Cisco Compute Hyperconverged with Nutanix

Disjoint Layer 2 Networking Configurations

and Distributed Virtual Switch Migrations

Document Information

Revision History

Version	Date	Foundation VM version	Foundation Central version	AOS LTS version	AOS STS version	LCM Version	Notes
1.0	Feb 2024	5.5	N/A	6.5.4.5	6.7.1	2.7	Initial Release for FI based deployments with M6 generation servers.

Contents

# Common use cases for Disjoint Layer 2 VLAN configs

Use case1

Management (OOB and Storage) and DMZ (VM traffic) are connected to different upstream networks – a common DMZ deployment for UCS for Banks

Use case 2

VMs deployed are part of different groups using common storage infrastructure. Networks are isolated and disjoint

Use case 3

Management (OOB and Storage) and Backup (via a backup proxy VM) are connected to different upstream networks

Internal Network

DMZ Network

Fabric Interconnect A

Fabric Interconnect B
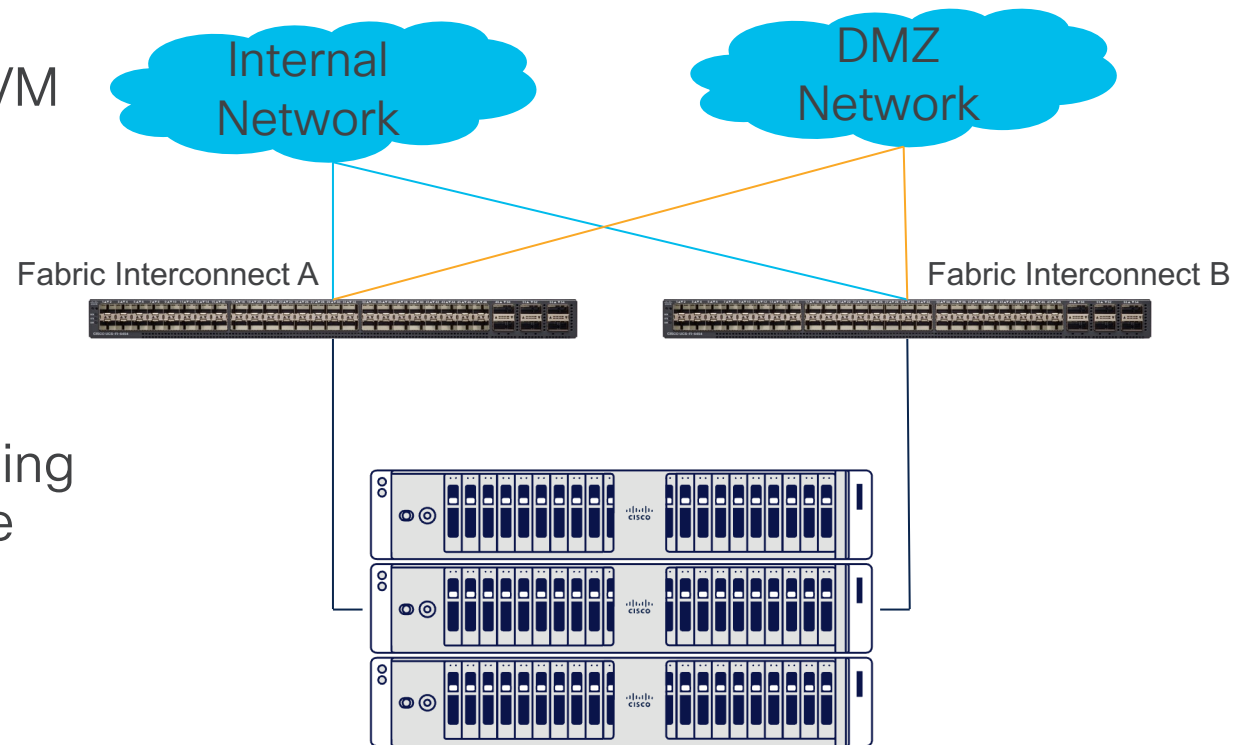
Summary of supported configurations

- For ESXi deployments – This document covers the steps to add additional vNICs to the hosts, the disjoint L2 configuration in UCSM and the virtual switch configuration in VMware vCenter.

- For AHV deployments – Support for adding additional vNICs is not supported. However, a disjoint L2 configuration is still possible in a dual-VIC hardware configuration, i.e. a Cisco VIC mLOM + Cisco VIC PCIe card, because the default configuration built by Foundation will have 4 vNICs.

- Guest VM Networking – In FI managed mode, we support the addition of 3rd party NIC cards that are connected directly to ToR switches. This is for guest VM traffic only and the physical links of the card should be used by their own dedicated vSwitches. These NICs should be disconnected during install. Note: Cisco VIC cards can't be used for this purpose

Cisco UCS Network Configuration

Assumptions and Prerequisites

- This document assumes all northbound network connections have been established between the Fabric Interconnects and their northbound switches, and the configuration of the allowed VLANs has already been completed on the northbound switches.

- This document assumes a basic disjoint layer 2 configuration as shown in the diagram following this slide, where two northbound paths exist from each Fabric Interconnect, each carrying a distinct set of VLAN IDs.

- This document does not cover the initial installation of Nutanix but does cover post-setup configuration tasks necessary to enable disjoint L2 functionality for both ESXi and AHV hypervisors.

- Disjoint L2 with AHV is only possible with dual Cisco VIC cards per server which has 4 vNICs defined by Foundation during the installation.

Disjoint Layer 2 Config

Upstream Switch 1   Upstream Switch 2   Upstream Switch 3   Upstream Switch 4

PO10   **PO11**   **PO20**   **PO21**

VLANs carried via
PO10 and PO20 to
switch 1 and 2: vlan
50 and 51

Fabric Interconnect A   Fabric Interconnect B

VLANs carried via
PO11 and PO21 to
switch 3 and 4: vlan
52
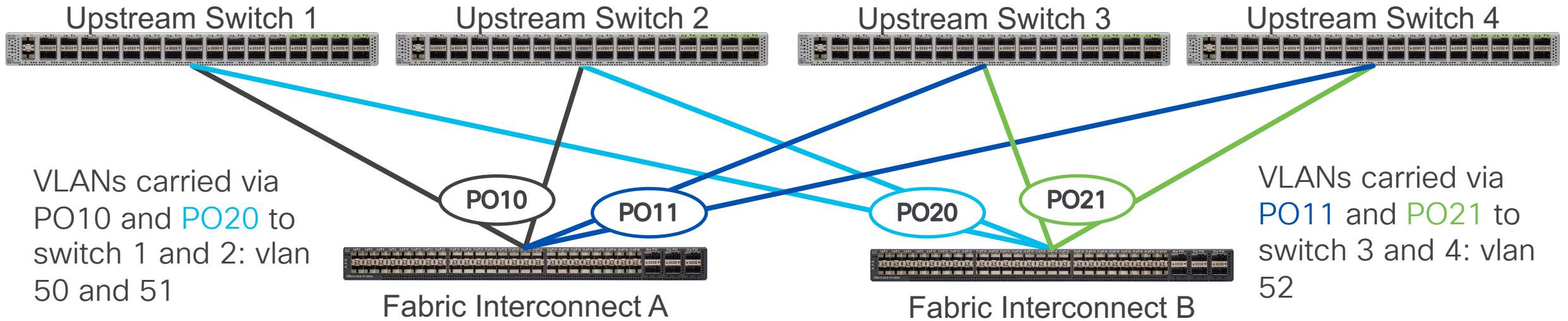
Note: In this example all northbound connections are vPC port channels, these uplinks could be single connections, for example a single link from FI-A to switch 3 and a single link from FI-B to switch 4, each configured to carry only VLAN 52. This matches the examples shown in the document as built in our lab.

