NSX Upgrade Guide

Update 4
VMware NSX for vSphere 6.4
VMware NSX Data Center for vSphere 6.4

vmware®

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NSX Upgrade Guide

The *NSX Upgrade Guide*, describes how to upgrade the VMware NSX® Data Center for vSphere® system by using the VMware NSX® Manager™ user interface, the VMware vSphere® Web Client, and the VMware vSphere® Client™. The information includes step-by-step configuration instructions, and suggested best practices.

Important NSX for vSphere is now known as NSX Data Center for vSphere.

Intended Audience

This manual is intended for anyone who wants to upgrade or use NSX in a VMware vCenter environment. The information in this manual is written for experienced system administrators who are familiar with virtual machine technology and virtual datacenter operations. This manual assumes familiarity with VMware vSphere, including VMware ESXi, vCenter Server, and the vSphere Web Client.

Task Instructions

Task instructions in this guide are based on the vSphere Web Client. You can also perform some of the tasks in this guide by using the new vSphere Client. The new vSphere Client user interface terminology, topology, and workflow are closely aligned with the same aspects and elements of the vSphere Web Client.

Note Not all functionality of the NSX plug-in for the vSphere Web Client has been implemented for the vSphere Client in NSX 6.4. For an up-to-date list of supported and unsupported functionality, see https://docs.vmware.com/en/VMware-NSX-for-vSphere/6.4/rn/nsx-vsphere-client-65-functionality-support.html.

VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to http://www.vmware.com/support/pubs.

Read the Supporting Documents

In addition to this upgrade guide, VMware publishes various other documents that support the upgrade process.

Release Notes

Before beginning the upgrade, check the release notes. Known upgrade issues and workarounds are documented in the NSX release notes. Reading the upgrade issues before you begin the upgrade process can save you time and effort. See https://docs.vmware.com/en/VMware-NSX-for-vSphere/index.html.

Product Interoperability Matrix

Verify interoperability with other VMware products, such as vCenter. See the **Interoperability** tab of the VMware Product Interoperability Matrix at http://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php#interop&93=.

Upgrade Path Matrix

Verify support for the upgrade path from your current version of NSX to the version that you are upgrading to. See the **Upgrade Path** tab of the VMware Product Interoperability Matrix at http://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php#upgrade&solution=93.

Compatibility Guide

Verify the compatibility of partner solutions with NSX at the VMware Compatibility Guide, at http://www.vmware.com/resources/compatibility/search.php?deviceCategory=security.

System Requirements for NSX Data Center for vSphere

Before you install or upgrade NSX Data Center for vSphere, consider your network configuration and resources. You can install one NSX Manager per vCenter Server, one instance of Guest Introspection per ESXi host, and multiple NSX Edge instances per datacenter.

Hardware

This table lists the hardware requirements for NSX Data Center for vSphere appliances.

Table 1. Hardware Requirements for Appliances

Appliance	Memory	vCPU	Disk Space
NSX Manager	16 GB (24 GB for larger NSX Data Center for vSphere deployments)	4 (8 for larger NSX Data Center for vSphere deployments)	60 GB
NSX Controller	4 GB	4	28 GB

Table 1. Hardware Requirements for Appliances (Continued)

Appliance	Memory	vCPU	Disk Space
NSX Edge (Distributed logical router is deployed as compact appliance)	■ Compact: 512 MB ■ Large: 1 GB ■ Quad Large: 2 GB ■ X-Large: 8 GB	■ Compact: 1 ■ Large: 2 ■ Quad Large: 4 ■ X-Large: 6	■ Compact, Large, Quad Large: 1 disk 584MB + 1 disk 512MB ■ XLarge: 1 disk 584MB + 1 disk 2GB + 1 disk 256MB
Guest Introspection	2 GB	2	5 GB (Provisioned space is 6.26 GB)

As a general guideline, increase NSX Manager resources to 8 vCPU and 24 GB of RAM if your environment contains more than 256 hypervisors or more than 2000 VMs.

