range&gt;&gt;</td>
</tr>
<tr>
<td>iSCSI 2 IP address range</td>
<td>&lt;&lt;iSCSI2_ip_range&gt;&gt;</td>
</tr>
</tbody>
</table>

Network switch admin password  <<net_switch_admin_password>>
### APPENDIX B: RESOURCES FOR AUTOMATION

This deployment guide describes the manual steps for building an HPE Storage dHCI solution based on the verified configuration. No automation is provided except for automation that is built into products. Most components of an HPE Storage dHCI solution have some type of library (REST, Python, Java, PowerShell, and so on) that can be used for automation efforts. The following list identifies resources that can be used to streamline deployments:

**VMware**
- VMware API and SDK documentation

**HPE Storage**
- HPE Storage API documentation, available on the HPE Alletra 6000, Nimble Storage documentation page of the HPE InfoSight portal (login required)

**HPE Storage dHCI**
- HPE Storage dHCI API documentation, available on the HPE Alletra 6000, Nimble Storage documentation page of the HPE InfoSight portal (login required)

**HPE iLO**
- HPE iLO RESTful API
  - Managing Hewlett Packard Enterprise Servers Using the RESTful API
  - HPE iLO SDK and libraries on GitHub

---

<table>
<thead>
<tr>
<th>TABLE 12. VMware vCenter configuration worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VMware vCenter description</strong></td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Value</td>
</tr>
<tr>
<td>vCenter VM name</td>
</tr>
<tr>
<td>vCenter IP address</td>
</tr>
<tr>
<td>vCenter FQDN</td>
</tr>
<tr>
<td>vCenter appliance root password</td>
</tr>
<tr>
<td>vCenter administrator password</td>
</tr>
<tr>
<td>vCenter SSO password</td>
</tr>
<tr>
<td>vCenter SSO site name</td>
</tr>
<tr>
<td>vCenter datacenter name</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 13. HPE Storage dHCI configuration worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HPE Storage dHCI description</strong></td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Value</td>
</tr>
<tr>
<td>HPE Storage dHCI VMware datacenter name</td>
</tr>
<tr>
<td>HPE Storage dHCI VMware cluster name</td>
</tr>
<tr>
<td>ESXi root password</td>
</tr>
<tr>
<td>ILO dHCI admin password</td>
</tr>
</tbody>
</table>
APPENDIX C: CONFIGURE STATIC IP ADDRESSES ON THE ESXI HYPervisor

If you do not have a DHCP server, use the following procedure to configure static IP addresses for all components before beginning the deployment of your HPE Storage dHCI solution.

NOTE
If you have a DHCP server in the management VLAN, do not use this appendix. Instead, see Deploying the HPE Nimble Storage dHCI solution.

Before you begin, verify that you have the correct versions of all firmware components as specified in this guide. You must perform the following steps on each HPE ProLiant DL rack server in your configuration:

1. Connect the keyboard and monitor to the HPE ProLiant DL rack server.
2. Power up the server.
3. After the server reboots, press F2 to open the RBSU and customize the system.
5. Select Network Adapters and press Enter.
6. In the Network Adapters dialog box, select your correct vmnic interface (for example, vmnic4 or vmnic5).
7. Press Enter to confirm the network adapter selections.
8. Select IPv4 Configuration.
9. In the IPv4 Configuration dialog box, provide the following information about your network and then press Enter:
   - Set the IPv4 address.
   - Specify the subnet mask.
   - Identify the default gateway.
10. Select DNS Configuration.
11. In the DNS Configuration dialog box, provide the following information and then press Enter:
    - Specify the primary DNS server.
    - Specify the host name.
12. Select Custom DNS Suffixes.
13. In the Custom DNS Suffixes dialog box, specify the suffixes and press Enter.
14. Press Esc to exit the Configure Management Network submenu.
15. Press Y to confirm the changes and return to the main menu.
17. In the Troubleshooting Options dialog box, select Enable SSH and press Enter.
18. Press Esc to exit the Troubleshooting Mode Options submenu.
19. Press Esc to return to the login screen.
20. Restart the SLP server on each ESXi host:
    - Log in as root and use Prostack123! as the password.
    - Run /etc/init.d/slpd restart.
21. Repeat this procedure for all other HPE ProLiant servers in the configuration.
APPENDIX D: CONFIGURE PEER PERSISTENCE WITH HPE STORAGE DHCI

HPE Storage dHCI supports Peer Persistence with some limitations. Before moving forward, review the Peer Persistence deployment guide, which is available in HPE Infosight.