Log in to Cisco UCS Manager
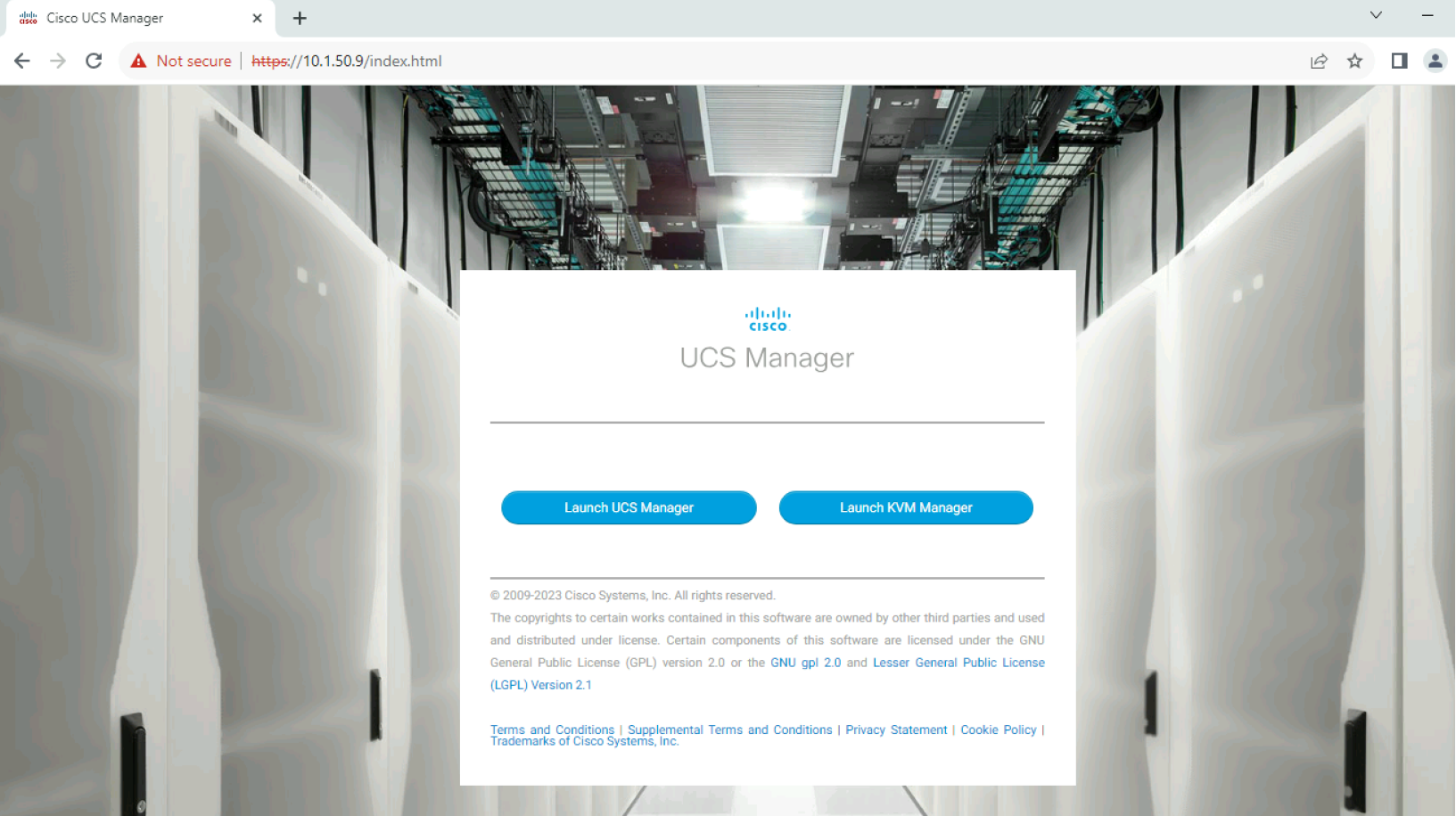
Connect to the roaming cluster IP address, not an individual FI's IP address

Enable Uplink Ports

If not already done, configure the uplink ports for both FI-A and FI-B for all interfaces that will be used as uplinks

Create Uplink Port Channels (optional)

If using port-channels from the FIs to the uplink switches, create the port channels for FI-A and FI-B, adding the uplink ports that were enabled earlier.

Create UCS VLANs

Create all of the VLANs needed in UCS Manager, for example the VLAN for Nutanix cluster CVMs and ESXi/AHV host management, and multiple VLANs for the guest VMs which would be divided across the uplinks in the disjoint L2 configuration.