For specific sizing details contact VMware support.

For information about increasing the memory and vCPU allocation for your virtual appliances, see "Allocate Memory Resources", and "Change the Number of Virtual CPUs" in *vSphere Virtual Machine Administration*.

The provisioned space for a Guest Introspection appliance shows as 6.26 GB for Guest Introspection. This is because vSphere ESX Agent Manager creates a snapshot of the service VM to create fast clones, when multiple hosts in a cluster shares a storage. For more information on how to disable this option via ESX Agent Manager, refer to the *ESX Agent Manager* documentation.

Network Latency

You should ensure that the network latency between components is at or below the maximum latency described.

Table 2. Maximum network latency between components

Components	Maximum latency
NSX Manager and NSX Controller nodes	150 ms RTT
NSX Manager and ESXi hosts	150 ms RTT
NSX Manager and vCenter Server system	150 ms RTT
NSX Manager and NSX Manager in a cross-vCenter NSX environment	150 ms RTT

Software

For the latest interoperability information, see the Product Interoperability Matrixes at http://partnerweb.vmware.com/comp_guide/sim/interop_matrix.php.

For recommended versions of NSX Data Center for vSphere, vCenter Server, and ESXi, see the release notes for the version of NSX Data Center for vSphere to which you are upgrading. Release notes are available at the NSX Data Center for vSphere documentation site: https://docs.vmware.com/en/VMware-NSX-for-vSphere/index.html.

For an NSX Manager to participate in a cross-vCenter NSX deployment the following conditions are required:

Component	Version
NSX Manager	6.2 or later
NSX Controller	6.2 or later
vCenter Server	6.0 or later
ESXi	■ ESXi 6.0 or later ■ Host clusters prepared with NSX 6.2 or later VIBs

To manage all NSX Managers in a cross-vCenter NSX deployment from a single vSphere Web Client, you must connect your vCenter Server systems in Enhanced Linked Mode. See Using Enhanced Linked Mode in *vCenter Server and Host Management*.

To verify the compatibility of partner solutions with NSX, see the VMware Compatibility Guide for Networking and Security at http://www.vmware.com/resources/compatibility/search.php?deviceCategory=security.

Client and User Access

The following items are required to manage your NSX Data Center for vSphere environment:

- Forward and reverse name resolution. This is required if you have added ESXi hosts by name to the vSphere inventory, otherwise NSX Manager cannot resolve the IP addresses.
- Permissions to add and power on virtual machines
- Access to the datastore where you store virtual machine files, and the account permissions to copy files to that datastore
- Cookies must be enabled on your Web browser to access the NSX Manager user interface.
- Port 443 must be open between the NSX Manager and the ESXi host, the vCenter Server, and the NSX Data Center for vSphere appliances to be deployed. This port is required to download the OVF file on the ESXi host for deployment.
- A Web browser that is supported for the version of vSphere Web Client you are using. See "Using the vSphere Web Client" in the *vCenter Server and Host Management* documentation for details.
- For information about using the vSphere Client (HTML5) on vSphere 6.5 with NSX Data Center for vSphere 6.4, see https://docs.vmware.com/en/VMware-NSX-for-vSphere/6.4/rn/nsx-vsphere-client-65-functionality-support.html.

Ports and Protocols Required by NSX Data Center for vSphere

The following ports must be open for NSX Data Center for vSphere to operate properly.

Note If you have a cross-vCenter NSX environment and your vCenter Server systems are in Enhanced Linked Mode, each NSX Manager appliance must have the required connectivity to each vCenter Server system in the environment to manage any NSX Manager from any vCenter Server system.

