



# Network configuration

## HCI

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# Network configuration

NetApp HCI can utilize multiple different network cabling and VLAN configurations. It is important to plan your network configuration to ensure a successful deployment.

## Required network segments

NetApp HCI requires a minimum of three network segments: management, storage, and virtualization traffic (which includes virtual machines and vMotion traffic). You can also separate virtual machine and vMotion traffic. These network segments usually exist as logically separated VLANs in the NetApp HCI network infrastructure.

How compute and storage nodes connect to these networks depends on how you design the network and cable the nodes. The sample network illustrations in this guide assume the following networks:

Network name	VLAN ID
Management	100
Storage	105
vMotion	107
Virtual machines	200, 201

For automatic discovery and configuration of your NetApp HCI nodes in the NetApp Deployment Engine, you must have a network segment that is available as an untagged or native VLAN on all switch ports that are used for the SFP+/SFP28 interfaces on the nodes. This will provide layer 2 communication between all nodes for discovery and deployment. Without a native VLAN, you must configure the SFP+/SFP28 interfaces of all nodes manually with a VLAN and IPv4 address to be discoverable. In the network configuration examples in this document, the management network (VLAN ID 100) is used for this purpose.

The NetApp Deployment Engine enables you to quickly configure networks for compute and storage nodes during the initial deployment. You can place certain built-in management components such as vCenter and the management node on their own network segment if needed. These network segments require routing to allow vCenter and the management node to communicate with storage and compute management networks. In most deployments those components use the same management network (in this example, VLAN ID 100).



You configure virtual machine networks using vCenter. The default virtual machine network (port group "VM\_Network") in NetApp HCI deployments is configured without a VLAN ID. If you plan to use multiple tagged virtual machine networks (VLAN IDs 200, 201 in the example above), be sure to include them in the initial network planning.

# Network configuration and cabling options

You can use a two-cable network configuration for the H300E, H500E, H700E, and H410C compute nodes, simplifying cable routing. This configuration uses two SFP+/SFP28 interfaces plus an optional (but recommended) RJ45 interface for IPMI communication. These nodes can also use a six-cable configuration with two RJ45 and four SFP28/SFP+ interfaces.

All storage nodes support a network topology that uses four network ports; this topology uses ports A through D on H300S, H500S, H700S, and H610S nodes. Compute nodes support three network topologies:

Configuration option	Cabling and description
Option A	Two-cable configuration using ports D and E (two SFP28/SFP+ interfaces) on H300E, H500E, H700E and H410C nodes
Option B	Six-cable configuration using ports A through F (two RJ45 and four SFP28/SFP+ interfaces) on H300E, H500E, H700E and H410C nodes
Option C	Cable configuration similar to option B, but using native VLANs (or "access ports") on the switch for the management, storage, and vMotion networks

Nodes that do not have the correct number of connected cables cannot participate in the deployment. For example, you cannot deploy a compute node in a six-cable configuration if it only has ports D and E connected.



You can adjust the NetApp HCI network configuration after deployment to meet infrastructure needs. However, when you expand NetApp HCI resources, remember that new nodes must have the same cable configuration as the existing compute and storage nodes.

## Configuration option A: Two cables for compute nodes

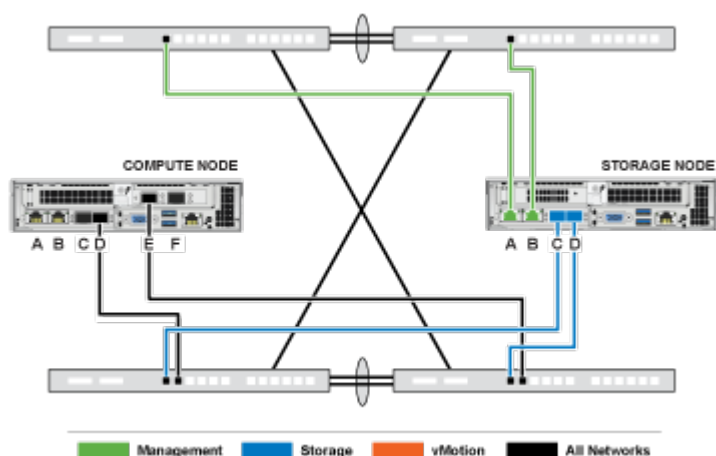
The NetApp H300E, H500E, H700E, H410C, and H610C compute nodes support using two network cables for connectivity to all NetApp HCI networks. This configuration requires that the storage, vMotion and any virtual machine networks use VLAN tagging. All compute and storage nodes must use the same VLAN ID scheme. This configuration uses vSphere Distributed Switches that require VMware vSphere Enterprise Plus licensing.

### VLAN configuration

As a best practice, you should configure the required network segments on all switch ports that the nodes are using. For example:

Network name	VLAN ID	Switch port configuration
Management	100	Native
Storage	105	Tagged
vMotion	107	Tagged
Virtual machines	200, 201	Tagged

The following illustration shows the recommended cabling configuration for two-cable H300E, H500E, H700E, and H410C compute nodes and four-cable H300S, H500S, H700S, and H410S storage nodes. All switch ports in this example share the same configuration.



## Example switch commands

You can use the following example commands to configure all switch ports used for NetApp HCI nodes. These commands are based on a Cisco configuration, but might require only small changes to apply to Mellanox switches. See your switch documentation for the specific commands you need to implement this configuration. Replace the interface name, description, and VLANs with the values for your environment.

```
interface {interface name, such as EthernetX/Y or GigabitEthernetX/Y/Z}
description {desired description, such as NetApp-HCI-NodeX-PortY}
mtu 9216
switchport mode trunk
switchport trunk native vlan 100
switchport trunk allowed vlan 105,107,200,201
spanning-tree port type edge trunk
```



Some switches might require inclusion of the native VLAN in the allowed VLAN list. See the documentation for your specific switch model and software version.