Create UCS VLAN Groups
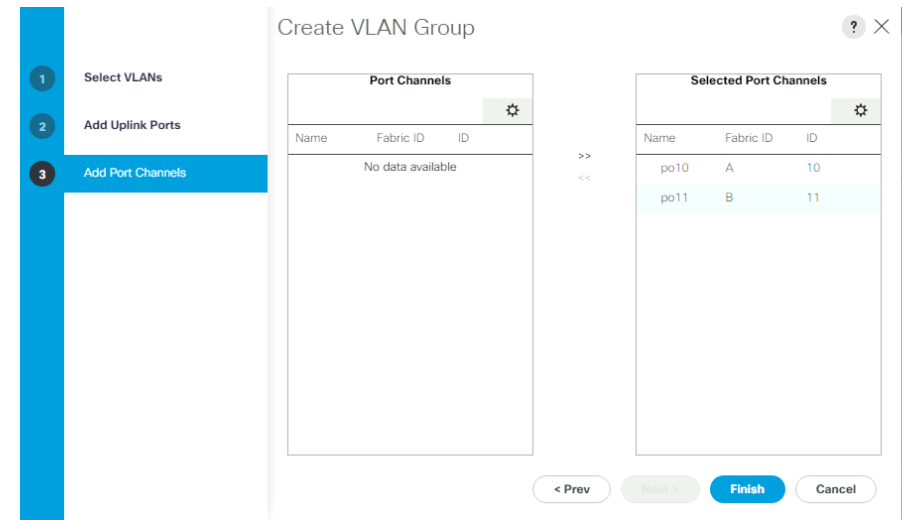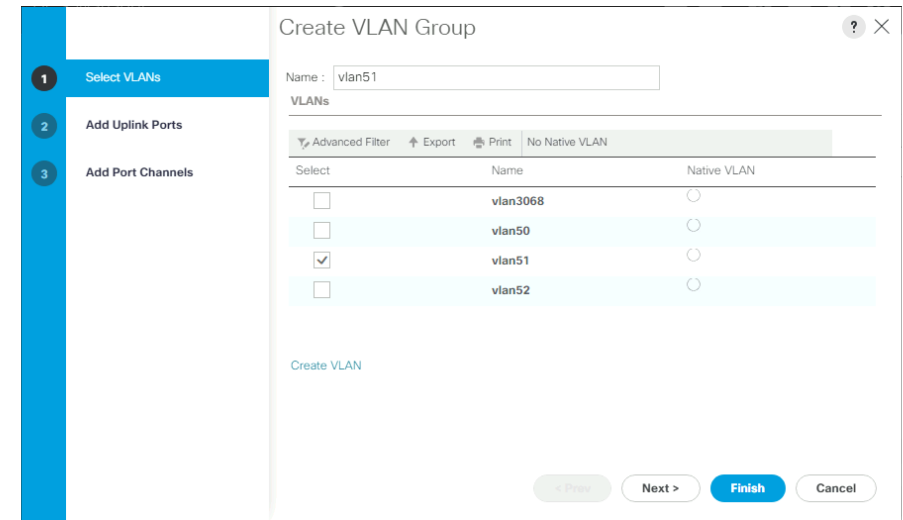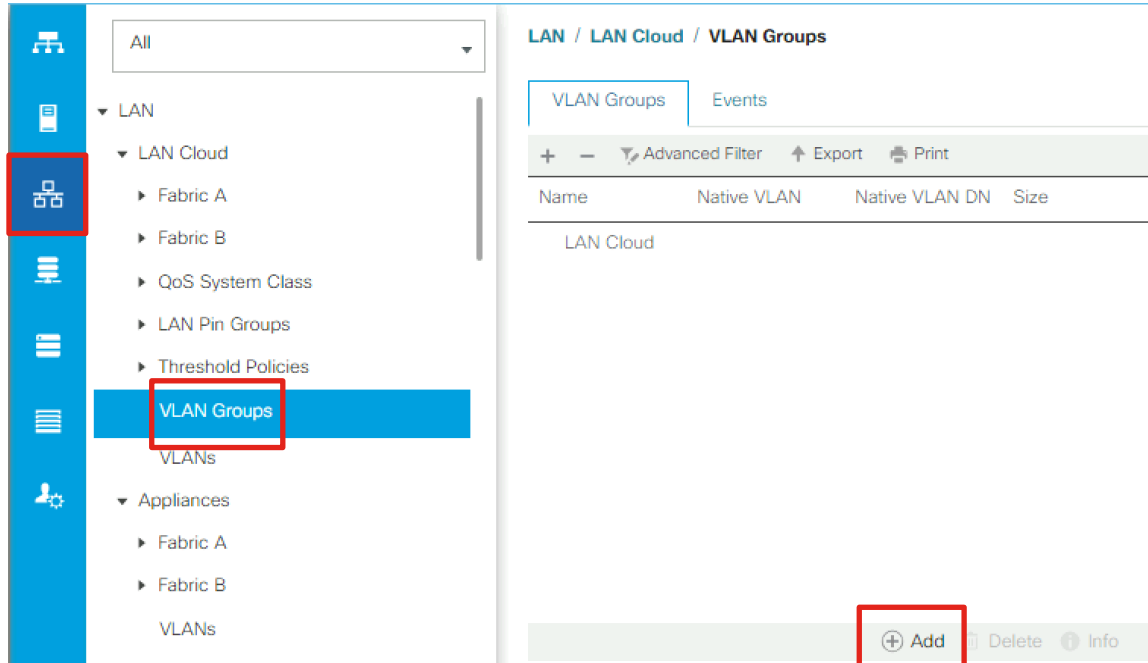
Create a VLAN Group for each set of uplinks, adding to it the VLAN IDs carried by those uplinks, and adding the port channels or the individual uplink ports to the group as well. For our example we will create two VLAN groups, one with VLAN 51, and one with VLAN 52.

UCS VLAN Groups Continued

Create a VLAN Group for each set of uplinks, adding to it the VLAN IDs carried by those uplinks, and adding the port channels or the individual uplink ports to the group as well. For our example we will create two VLAN groups, one with VLAN 51, and one with VLAN 52.

Nutanix Installation

Install a new Nutanix Cluster

Perform a standard installation of Cisco Compute Hyperconverged with Nutanix, following the latest version of this document at Cisco Communities: https://community.cisco.com/t5/unified-computing-system-knowledge-base/cisco-compute-hyperconverged-with-nutanix-field-guide/ta-p/4982563

Modify UCS Configurations

- [Modify Configuration for ESXi](#)
- [Modify Configuration for AHV](#)

Modify UCS Config for ESXi

Add vNICs to the Nutanix Service Profiles

Add two new vNICs to each of the Nutanix Service Profiles for all the servers in the cluster. In our example, these two vNICs will carry only VLAN 52, as the original two vNICs were configured to carry VLAN 51 by Foundation during the installation. The first vNIC will be configured on Fabric A, the second on Fabric B.

Add the First New vNIC

- Give the new vNIC a descriptive name to differentiate it from the original vNICs.
- Select a MAC address pool with enough available addresses for all the new interfaces.
- Select Fabric A, and **DO NOT** enable failover.
- Select only the vlan ID or IDs which will be carried on the secondary uplinks, in our example only VLAN ID 52. **DO NOT** select any of them as native.
- **NOTE:** you cannot mix VLANs from the different uplinks or VLAN groups on a single vNIC, this will cause a config error.
- You may select a VLAN Group instead of VLANs one-by-one.
- Modify the MTU to 9000.
- Select the network control policy which matches the name of the server's service profile.

Add the Second New vNIC

- Give the new vNIC a descriptive name to differentiate it from the original vNICs.
- Select a MAC address pool with enough available addresses for all the new interfaces.
- Select Fabric B, and **DO NOT** enable failover.
- Select only the vlan ID or IDs which will be carried on the secondary uplinks, in our example only VLAN ID 52. **DO NOT** select any of them as native.
- **NOTE:** you cannot mix VLANs from the different uplinks or VLAN groups on a single vNIC, this will cause a config error.
- You may select a VLAN Group instead of VLANs one-by-one.
- Modify the MTU to 9000.
- Select the network control policy which matches the name of the server's service profile.

Verify the Desired Order and Save Changes

Verify that the new vNICs are listed with their desired order as 3 and 4, then save the changes in the service profile. The changes will result in pending changes which will automatically take effect on the next reboot of the node.

Repeat for all the Nutanix Service Profiles

Repeat the process until all the service profiles in the cluster have 4 vNICs set with the appropriate VLAN IDs, then proceed with rolling reboots of the nodes in the cluster to apply the new configuration.
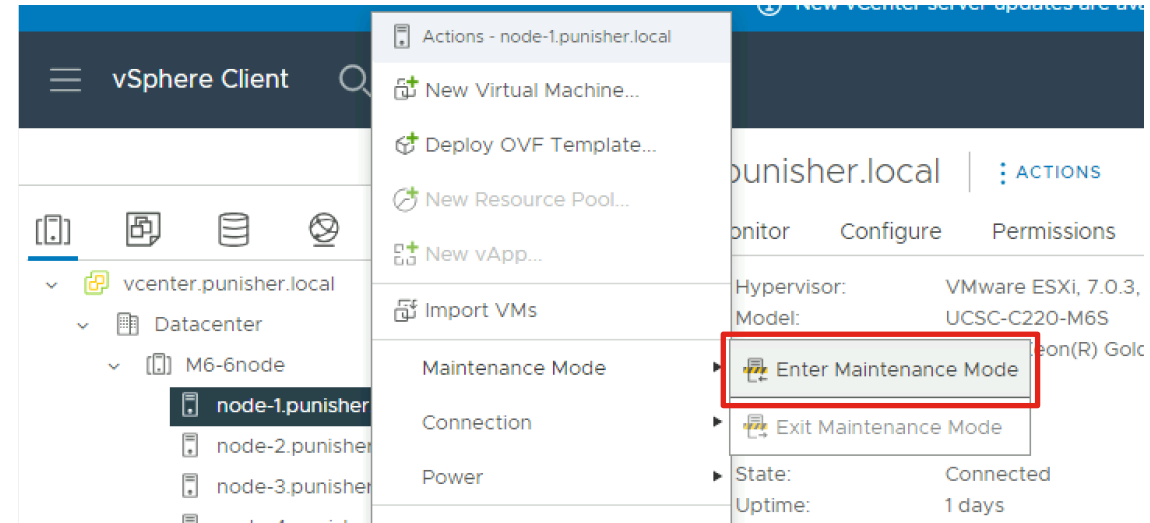
Place First Node in Maintenance Mode and Reboot