Table 3. Ports and Protocols Required by NSX Data Center for vSphere

Source	Target	Port	Protocol	Purpose	Sensitive	TLS	Authentication
Client PC	NSX Manager	443	TCP	NSX Manager Administrative Interface	No	Yes	PAM Authentication
Client PC	NSX Manager	443	TCP	NSX Manager VIB Access	No	No	PAM Authentication
ESXi Host	vCenter Server	443	TCP	ESXi Host Preparation	No	No	
vCenter Server	ESXi Host	443	TCP	ESXi Host Preparation	No	No	
ESXi Host	NSX Manager	5671	TCP	RabbitMQ	No	Yes	RabbitMQ User/Password
ESXi Host	NSX Controller	1234	TCP	User World Agent Connection	No	Yes	
NSX Controller	NSX Controller	2878, 2888, 3888	TCP	Controller Cluster - State Sync	No	Yes	IPsec
NSX Controller	NSX Controller	7777	TCP	Inter-Controller RPC Port	No	Yes	IPsec
NSX Controller	NSX Controller	30865	TCP	Controller Cluster - State Sync	No	Yes	IPsec
NSX Manager	NSX Controller	443	TCP	Controller to Manager Communication	No	Yes	User/Password
NSX Manager	vCenter Server	443	TCP	vSphere Web Access	No	Yes	
NSX Manager	vCenter Server	902	TCP	vSphere Web Access	No	Yes	
NSX Manager	ESXi Host	443	TCP	Management and provisioning connection	No	Yes	
NSX Manager	ESXi Host	902	TCP	Management and provisioning connection	No	Yes	
NSX Manager	DNS Server	53	TCP	DNS client connection	No	No	
NSX Manager	DNS Server	53	UDP	DNS client connection	No	No	

Table 3. Ports and Protocols Required by NSX Data Center for vSphere (Continued)

Source	Target	Port	Protocol	Purpose	Sensitive	TLS	Authentication
NSX Manager	Syslog Server	514	TCP	Syslog connection	No	No	
NSX Manager	Syslog Server	514	UDP	Syslog connection	No	No	
NSX Manager	NTP Time Server	123	TCP	NTP client connection	No	Yes	
NSX Manager	NTP Time Server	123	UDP	NTP client connection	No	Yes	
vCenter Server	NSX Manager	80	TCP	Host Preparation	No	Yes	
REST Client	NSX Manager	443	TCP	NSX Manager REST API	No	Yes	User/Password
VXLAN Tunnel End Point (VTEP)	VXLAN Tunnel End Point (VTEP)	8472 (default before NSX 6.2.3) or 4789 (default in new installs of NSX 6.2.3 and later)	UDP	Transport network encapsulation between VTEPs	No	Yes	
ESXi Host	ESXi Host	6999	UDP	ARP on VLAN LIFs	No	Yes	
ESXi Host	NSX Manager	8301, 8302	UDP	DVS Sync	No	Yes	
NSX Manager	ESXi Host	8301, 8302	UDP	DVS Sync	No	Yes	
Guest Introspection VM	NSX Manager	5671	TCP	RabbitMQ	No	Yes	RabbitMQ User/Password
Primary NSX Manager	Secondary NSX Manager	443	TCP	Cross-vCenter NSX Universal Sync Service	No	Yes	
Primary NSX Manager	vCenter Server	443	TCP	vSphere API	No	Yes	
Secondary NSX Manager	vCenter Server	443	TCP	vSphere API	No	Yes	
Primary NSX Manager	NSX Universal Controller Cluster	443	TCP	NSX Controller REST API	No	Yes	User/Password

Table 3. Ports and Protocols Required by NSX Data Center for vSphere (Continued)

Source	Target	Port	Protocol	Purpose	Sensitive	TLS	Authentication
Secondary NSX Manager	NSX Universal Controller Cluster	443	TCP	NSX Controller REST API	No	Yes	User/Password
ESXi Host	NSX Universal Controller Cluster	1234	TCP	NSX Control Plane Protocol	No	Yes	
ESXi Host	Primary NSX Manager	5671	TCP	RabbitMQ	No	Yes	RabbitMQ User/Password
ESXi Host	Secondary NSX Manager	5671	TCP	RabbitMQ	No	Yes	RabbitMQ User/Password

Upgrading NSX

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Starting in NSX 6.4 you can plan and execute the NSX Data Center for vSphere upgrade using the Upgrade Coordinator.