Limitations
HPE Storage support for Peer Persistence has the following limitations:

- Two HPE Storage dHCI arrays are required
- The arrays must be of the same model (for example, AF40 and AF40).
- The arrays must be running the same version of the array OS.
- No more than 32 servers can be used for dHCI. (This maximum total does not mean 20 per site, but 20 for both sites together.)
- A VMware vSphere cluster can be spread across only two sites.
- One VMware vCenter server is required.

Others limitations might apply. Check HPE Infosight to see the latest deployment guide for HPE Storage arrays.

Network configuration example
Before moving forward with the deployment, you must complete the network configuration between your sites. One specific requirement that belongs to Peer Persistence with HPE Storage dHCI is the VLANs configuration. The Management VLAN and both iSCSI VLANs must be available between the two solutions.

You networking configuration should be similar to the one shown below.

![Network Configuration Diagram]

FIGURE 9. Example networking configuration

Configure Peer Persistence
To configure Peer Persistence with HPE Storage dHCI, you must configure the first dHCI solution by using all the servers available from both sides.

1. Review the section Installing and configuring HPE Storage dHCI – Before you begin.
2. Perform the steps from the section Deploying the HPE Nimble Storage dHCI solution on the first dHCI system. Make sure that you select all the servers from both sites during the deployment.
3. On the second dHCI system, perform only the task Discover the array from the section Deploying the HPE Nimble Storage dHCI solution. When the Setup Complete message appears, you can close the window.
4. Log in to the HPE Storage web UI on the first dHCI solution.
5. Go to Hardware → Action → Add Array to Group, and look for your second array in the list.
6. Click Add and provide the login and password of your second array.
7. Click Finish.

8. At this point, the relation is created between the two arrays. You can use the HPE Storage dHCI vCenter plugin to create a volume collection and datastore.

Configure automatic switchover (optional)
This section provides the steps to enable automatic switchover capability. It requires a witness VM that must be installed on an independent host in a third site that can communicate with the group leader array and member on TCP/IP port 5395.

1. Deploy a VM with CentOS 7.2 installed.
2. Download the latest RPM from HPE Infosight and upload it on your VM.
3. Install the RPM by using yum.

```
sudo yum install “Nimble RPM”
```

4. Enable automatic startup of the HPE Storage Witness daemon.

```
sudo systemctl enable nimble-witnessd
```

5. Start the witness daemon;

```
sudo systemctl start nimble-witnessd
```

6. Open a web browser and log in to the HPE Storage UI of your first dHCI system.
7. Go to Administration → Availability:
   a. Under Automatic Switchover, click Enable and click Save.
   cc. Under Witness, provide the following information and then click Save:
      i. The host name or IP address of your HPE Storage Witness daemon.
      ii. The port that was used for the Witness daemon.
      iii. The user name and password that were used to deploy and start the Witness daemon.

Create a volume collection and a datastore
This section provides the following steps to create a new synchronously replicated datastore on your second array:

1. Open a web browser and connect to vCenter (HTML5).
2. Click Menu and select HPE Storage.
3. Click Groups and select your group.
4. Click Datastores and select VMFS.
5. Click the plus sign (+) to add a new datastore.
6. In the Datastore dialog box, provide the following information and then click Next:
   a. Specify a name for the datastore.
   dd. Provide a short description of the datastore.
   ee. Select the datacenter where you want the VMFS datastore to be created.
   ff. Under Protocol, select iSCSI.
   gg. Under Host, select your HPE Storage dHCI cluster.
7. Specify a size for the VMFS datastore.
8. Click Location to specify the array on which want to create the volume.
9. Select Create a new volume collection to use with this datastore and then click Next.

The dialog box expands to enable you to create a volume collection and a schedule for it. You must provide a name for the volume collection. You can then use that volume collection with another datastore, if you choose. Next, complete the information in the Create
**Volume Collection** section of the dialog box. You might need to use the scroll bar to see all the options. The same volume collection can be used with multiple volumes. When you create a new volume, you can assign the volume collection by using **Join volume collection**.

- **Start from protection template.** Decide whether to use one of the default protection templates as the basis for the volume collection you are creating. Otherwise, select **No protection template**.

- **Replication type.** Select **Synchronous**.

- **Replication partner.** The replication partner should be autoselected.

- **Synchronization service.** From the drop-down list, select the application that provides the synchronization. If you select **VMware vCenter**, you must provide a host IP address or a host name, the port number to be used for communication (default: 443), and a user name and password for the host.