Place the first node into maintenance mode via vCenter, Prism Element or Prism Central. If using vCenter you will likely have to manually shut down the controller VM (CVM) on the node for the node to enter maintenance mode. Then reboot the node to apply the new vNIC changes.

Verify Pending Change Applied and Cluster State

Verify the pending activity in UCSM for the first server is automatically applied during the reboot. Observe that the Nutanix cluster Data Resiliency Status will be in either a Warning or Error status depending on the configured redundancy factor setting. After the node reboots, exit from maintenance mode and ensure the controller VM boots. Do not place any additional nodes into maintenance mode or reboot them until the first server has booted and the Resiliency Status returns to OK. Repeat the reboots, rolling through all servers one-by-one.

Modify UCS Config for AHV

Requirements and Caveats

- Extra vNICs cannot be added to the UCSM configuration when running AHV
- Disjoint L2 configuration is therefore only possible with dual VIC configurations which are built by Foundation with 4 vNICs by default
- Foundation will build the system with all 4 vNICs as uplinks on a single OVS virtual switch carrying one native VLAN
- The process is to remove one pair of uplinks from the default OVS virtual switch, and create a new virtual switch using those uplinks
- Adding or removing uplinks from an existing OVS virtual switch, and creating the new virtual switch will each result in rolling reboots of the hypervisors

Determine in UCSM which uplinks to remove from each node

Removing these two vNICS would be an example of a Split Card configuration

Removing these two vNICS would be an example of a Spread vNIC configuration

Two strategies:
1. Split cards: Use both A and B side vNICs from one card as the uplinks for the new virtual switch.
2. Spread vNICs: Use the A side from one card and the B side from the other card as the uplinks

In UCSM, the placement designates which Cisco VIC the vNIC is placed on. Note the MAC addresses to verify the correct interfaces.

Add VLANs in UCS Manager

Create additional VLANs in UCS Manager for guest VMs, if not already created earlier

Modify the VLAN(s) of the Nutanix Host vNICs

Modify the VLANs to the vNICs of the Nutanix service profiles. For example, change the two vNICs on the second VIC to carry only the disjoint L2 VLAN ID, leaving the other two vNICs carrying the other VLAN(s). These VLANs must be non-native (i.e. tagged), while the original VLAN used during installation is native. Repeat for all the hosts in the cluster.
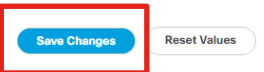
Guest VM Networking

- [Guest VM Networking for ESXi](#)
- [Guest VM Networking for AHV](#)

Configure Guest VM Networking for ESXi

Verify New Physical Adapters

Add New Virtual Switch

Add New Virtual Switch Continued

node-1.punisher.local - Add Networking ✕

✓ 1 Select connection type **Select connection type**
2 Select target device Select a connection type to create.
3 Connection settings
4 Ready to complete

○ VMkernel Network Adapter

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN, host management and etc.

● Virtual Machine Port Group for a Standard Switch

A port group handles the virtual machine traffic on standard switch.

○ Physical Network Adapter

A physical network adapter handles the network traffic to other hosts on the network.

CANCEL BACK NEXT

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node-1.punisher.local - Add Networking ✕

✓ 1 Select connection type **Select target device**
2 Select target device Select a target device for the new connection.
3 Create a Standard Switch
4 Connection settings
5 Ready to complete

○ Select an existing standard switch

BROWSE...

● New standard switch

MTU (Bytes) 1500

CANCEL BACK NEXT

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node-1.punisher.local - Add Networking ✕

✓ 1 Select connection type **Create a Standard Switch**
✓ 2 Select target device Assign free physical network adapters to the new switch.
3 Create a Standard Switch
4 Connection settings
5 Ready to complete

Assigned adapters All Properties CDP LLDP

+ | ✗ ↑ ↓

Active adapters
(New) vmnic2
Standby adapters
(New) vmnic3
Unused adapters

Adapter Cisco Systems Inc
Name vmnic2
Location PCI 0000:35:00.2
Driver nenic

Status
Status Connected
Actual speed, Duplex 25 Gbit/s, Full Du
Configured speed, Duplex 25 Gbit/s, Full Du
Networks No networks

Network I/O Control
Status Allowed

SR-IOV
Status Not supported

Cisco Discovery Protocol
ⓘ Cisco Discovery Protocol is not available on t

CANCEL BACK NEXT

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node-1.punisher.local - Add Networking ✕