This chapter includes the following topics:

Preparing for the NSX Upgrade

To help ensure a successful NSX Data Center for vSphere upgrade, check the release notes for upgrade issues, prepare the infrastructure for the upgrade, and use the correct upgrade sequence.

- NSX Data Center for vSphere functionality is affected during upgrade:
  - See Operational Impacts of NSX Upgrades for information about the effect of each part of the upgrade.
  - As a best practice, quiesce all operations in the environment until all sections of the upgrade are finished.

Caution Downgrades are not supported:

- Always back up NSX Manager before proceeding with an upgrade.
- After NSX Manager has been upgraded successfully, NSX cannot be downgraded.

- Upgrade Preparation Checklist

  You can prepare the infrastructure for the NSX Data Center for vSphere upgrade by performing these checks and tasks.

- Evaluate License Needs when Upgrading NSX

  NSX introduced a new licensing model in May 2016.

- Operational Impacts of NSX Upgrades

  The NSX Data Center for vSphere upgrade process can take some time. It is important to understand the operational state of components during an upgrade, such as when some but not all hosts have been upgraded, or when NSX Edges have not yet been upgraded.

- Understand FIPS Mode and NSX Upgrade

  Starting in NSX 6.3.0, you can enable FIPS mode, which turns on the cipher suites that comply with FIPS.

- Verify the NSX Working State

  Before beginning the upgrade, it is important to test the NSX working state. Otherwise, it might be difficult to determine if any post-upgrade issues are caused by the upgrade or if they existed before the upgrade process started.

- Uninstall NSX Data Security

  NSX Data Security was deprecated in NSX 6.2.3, and has been removed from NSX 6.3.0. You must uninstall NSX Data Security before upgrading to NSX 6.3.0 or later.

- NSX Backup and Restore

  Proper backup of all NSX Data Center for vSphere components is crucial to restore the system to its working state in the event of a failure.

- Managing NSX Manager Backups Created During Upgrade

  When you upgrade NSX Manager to NSX 6.4.1 or later, a backup is taken and saved locally as part of the upgrade process. You must contact VMware customer support to restore this backup. This automatic backup is intended as a failsafe in case the regular backup fails.

- Download the Upgrade Bundle and Check the MD5

  The upgrade bundle contains all the files needed to upgrade the NSX Data Center for vSphere infrastructure. Before upgrading NSX Manager you will first need to download the upgrade bundle for the version you wish to upgrade to.

Upgrade Preparation Checklist

You can prepare the infrastructure for the NSX Data Center for vSphere upgrade by performing these checks and tasks.

Release Notes

Check the release notes for version-specific information, including known issues that affect your installation and version. See https://docs.vmware.com/en/VMware-NSX-for-vSphere/index.html.

Compatibility Checks

- Verify that the current vSphere and ESXi versions are compatible with the NSX Data Center for vSphere version you are upgrading to. See the VMware Interoperability Matrix at https://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php#interop&93=&2=&1=.

- If any Guest Introspection or Network Extensibility partner services are deployed, verify compatibility before upgrading:
  - In most circumstances, NSX Data Center for vSphere can be upgraded without impacting partner solutions. However, if your partner solution is not compatible with the version of NSX Data Center for vSphere to which you are upgrading, you must upgrade the partner solution to a compatible version before upgrading.
  - Consult the VMware Compatibility Guide for Networking and Security. See http://www.vmware.com/resources/compatibility/search.php?deviceCategory=security.
  - Consult the partner documentation for compatibility and upgrade details.
- If you have Data Security in your environment, uninstall it before upgrading NSX. Data Security is not supported in NSX 6.3.0 and later. See Uninstall NSX Data Security.