- **Schedule name.** Provide a name that you can use to identify the schedule. It is a good practice to include in the name a summary of the schedule; for example, **Retain-30Daily** indicates that backups are made daily and are retained for 30 days. In this section of the dialog box, you can specify when backups will be taken, how often they will be taken, and how long they will be retained. You can also specify how frequently to update the replication partner by using one of the backup snapshots.

10. Set limits for IOPS and MBps and click **Next**.

   You can select either **No Limit** or **Set Limit**, which allows you to enter a value for that option.

11. View the settings summary and click **Finish**.

   The new datastore is now created and automatically replicated synchronously on your second array.

**Verify the storage devices configuration (optional)**

After you configure synchronous replication on a volume, the following actions take place:

- A destination volume is created and is automatically added to the volume collection.

- The volumes in the destination volume collection inherit the serial number from the source volumes.

- The volumes in the destination volume collection inherit the existing ACLs from the source volumes.

- The volumes in the destination volume collection are brought online to export the SCSI standby paths.

It is important that your servers see the iscsi path of both arrays. After you have created a datastore, you can check the path configuration within vCenter.

1. Open a web browser and connect to vCenter (HTML5).

2. Click **Menu** and select **Hosts** and **Cluster**.

3. Perform the following steps on each host:
   a. Click the host and click **Configure**.
      
      i. Click **Storage Devices** and select a synchronously replicated datastore.
      
      ii. Click **Path**.

      You should see active (source) and standby (destination) paths.

**APPENDIX E: CONFIGURE VSphere ENHANCED LINKED MODE WITH HPE STORAGE DHCI**

vSphere Enhanced Linked Mode is used to join multiple vCenter Server instances for unified monitoring and management purposes. This capability enables centralized VM administrators to perform management tasks transparently across sites, regardless of vCenter Server and datacenter boundaries.

HPE Storage dHCI supports vSphere Enhanced Linked mode. You should configure vSphere Enhanced Linked mode before beginning the HPE Storage dHCI deployment, unless you want to deploy new or multiple new vCenter Server instances during deployment.

**REQUIREMENT**

To support vSphere Enhanced Linked mode, the array OS must be at version 5.1.3-100 or later.

If you plan to deploy two or more HPE Nimble Storage dHCI infrastructures and create a new vCenter Server instance as part of the deployment, complete the following steps:
1. Review the section Installing and configuring HPE Storage dHCI – Before you begin.
2. Complete the steps from the section Deploying the HPE Nimble Storage dHCI solution on the first dHCI system.
   Be sure to create a new vCenter Server instance as part of the deployment.
3. Before moving forward with the second dHCI solution, you must manually deploy a new vCenter Server instance by using the procedure described in About vCenter Server Installation and Setup.
4. Configure vSphere Enhanced Linked mode by using the procedure described in Enhanced Linked Mode for vCenter Server or vCenter Server Appliance with an External Platform Services Controller.
5. On the second dHCI system, deploy the solution, using an existing vCenter Server instance, and point it to the second one that has been deployed manually.
6. Log in to your first vCenter Server instance to check the configuration:
   a. Click Menu.
   ji. Click HPE Storage
      You should be able to browse among all the vCenter Server instances that were configured by using vSphere Enhanced linked mode.
APPENDIX F: HPE FLEXFABRIC 5700 ETHERNET NETWORKING CABLING

Table 14 provides an overview of how to cable an HPE Storage dHCI solution with six HPE ProLiant DLs and one HPE Storage hybrid flash array. All ports are Base-T for HPE Storage arrays, HPE ProLiant servers, and HPE FlexFabric switches.

NOTE
If your array is running release 6.0.0.0 or later, use server ports 1 and 3 for vSwitch 0 (MGMT) and server ports 2 and 4 for iSCSI 1 and iSCSI 2. If the array is running an earlier version of the array OS, use ports 1 and 2 for vSwitch 0 (MGMT) and ports 3 and 4 for iSCSI 1 and iSCSI 2.