✓ 1 Select connection type **Connection settings**
✓ 2 Select target device Use network labels to identify migration-compatible connections common to two or more
✓ 3 Create a Standard Switch hosts.
4 Connection settings
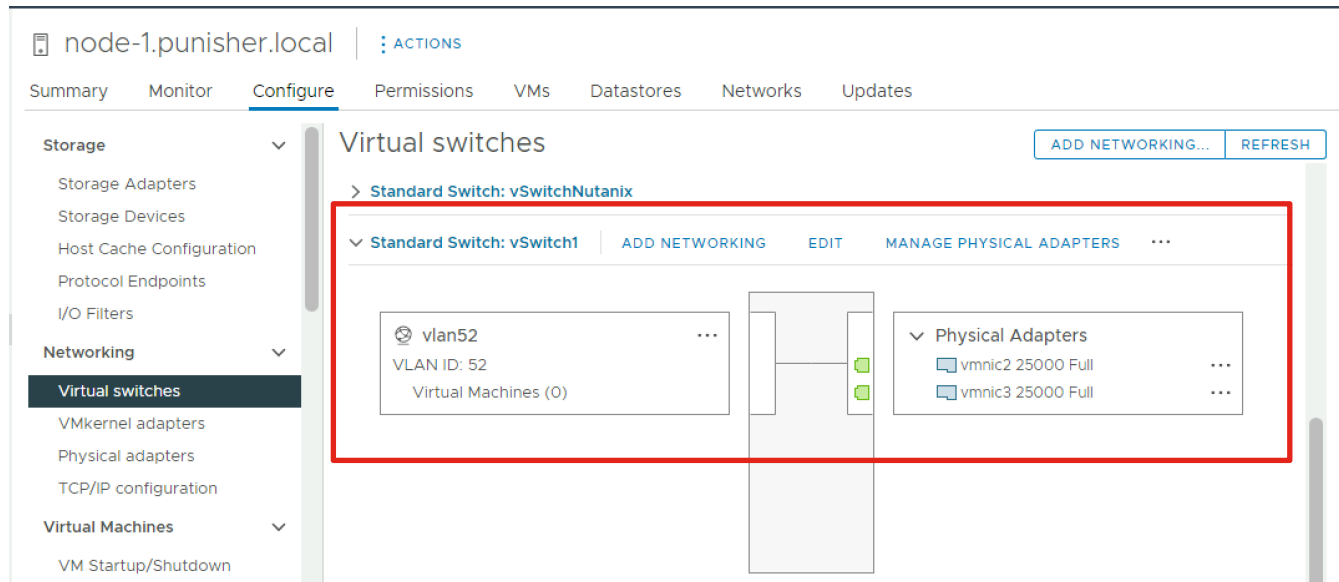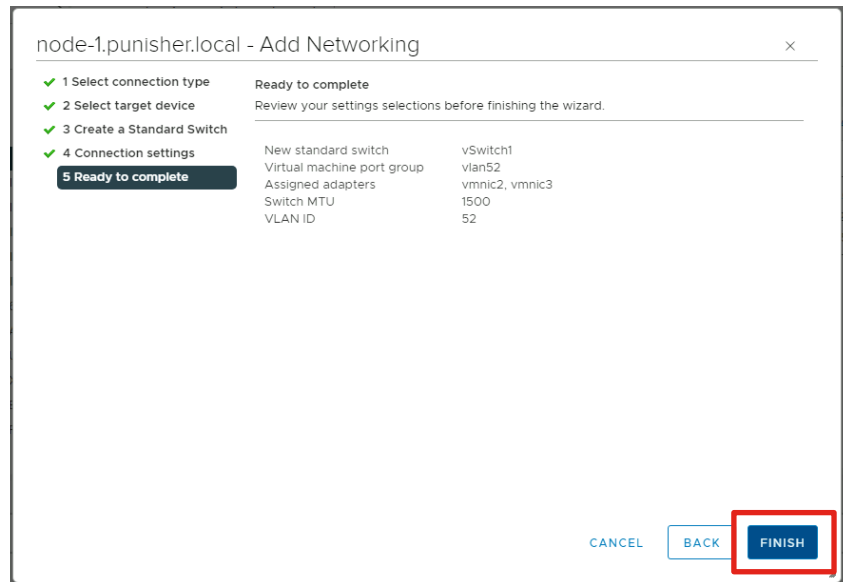5 Ready to complete

Network label vlan52

VLAN ID 52 ▾

CANCEL BACK NEXT

Add New Virtual Switch Completed

Add a new standard virtual switch, using the two new vNICs as the uplinks, with vmnic2 as active and vmnic3 as standby, plus one or more port groups carrying the disjoint L2 VLAN IDs. Repeat the steps for all the servers in the cluster. Afterwards, new or existing VMs can be created or migrated to use the additional disjoint layer 2 VLANs.

Configure Guest VM Networking for AHV

Verify in Prism Element the uplinks to remove

Verify in Prism Element the Host NICs as seen by AHV and match their MAC addresses to determine which uplinks to remove from the default virtual switch. In our example we will use Split cards, so we will remove eth0 and eth1, as they are the A and B pair from the second Cisco VIC as seen in UCSM.

Remove the uplinks from the default OVS virtual switch

Select uplinks to remove

Uncheck the box next to the uplinks to be removed from this virtual switch. Expand the section for each host, unselecting the uplinks to be removed from all the hosts, then click Save.
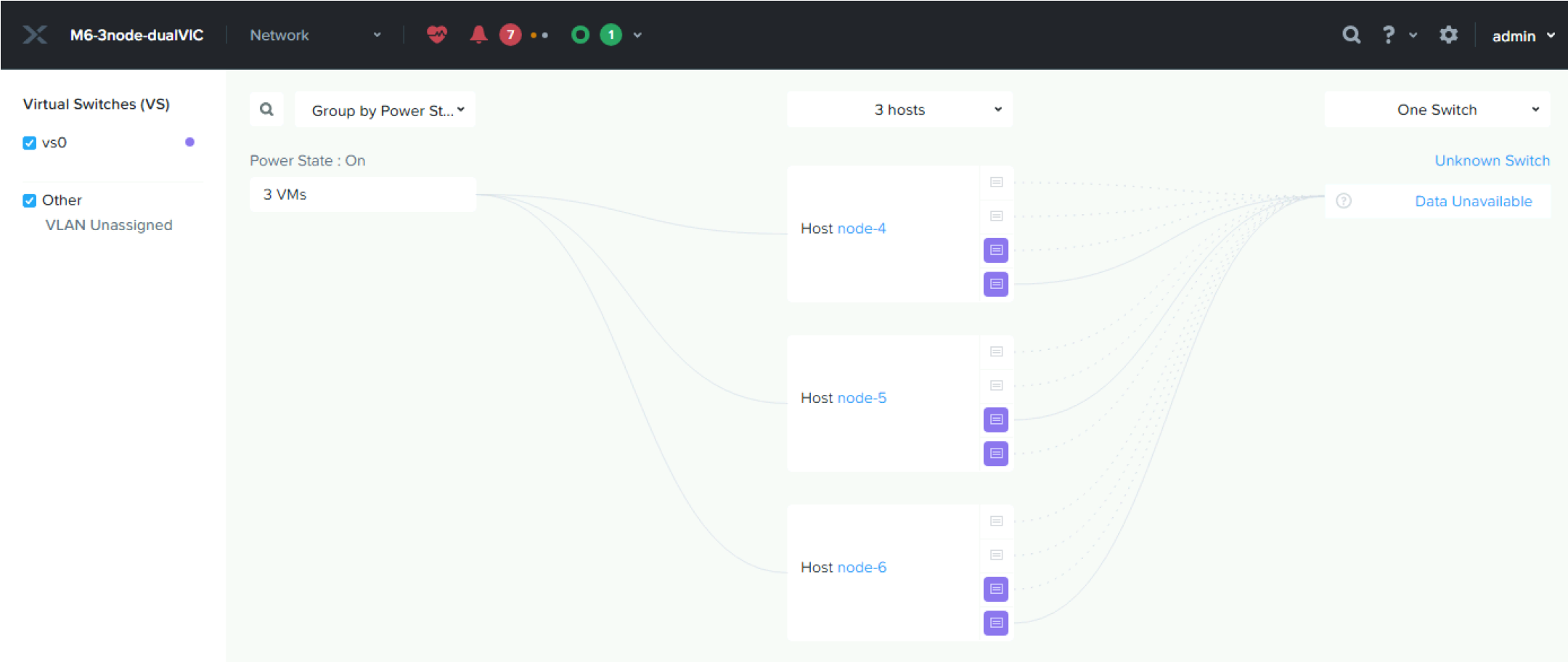
Monitor rolling reboots until completed

Verify the nodes now only use 2 uplinks

Create a new virtual switch

Choosing the standard or quick option appears to result in rolling reboots of the hypervisors.