General Infrastructure Preparation

- Verify that forward and reverse name resolution works and that the following systems can resolve each other's DNS names:
  - NSX Manager appliances
  - vCenter Server systems
  - Platform Services Controller systems
  - ESXi hosts
- If VUM is in use in the environment, ensure that the bypassVumEnabled flag is set to true in vCenter. This setting configures the EAM to install the VIBs directly to the ESXi hosts even when the VUM is installed or not available. See http://kb.vmware.com/kb/2053782.
- Verify that you have a current backup of the NSX Manager, vCenter, and vSphere Distributed Switches. See NSX Backup and Restore.
- Create and download a support bundle. See "Support Bundle Collection Tool" in the *NSX Administration Guide*.
- Verify the working state of the NSX environment. See Verify the NSX Working State.
- Download and stage the upgrade bundle, validate with md5sum. See Download the Upgrade Bundle and Check the MD5.
- Verify that all vCenter users who manage licenses are in the **LicenseService.Administrators** group.

NSX Manager Preparation

- Determine which NSX Managers must be upgraded in the same maintenance window.
  - If you have a cross-vCenter NSX environment, you must upgrade the primary and all secondary NSX Managers to the same NSX version in a single maintenance window.

  - If you have multiple NSX Managers connected to vCenter Server systems that use the same SSO server, not all combinations of NSX Manager version are supported. You must plan the upgrade of your NSX Managers so that you have a supported configuration at the end of the maintenance window
    - All NSX Managers using the same version of NSX is supported.
    - NSX Managers using different version of NSX is supported if at least one NSX Manager has NSX 6.4.0 or later installed, and all other NSX Managers have NSX 6.3.3 or later installed.
- Validate the NSX Manager file system usage, and perform a cleanup if file system usage is at 100 percent.
  a Log in to NSX Manager and run `show filesystems` to show the filesystem usage.
  b If the usage is 100 percent, enter privileged (enable) mode, and run the `purge log manager` and `purge log system` commands.
  c Reboot the NSX Manager appliance for the log cleanup to take effect.
- Verify the NSX Manager virtual appliance reserved memory meets the system requirements before upgrading.

  See System Requirements for NSX Data Center for vSphere.

NSX Controller Preparation

- The NSX Controller cluster must contain three controller nodes. If it has fewer than three, you must add additional nodes before starting the upgrade. See "Deploy NSX Controller Cluster" in the *NSX Installation Guide* for steps to add controller nodes.

NSX Edge Preparation

- If you have any vCloud Networking and Security 5.5 or earlier vShield Edge appliances, you must upgrade them to NSX 6.2.x or later before upgrading to NSX 6.4.
- Verify the hosts have enough resources to deploy additional NSX Edge Services Gateway appliances during the upgrade, particularly if you are upgrading multiple NSX Edge appliances in parallel. See the System Requirements for NSX Data Center for vSphere for the resources required for each NSX Edge size.
  - For a single NSX Edge instance, there are two NSX Edge appliances of the appropriate size in the poweredOn state during upgrade.
  - For an NSX Edge instance with high availability, both replacement appliances are deployed before replacing the old appliances. This means there are four NSX Edge appliances of the appropriate size in the poweredOn state during upgrade of a given NSX Edge. Once the NSX Edge instance is upgraded, either of the HA appliances could become active.
- Verify that the host clusters listed in the configured location and live location for all NSX Edge appliances are prepared for NSX and that their messaging infrastructure status is `GREEN`.

  You must do this even if you do not intend to upgrade all NSX Edge appliances to NSX 6.4.

If the configured location is not available, for example, because the cluster has been removed since the NSX Edge appliance was created, then verify the live location only.