TABLE 14. Cabling the HPE Storage dHCI solution

<table>
<thead>
<tr>
<th>Switch</th>
<th>Port</th>
<th>Device</th>
<th>Port</th>
<th>Cable type</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE FF5700 switch 1</td>
<td>1</td>
<td>HPE FF5700 switch 2</td>
<td>1</td>
<td>HPE X240 40 Gbps QSFP+ DAC</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>2</td>
<td>HPE FF5700 Switch 2</td>
<td>2</td>
<td>HPE X240 40 Gbps QSFP+ DAC</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>3</td>
<td>HPE Storage controller A</td>
<td>MGMT1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>4</td>
<td>HPE Storage controller B</td>
<td>MGMT2</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>1</td>
<td>HPE Storage controller A</td>
<td>MGMT2</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>2</td>
<td>HPE Storage controller B</td>
<td>MGMT2</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>5</td>
<td>HPE Storage controller A</td>
<td>DATA1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>6</td>
<td>HPE Storage controller A</td>
<td>DATA2</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>7</td>
<td>HPE Storage controller B</td>
<td>DATA2</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>8</td>
<td>iLO – HPE ProLiant #1</td>
<td>ILO</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>9</td>
<td>iLO – HPE ProLiant #2</td>
<td>ILO</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>10</td>
<td>iLO – HPE ProLiant #3</td>
<td>ILO</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>11</td>
<td>iLO – HPE ProLiant #4</td>
<td>ILO</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>12</td>
<td>iLO – HPE ProLiant #5</td>
<td>ILO</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>13</td>
<td>iLO – HPE ProLiant #6</td>
<td>ILO</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>14</td>
<td>HPE ProLiant #1</td>
<td>LOM1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>15</td>
<td>HPE ProLiant #1</td>
<td>PC1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>16</td>
<td>HPE ProLiant #2</td>
<td>LOM1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>17</td>
<td>HPE ProLiant #2</td>
<td>PC1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>18</td>
<td>HPE ProLiant #3</td>
<td>LOM1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>19</td>
<td>HPE ProLiant #3</td>
<td>PC1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>20</td>
<td>HPE ProLiant #4</td>
<td>LOM1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>21</td>
<td>HPE ProLiant #4</td>
<td>PC1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>22</td>
<td>HPE ProLiant #5</td>
<td>LOM1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>23</td>
<td>HPE ProLiant #5</td>
<td>PC1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 1</td>
<td>24</td>
<td>HPE ProLiant #6</td>
<td>LOM1</td>
<td>RJ45 – cat6</td>
</tr>
<tr>
<td>HPE FF5700 switch 2</td>
<td>25</td>
<td>HPE ProLiant #6</td>
<td>PC1</td>
<td>RJ45 – cat6</td>
</tr>
</tbody>
</table>
APPENDIX G: HPE M-SERIES SN2010M ETHERNET NETWORKING CABLING

Table 15 provides an overview of how to cable an HPE Storage dHCI solution with five HPE ProLiant DLs and one HPE Storage hybrid flash array.

Important notes:

- In addition to two switch MGMT0 IP addresses, a third IP address for the MLAG VIP is required in the same subnet as the MGMT0 ports. MLAG requires that the MGMT0 ports on the switches communicate. It will not work if you use MGMT1. For more information about the HPE M-Series Switch Series, see the HPE Support Center website.

- If your array is running release 6.0.0.0 or later, use server ports 1 and 3 for vSwitch 0 (MGMT) and server ports 2 and 4 for iSCSI 1 and iSCSI 2. If the array is running an earlier version of the array OS, use ports 1 and 2 for vSwitch 0 (MGMT) and ports 3 and 4 for iSCSI 1 and iSCSI 2.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Port</th>
<th>Device</th>
<th>Port</th>
<th>Transceiver type</th>
<th>SKU</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE SN2010M switch 1</td>
<td>1</td>
<td>HPE Storage controller A</td>
<td>MGMT1</td>
<td>HPE 10GBASE-T SFP+</td>
<td>RJ45</td>
</tr>
<tr>
<td>HPE SN2010M switch 1</td>
<td>2</td>
<td>HPE Storage controller B</td>
<td>MGMT1</td>
<td>HPE 10GBASE-T SFP+</td>
<td>RJ45</td>
</tr>
<tr>
<td>HPE SN2010M switch 1</td>
<td>3</td>
<td>HPE Storage controller A</td>
<td>iSCSI1</td>
<td>HPE X240 10 Gbps SFP+</td>
<td>DAC</td>
</tr>
<tr>
<td>HPE SN2010M switch 1</td>
<td>4</td>
<td>HPE Storage controller B</td>
<td>iSCSI1</td>
<td>HPE X240 10 Gbps SFP+</td>
<td>DAC</td>
</tr>
<tr>
<td>HPE SN2010M switch 1</td>
<td>5</td>
<td>iLO – HPE ProLiant #1</td>
<td>ILO</td>
<td>HPE X120 1G SFP</td>
<td>JD120B</td>
</tr>
<tr>
<td>HPE SN2010M switch 1</td>
<td>6</td>
<td>iLO – HPE ProLiant #2</td>
<td>ILO</td>
<td>HPE X120 1G SFP</td>
<td>JD120B</td>
</tr>
</tbody>
</table>
### APPENDIX H: CHECKLIST

Use the checklist provided in Table 16 to confirm that everything is in place before you start the deployment.