Create a new virtual switch continued

Create Virtual Switch

Bond Type

Active-Backup

One adapter in the bond is active. Additional adapters act as backup until the active adapter fails. **Link Aggregation must not be configured on the connected switch.**

Select Hosts

All Hosts ×

Select Uplink Ports

Show

◉ Connected and Unconnected Uplink Ports

○ Only Connected Uplink Ports

On Switches (with LLDP)

All switches

Uplink Port Speeds

All Speeds

Select All   Clear All

Hosts	10G NICs	
node-4	4 ports	^
	☑ eth0	
	☑ eth1	

‹ Back   Cancel   **Create**

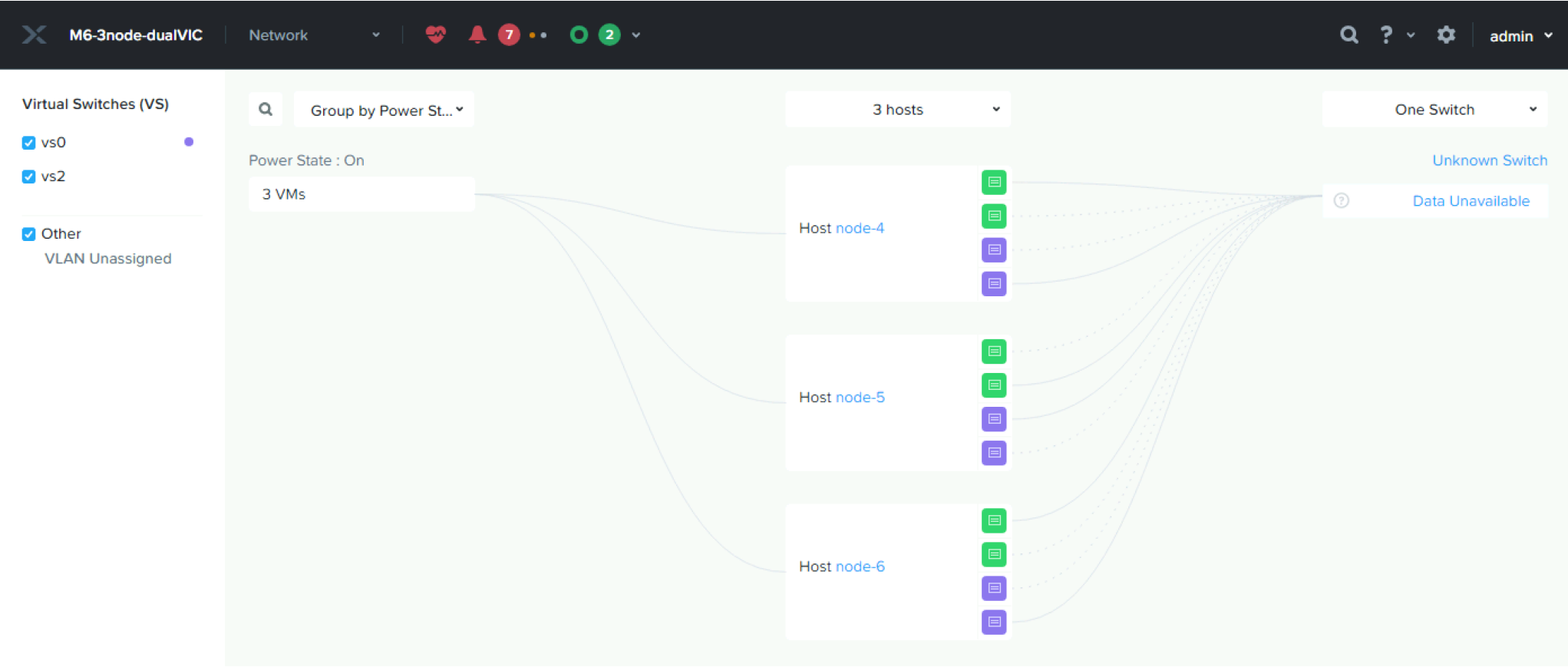Leave the bond type as Active-Backup.
Expand each node and select the two uplinks which were removed from the default virtual switch.
Click Create.

Monitor rolling reboots until completed

Verify the configuration

Create VM Subnet(s)

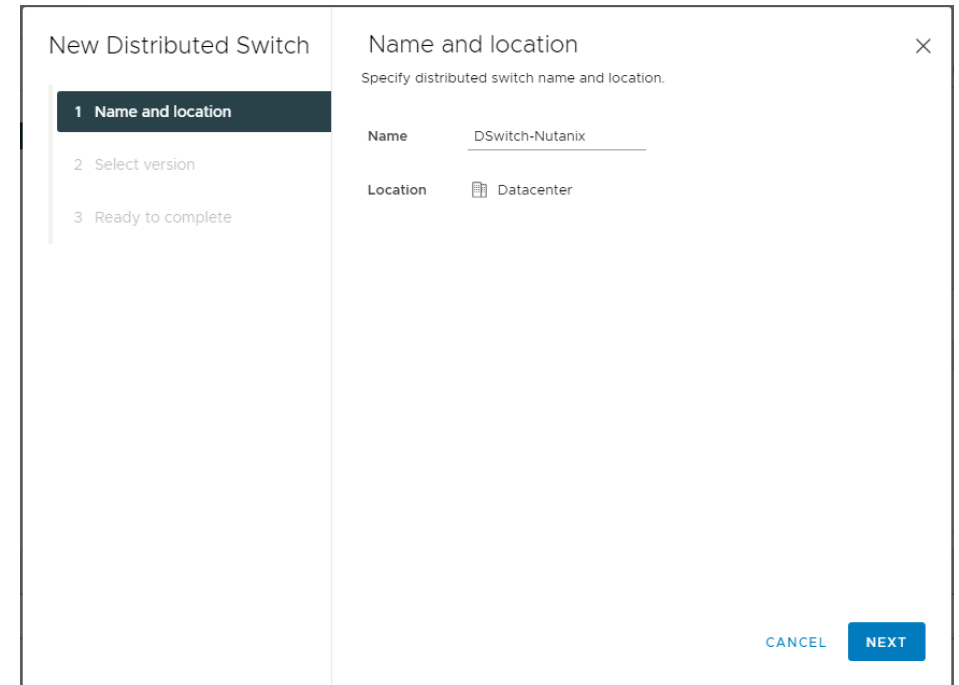Create the needed subnets with the necessary VLAN IDs and associating them with the appropriate virtual switches.

Distributed Virtual Switch Migration

Create New Distributed Virtual Switch(es)
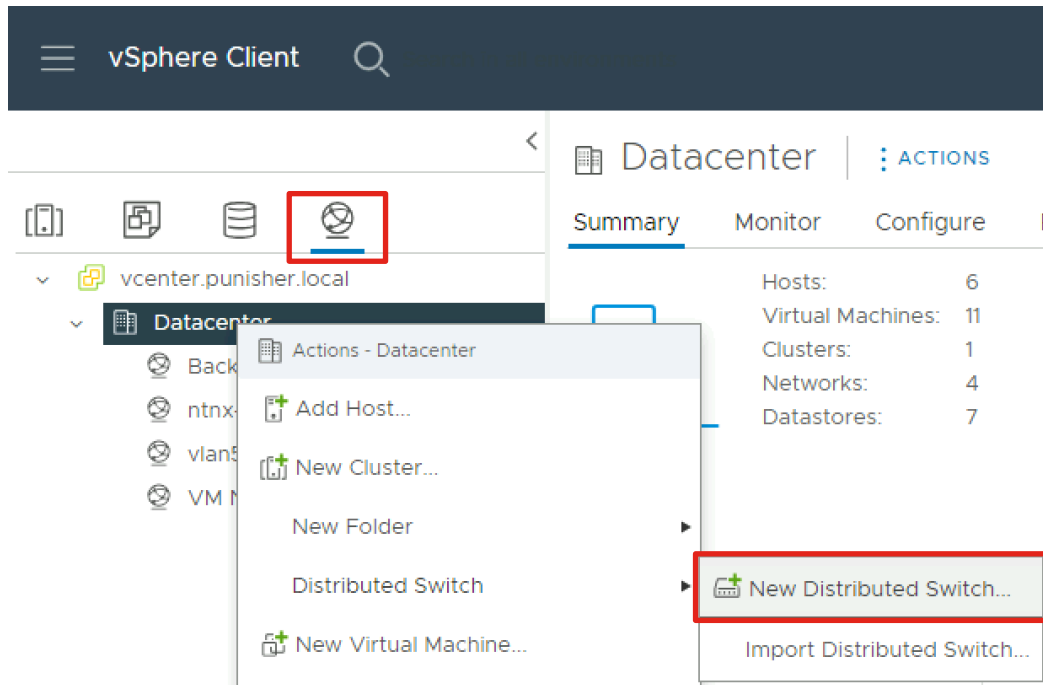
Refer to the official documentation for migration to distributed virtual switches available here:
https://portal.nutanix.com/page/documents/details?targetId=vSphere-Admin6-AOS-v6_7:vsp-cluster-migrate-std-dist-without-lacp-vsphere-c.html