- Find the ID of the original configured location (*configuredResourcePool* > *id*) and the current live location (*resourcePoolId*) with the `GET https://NSX-Manager-IP-Address/api/4.0/edges/{edgeId}/appliances` API request.
- Find the host preparation status and the messaging infrastructure status for those clusters with the `GET https://NSX-Manager-IP-Address/api/2.0/nwfabric/status?resource={resourceId}` API request, where *resourceId* is the ID of the configured and live location of the NSX Edge appliances found previously.
  - Look for the status corresponding to the *featureId* of `com.vmware.vshield.vsm.nwfabric.hostPrep` in the response body. The status must be `GREEN`.

    ```
    <nwFabricFeatureStatus>
      <featureId>com.vmware.vshield.vsm.nwfabric.hostPrep</featureId>
      <featureVersion>6.3.1.5124716</featureVersion>
      <updateAvailable>false</updateAvailable>
      <status>GREEN</status>
      <installed>true</installed>
      <enabled>true</enabled>
      <allowConfiguration>false</allowConfiguration>
    </nwFabricFeatureStatus>
    ```

  - Look for the status corresponding to the *featureId* of `com.vmware.vshield.vsm.messagingInfra` in the response body. The status must be `GREEN`.

    ```
    <nwFabricFeatureStatus>
      <featureId>com.vmware.vshield.vsm.messagingInfra</featureId>
      <updateAvailable>false</updateAvailable
      <status>GREEN</status>
      <installed>true</installed>
      <enabled>true</enabled>
      <allowConfiguration>false</allowConfiguration>
    </nwFabricFeatureStatus>
    ```

If the hosts are not prepared for NSX, do the following:

- Navigate to **Installation and Upgrade > Host Preparation** and prepare the hosts for NSX.
- Verify that the messaging infrastructure is GREEN.
- Redeploy the NSX Edges on the host.

If the hosts are not prepared for NSX, do the following:

- Navigate to **Installation > Host Preparation** and prepare the hosts for NSX.
- Verify that the messaging infrastructure is GREEN.

- Redeploy the NSX Edges on the host.

Evaluate License Needs when Upgrading NSX

NSX introduced a new licensing model in May 2016.

If you have an active support contract, when you upgrade from NSX 6.2.2 or earlier to NSX 6.2.3 or later, your existing license is converted to a NSX Enterprise license, and you will be entitled to the same functionality in the Enterprise offering.

For more information about the NSX Data Center, NSX, and NSX for vShield Endpoint licencing editions and associated features, see https://kb.vmware.com/kb/2145269.

Operational Impacts of NSX Upgrades

The NSX Data Center for vSphere upgrade process can take some time. It is important to understand the operational state of components during an upgrade, such as when some but not all hosts have been upgraded, or when NSX Edges have not yet been upgraded.

You should upgrade all NSX Data Center for vSphere components in a single outage window to minimize downtime and reduce confusion among NSX users who cannot access certain management functions during the upgrade. However, if your site requirements prevent you from completing the upgrade in a single outage window, the information below can help your NSX users understand what features are available during the upgrade.

An NSX Data Center for vSphere deployment upgrade proceeds as follows:

NSX Manager —> NSX Controller Cluster —> Host Clusters —> Distributed Logical Routers —> Guest Introspection

Edge Services Gateways can be upgraded at any time after the NSX Manager upgrade.

Important Before you start the upgrade, read Preparing for the NSX Upgrade and the *NSX Data Center for vSphere Release Notes* for detailed information about upgrade prerequisites and upgrade known issues.

NSX Manager Upgrade

Planning the NSX Manager upgrade:

- In a cross-vCenter NSX environment, you must upgrade the primary NSX Manager first, and then upgrade secondary NSX Managers.
- In a cross-vCenter NSX environment you must upgrade all NSX Managers in the same maintenance window.

Impact during the NSX Manager upgrade:

- NSX Manager configuration using the vSphere Web Client and API is blocked.
- Existing VM communication continues to function.

- New VM provisioning continues to work in vSphere, but the new VMs cannot be connected to or disconnected from logical switches during the NSX Manager upgrade.
- During the NSX Manager upgrade in a cross-vCenter NSX environment, do not make any changes to universal objects until the primary and all secondary NSX Managers are upgraded. This includes create, update, or delete of universal objects, and operations involving universal objects (for example, apply a universal security tag to a VM).