## Configuration option B: Six cables for compute nodes

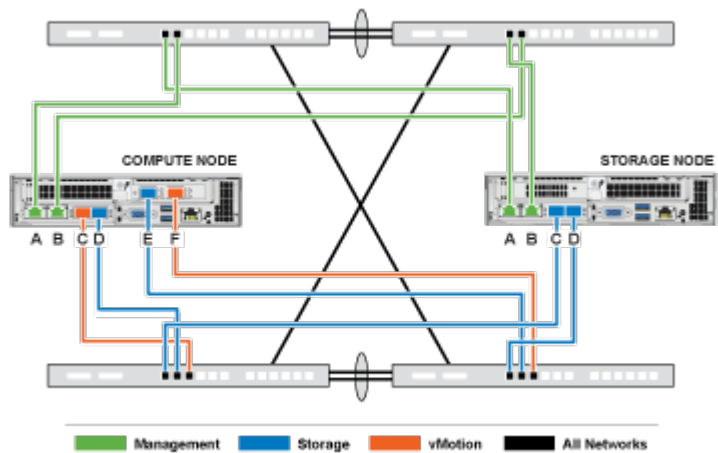
As a secondary network configuration option, the H300E, H500E, H700E and H410C compute nodes support using six network cables for connectivity to all NetApp HCI networks. This configuration requires that the storage, vMotion and any virtual machine networks use VLAN tagging. You can use this configuration with vSphere Standard Switches or vSphere Distributed Switches (which require VMware vSphere Enterprise Plus licensing).

### VLAN configuration

When you deploy compute nodes using six cables and storage nodes using four cables, as a best practice, you should configure the required network segments on all switch ports that the nodes are using. For example:

Network name	VLAN ID	Switch port configuration
Management	100	Native
Storage	105	Tagged
vMotion	107	Tagged
Virtual machines	200, 201	Tagged

The following illustration shows the recommended cabling configuration for six-cable compute nodes and four-cable storage nodes. All switch ports in this example share the same configuration.



### Example switch commands

You can use the following example commands to configure all switch ports used for NetApp HCI nodes. These commands are based on a Cisco configuration, but might require only small changes to apply to Mellanox switches. See your switch documentation for the specific commands you need to implement this configuration. Replace the interface name, description, and VLANs with the values for your environment.

```
interface {interface name, such as EthernetX/Y or GigabitEthernetX/Y/Z}
```

```
description {desired description, such as NetApp-HCI-NodeX-PortY}  
mtu 9216  
switchport mode trunk  
switchport trunk native vlan 100  
switchport trunk allowed vlan 105,107,200,201  
spanning-tree port type edge trunk
```



Some switches might require inclusion of the native VLAN in the allowed VLAN list. See the documentation for your specific switch model and software version.

### Configuration option C: Six cables for compute nodes with native VLANs

You can deploy NetApp HCI without using tagged VLANs for storage and virtualization traffic, and instead rely on the switch configuration to separate the network segments. You can use this configuration with vSphere Standard Switches or vSphere Distributed Switches (which require VMware vSphere Enterprise Plus licensing).

#### VLAN configuration

This topology option uses the following VLAN configuration:

Node ports used	Network name	VLAN ID	Connected switch port configuration
Ports A and B on compute and storage nodes	Management	100	Native
Ports D and E on compute nodes	Storage	105	Native
Ports C and D on storage nodes	Storage	105	Native
Ports C and F on compute nodes	vMotion	107	Native
Ports C and F on compute nodes	Virtual machines	200, 201	Tagged



Deploying this configuration requires careful switch port configuration. Configuration errors in this network topology can result in deployment problems that are difficult to diagnose.

The following illustration shows the network configuration overview for this topology option. In the example, individual switch ports are configured with the appropriate network segment as the native network.



## Example switch commands

You can use the following example switch commands to configure switch ports used for the NetApp HCI nodes. These commands are based on a Cisco configuration, but might require only minimal changes to apply to Mellanox switches. See your switch documentation for the specific commands you need to implement this configuration.

You can use the following example commands to configure the switch ports used for the management network. Replace the interface name, description, and VLANs with the values for your configuration.

```
interface {interface name, such as EthernetX/Y or GigabitEthernetX/Y/Z}
description {desired description, such as NetApp-HCI-NodeX-PortA|B}
switchport access vlan 100
spanning-tree port type edge
```

You can use the following example commands to configure the switch ports used for the storage network. Replace the interface name, description, and VLANs with the values for your configuration.

```
interface {interface name, such as EthernetX/Y or GigabitEthernetX/Y/Z}
description {desired description, such as NetApp-HCI-NodeX-PortC|D}
mtu 9216
switchport access vlan 105
spanning-tree port type edge
```

You can use the following example commands to configure the switch ports used for the vMotion and virtual machines network. Replace the interface name, description, and VLANs with the values for your configuration.

```
interface {interface name, such as EthernetX/Y or GigabitEthernetX/Y/Z}
description {desired description, such as NetApp-HCI-NodeX-PortC|F}
mtu 9216
switchport mode trunk
switchport trunk native vlan 107
switchport trunk allowed vlan 200,201
```



spanning-tree port type edge trunk



Some switches might require inclusion of the native VLAN in the allowed VLAN list. See the documentation for your specific switch model and software version.

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