Create New Distributed Virtual Switch(es) Continued
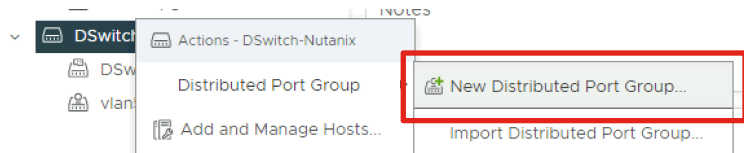
New Distributed Switch — Select version

Specify a distributed switch version.

1. Name and location
2. **Select version**
3. Configure settings
4. Ready to complete

- ● 7.0.3 - ESXi 7.0.3 and later
- ○ 7.0.2 - ESXi 7.0.2 and later
- ○ 7.0.0 - ESXi 7.0 and later
- ○ 6.6.0 - ESXi 6.7 and later
- ○ 6.5.0 - ESXi 6.5 and later

ⓘ The multicast filtering mode on the switch will be set to IGMP/MLD snooping if you continue with the selected version.

Features per version ⓘ

CANCEL   BACK   **NEXT**

New Distributed Switch — Configure settings

Specify number of uplink ports, resource allocation and default port group.

1. Name and location
2. Select version
3. **Configure settings**
4. Ready to complete

Number of uplinks	2
Network I/O Control	Disabled ⌄
Default port group	☑ Create a default port group
Port group name	vlan51-pg

CANCEL   BACK   **NEXT**

Create the new vDS for the cluster with 2 uplinks and a default port group to match the existing port group already in place. If you are not building a disjoint L2 setup and have dual Cisco VIC cards, you can configure with 4 uplinks. For a disjoint L2 setup, create a second vDS with 2 uplinks, also with port groups for the disjoint L2 VLANs, set with the correct VLAN IDs.

Create Additional Distributed Port Groups

Create distributed port groups for management, vmotion and the Nutanix storage backplane traffic. For a disjoint L2 configuration, ensure that the port groups are created on the appropriate vDS, and that their VLAN type and ID are properly set.

Edit Distributed Port Group Settings

Edit the uplink failover order for all the distributed port groups to use uplink 1 as active and uplink 2 as standby.

Add Hosts to the Distributed Switch

Add Hosts to the Distributed Switch Continued

Select vmnic0 and vmnic1 as uplinks 1 and 2 in a standard cluster with only two vNICs, or in a cluster with four vNICs in a disjoint L2 config. For a cluster with four vNICs not using disjoint L2, you can select all four vmnics here.
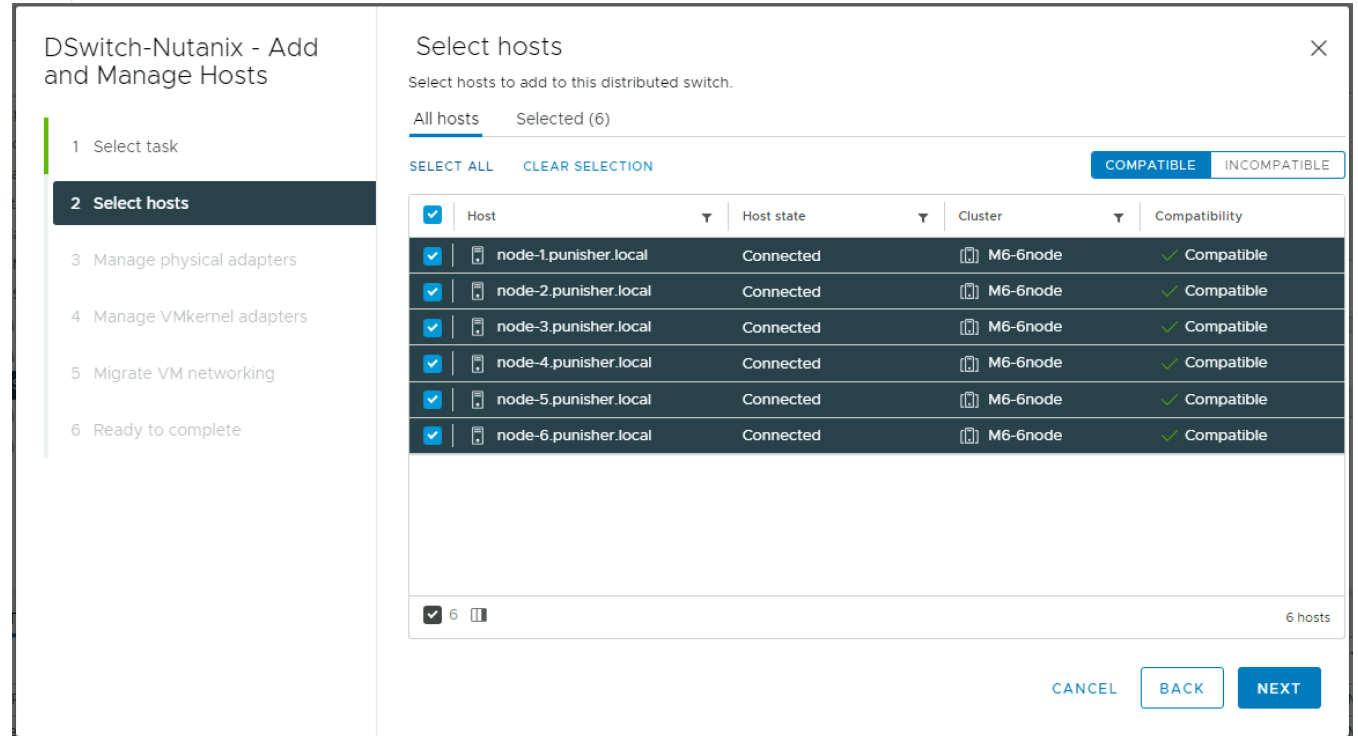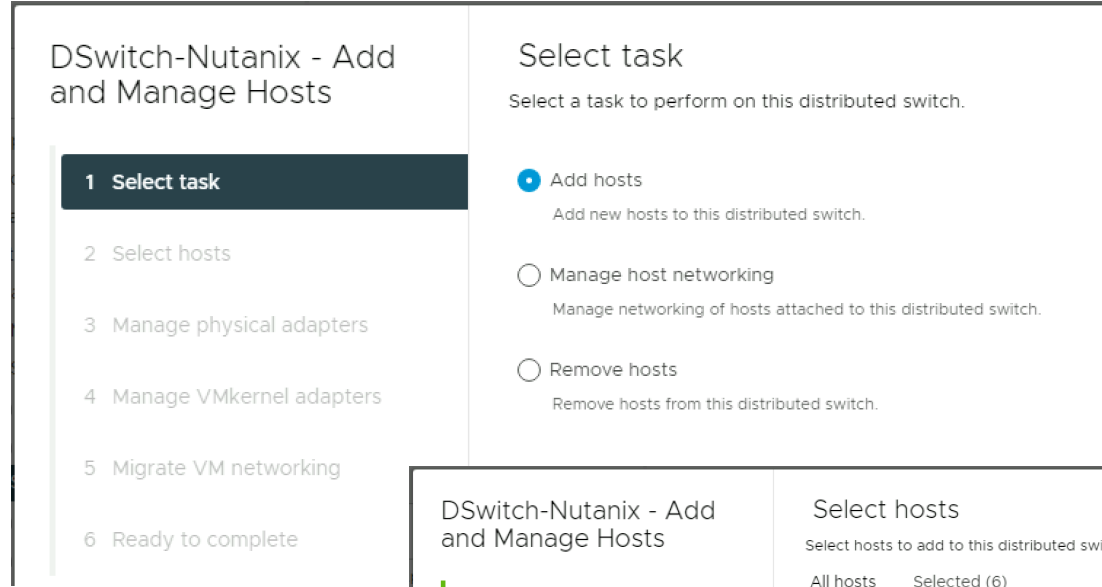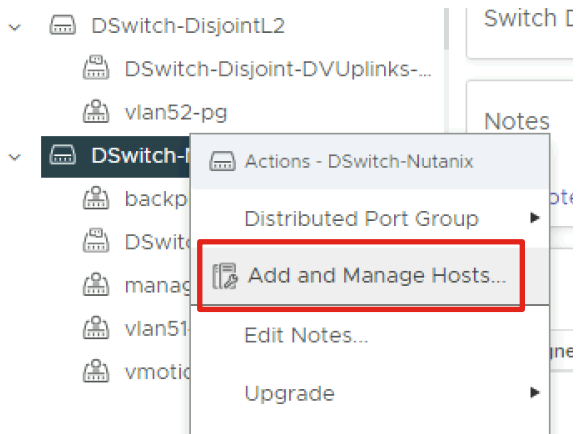
Add Hosts to the Distributed Switch Continued