After the NSX Manager upgrade:

- All NSX configuration changes are allowed.
- At this stage, if any new NSX Controller appliances are deployed, they will be deployed with the version matching the existing NSX Controller cluster until the NSX Controller cluster is upgraded.
- Changes to the existing configuration are allowed. New logical switches, logical routers, and edge service gateways can be deployed.
- For distributed firewall, if new features are introduced after the upgrade, you cannot use them until all hosts are upgraded.
- Depending on the NSX Data Center for vSphere release, once the NSX Manager has been upgraded, the Communication Channel Health status will display as Unknown for the control plane. You must complete the controller and host upgrades to see a status of Up.

NSX Controller Cluster Upgrade

Planning the NSX Controller upgrade:

- You can upgrade the NSX Controller cluster after NSX Manager is upgraded.
- In a cross-vCenter NSX environment, you must upgrade all NSX Managers before upgrading the NSX Controller cluster.
- VMware highly recommends upgrading the NSX Controller cluster in the same maintenance window as the NSX Manager upgrade.

Impact during the NSX Controller upgrade:

- Logical network creation and modifications are blocked during the upgrade process. Do not make logical network configuration changes while the NSX Controller cluster upgrade is in progress.
- Do not provision new VMs during this process. Also, do not move VMs or allow DRS to move VMs during the upgrade.
- During the upgrade, when there is a temporary non-majority state, existing virtual machines do not lose networking.
- Do not allow dynamic routes to change during the upgrade.

After the NSX Controller upgrade:

- Configuration changes are allowed.

Host Upgrade

Planning the host cluster upgrade:

- You can upgrade host clusters after NSX Managers and the NSX Controller cluster are upgraded.
- You can upgrade your host clusters in a separate maintenance window from the NSX Manager and NSX Controller cluster upgrades.
- You do not need to upgrade all host clusters in the same maintenance window. However, if Distributed Firewall is enabled, there is a limitation on migrating VMs between clusters with different NSX Data Center for vSphere versions:
  - Migrating VMs from clusters with a later version to clusters with an earlier version might cause the VMs to lose network connectivity.
  - Migrating VMs from clusters with an earlier version to clusters with a later version is supported.
- New features of the NSX Data Center for vSphere version installed on NSX Manager appear in the vSphere Web Client and the API, but might not function until the host VIBs are upgraded.
- To take advantage of all the new features of an NSX Data Center for vSphere release, upgrade the host clusters so that the host VIBs match the NSX Manager version.

Impact during the host cluster upgrade:

- Configuration changes are not blocked on NSX Manager.
- Controller-to-host communication is backward compatible, meaning that upgraded controllers can communicate with non-upgraded hosts.
- Upgrade is performed on a per-cluster basis. If DRS is enabled on the cluster, DRS manages the upgrade order of the hosts.
- Hosts currently undergoing upgrade must be placed in maintenance mode, so VMs must be powered off or evacuated to other hosts. This can be done with DRS or manually.
- Additions and changes to logical network are allowed.
- Provisioning of new VMs continues to work on hosts that are not currently in maintenance mode.

NSX Edge Upgrade

Planning the NSX Edge upgrade:

- You can upgrade NSX Edges in separate maintenance windows from other components.
- You can upgrade Logical Routers after NSX Managers, NSX Controller cluster, and host clusters are upgraded.
- You can upgrade an Edge Services Gateway even if you have not yet upgraded the NSX Controller cluster or host clusters.
- You do not need to upgrade all NSX Edges in the same maintenance window.

- If an upgrade is available for NSX Edge but you have not upgraded, changing size, resources, datastore, enabling advanced debugging, and enabling HA on the appliance will be blocked until the NSX Edge is upgraded.