**TABLE 16. Predeployment checklist**

<table>
<thead>
<tr>
<th>Required task</th>
<th>Relevant section in this guide</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration worksheet</td>
<td>Appendix A: Configuration worksheets</td>
<td>Be sure to fill out your worksheets before starting deployment.</td>
</tr>
<tr>
<td>Solution cabling</td>
<td>Cabling the network, storage, and server components</td>
<td>Cabling is the source of the most common problems. Before deploying the solution, make sure that you have reviewed your cabling and that your solution is cabled appropriately. For more information, visit the HPE InfoSight Welcome Center.</td>
</tr>
<tr>
<td>LLDP</td>
<td>LLDP</td>
<td>Make sure that LLDP is enabled on your switch.</td>
</tr>
</tbody>
</table>
| Switch configuration        | Configuring the Ethernet switch – Network requirements             | The HPE Storage dHCI solution does not support LAN tagging for iSCSI and management traffic:  
  • iSCSI traffic must be untagged for array and ESXi iSCSI interfaces.  
  • Management traffic must be untagged for array, ESXi management interfaces, and iLO.  
  • If you plan to use jumbo frames, you must configure them on your switch. |
<table>
<thead>
<tr>
<th>Required task</th>
<th>Relevant section in this guide</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNS/NTP</td>
<td>DNS and NTP</td>
<td>DNS and NTP are required for deploying the HPE Storage dHCI solution.</td>
</tr>
<tr>
<td>DHCP server</td>
<td>DHCP server</td>
<td>A DHCP server is not required, but Hewlett Packard Enterprise strongly recommends that you use one. Each ESXi host must have a temporary IP in the Management VLAN in order to be discovered. If you do not have a DHCP server in the Management VLAN, you can manually configure a temporary IP address on each ESXi host. For more information, see Appendix C: Configure static IP addresses on the ESXi hypervisor.</td>
</tr>
<tr>
<td>ESXi servers discovery</td>
<td>ESXi servers discovery</td>
<td>The array uses SLP to discover the ESXi servers. If no servers are discovered during deployment, make sure that:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• IGMP snooping is turned off on the dHCI-management VLAN of the switches.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Each ESXi host has an IP address on the management VLAN.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• You have not cabled any 1 Gb ports on ESXi hosts for the deployment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The VMNIC for the management interface is the first port connected at 10 Gb. Afterward, restart the SLP server on each ESXi host.</td>
</tr>
<tr>
<td>Firewall</td>
<td>Firewall</td>
<td>If you are using an existing vCenter, ensure that the firewall rules allow the following types of communication:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HPE Storage array communication to vCenter through port 443</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• vCenter communication to the HPE Storage array through port 443</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• vCenter communication with ESXi Management traffic (For more information, see VMware KB 1005182)</td>
</tr>
</tbody>
</table>
Resources

HPE Storage Validated Configuration Matrix
https://infosight.hpe.com/urn%3AAnimble%3A0013400001QfUyiAAF/resources/nimble/validated-configuration-matrix

HPE Support Site for HPE ProLiant DL360 Gen10 Servers

HPE Support Site for HPE ProLiant DL380 Gen10 Servers

HPE Integrated Lights Out (iLO 4) – Configuring the NIC Settings
support.hpe.com/hpsc/doc/public/display?docId=emr_na-a00045457en_us&docLocale=en_US

HPE Support Site for HPE FlexFabric 5700 Switch Series
support.hpe.com/hpsc/doc/public/display?docId=emr_na-c04406873

HPE Alletra 6000. Nimble Storage documentation page of the HPE InfoSight portal (login required)
infosight.hpe.com/urn%3AAnimble%3A0013400001QfUyiAAF/resources/nimble/docs

Installation Guide – HFxx

Installation Guide - AFxx
https://infosight.hpe.com/InfoSight/media/cms/active/pubs_Array_Installation_-_AFxx.pdf

VMware API and SDK documentation
vmware.com/support/pubs/sdk_pubs.html

HPE iLO RESTful API

Managing Hewlett Packard Enterprise Servers Using the RESTful API
support.hpe.com/hpsc/doc/public/display?docId=c04423967