DSwitch-Nutanix - Add and Manage Hosts

1 Select task

2 Select hosts

3 Manage physical adapters

4 Manage VMkernel adapters

5 Migrate VM networking

6 Ready to complete

Manage VMkernel adapters

Manage and assign VMkernel network adapters to the distributed switch.

Adapters on all hosts   Adapters per host

To assign vmkernel network adapter to port group, click on the arrow or "Assign port group" button. This assignment would be applied to all the hosts that have the same vmkernel network adapter available.

	Name ▼	In use by switch	Destination port group ▼
≫	vmk0	This switch	🖥 management-pg ✕
≫	vmk1	6 hosts / 6 switches	ASSIGN PORT GROUP

2 Vmkernel network adapters

CANCEL   BACK   NEXT

Assign vmkernel port vmk0 to the management distributed port group. **DO NOT** modify any setting related to vmk1.

Add Hosts to the Distributed Switch Continued

For the Nutanix controller VMs, migrate network adapter 1 to the management distributed port group, and network adapter 3 to the backplane distributed port group. **DO NOT** modify any setting related to network adapter 2 on the controller VMs. Also, migrate the adapters of any guest VMs already running on the system.
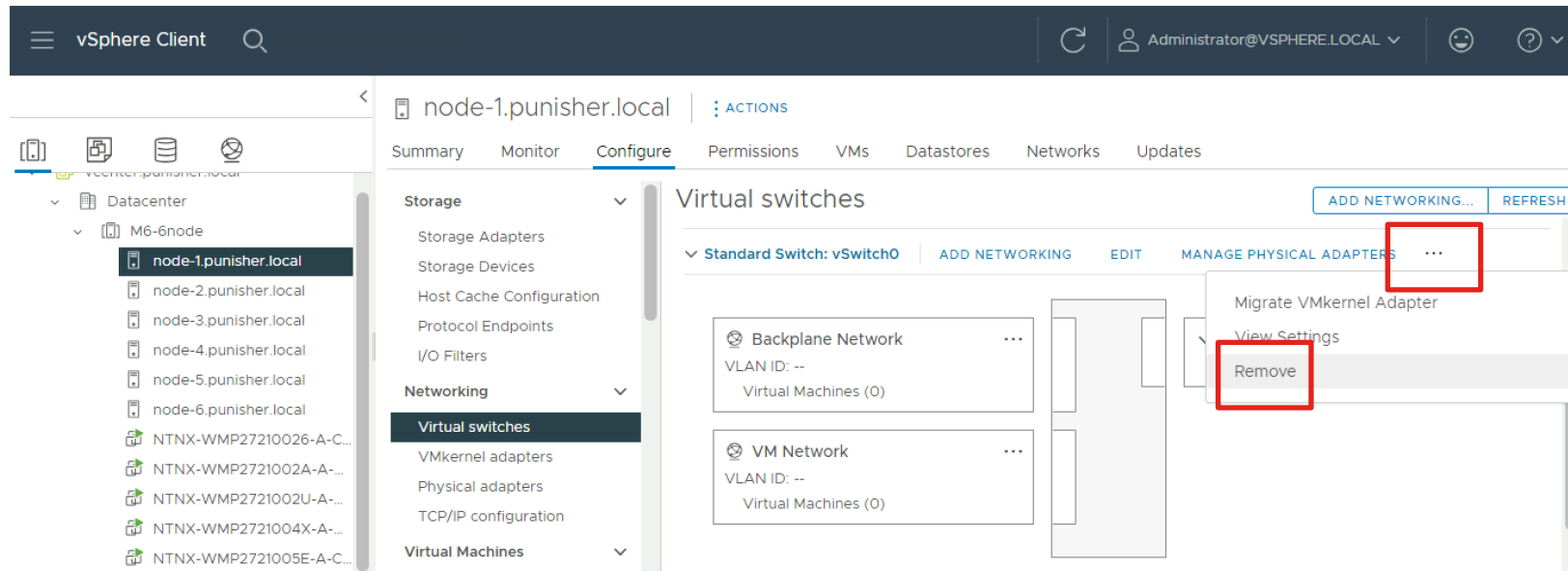
Add Hosts to the Distributed Switch Complete

For a disjoint L2 configuration, you must also add the hosts to the second vDS after adding them to the first. For the second vDS, there are no vmkernel ports to migrate, only guest VM adapters. For the second vDS, you choose vmnic2 as uplink 1 and vmnic3 as uplink 2.

Remove Standard Virtual Switches

The standard vSwitch0 can be removed, along with any other standard virtual switches you may have manually created. **DO NOT** modify or remove the standard virtual switch named vSwitchNutanix.

CISCO

The bridge to possible