Impact during the NSX Edge upgrade:

- On the NSX Edge device currently being upgraded, configuration changes are blocked. Additions and changes to logical switches are allowed. Provisioning new VMs continues to work.
- Packet forwarding is temporarily interrupted.
- In NSX Edge 6.0 and later, OSPF adjacencies are withdrawn during upgrade if graceful restart is not enabled.

After the NSX Edge upgrade:

- Configuration changes are not blocked.

Guest Introspection Upgrade

Planning the Guest Introspection upgrade:

- You can upgrade Guest Introspection after NSX Managers, NSX Controller cluster, and host clusters are upgraded.
- See the partner documentation for partner solution upgrade information.

Impact during the Guest Introspection upgrade:

- There is a loss of protection for VMs in the cluster when there is a change to the VMs, such as VM additions, vMotions, or deletions.

After the Guest Introspection upgrade:

- VMs are protected during VM additions, vMotions, and deletions.

Understand FIPS Mode and NSX Upgrade

Starting in NSX 6.3.0, you can enable FIPS mode, which turns on the cipher suites that comply with FIPS.

Caution When you upgrade from a version of NSX earlier than NSX 6.3.0 to NSX 6.3.0 or later, you must not enable FIPS mode before the upgrade is completed. Enabling FIPS mode before the upgrade is complete interrupts communication between upgraded and not-upgraded components.

NSX Upgrade and FIPS Status

Table 1-1. FIPS Mode Status in NSX Components After Upgrade from NSX 6.2 to NSX 6.3 or NSX 6.4.

NSX Component	FIPS Mode Status
NSX Manager	After upgrade, FIPS mode on NSX Manager appliances is available and turned off. Do not enable FIPS until upgrade of all NSX components is complete, and FIPS has been enabled on all NSX Edge appliances.
NSX Controller cluster	After upgrade, the NSX Controller cluster is FIPS compliant. This is not configurable.

Table 1-1. FIPS Mode Status in NSX Components After Upgrade from NSX 6.2 to NSX 6.3 or NSX 6.4. (Continued)

NSX Component	FIPS Mode Status
NSX host cluster	After upgrade, NSX host clusters are FIPS compliant. This is not configurable.
NSX Edge	After upgrade, FIPS mode on NSX Edge appliances is available and turned off. Do not enable FIPS until upgrade of all NSX components is complete.
Guest Introspection service VM	After upgrade, the Guest Introspection service VM is FIPS compliant. This is not configurable.

Enable FIPS

If you are upgrading from NSX 6.2 to NSX 6.3 or NSX 6.4, and want to enable FIPS, you must complete the following steps:

1 Verify that any partner solutions are FIPS mode certified. See the VMware Compatibility Guide at http://www.vmware.com/resources/compatibility/search.php?deviceCategory=security. Check the partner documentation for information.

2 Upgrade NSX Manager to NSX 6.3.0 or later.

3 Upgrade the NSX Controller cluster to NSX 6.3.0 or later.

4 Upgrade all host clusters running NSX workloads to NSX 6.3.0 or later.

5 Upgrade all NSX Edge appliances to NSX 6.3.0 or later.

6 If installed, upgrade Guest Introspection on all host clusters to NSX 6.3.0 or later.

7 Enable FIPS mode on NSX Edge appliances. See Change FIPS Mode on NSX Edge in the *NSX Administration Guide*.

8 Enable FIPS mode on the NSX Manager appliances. See Change FIPS Mode and TLS Settings on NSX Manager in the *NSX Administration Guide*.

Verify the NSX Working State

Before beginning the upgrade, it is important to test the NSX working state. Otherwise, it might be difficult to determine if any post-upgrade issues are caused by the upgrade or if they existed before the upgrade process started.

Do not assume that everything is working before you begin to upgrade the NSX Data Center for vSphere infrastructure. Make sure to check it first.

Procedure

1 Note the current versions of NSX Manager, vCenter Server, ESXi, and NSX Edges.

2 Identify administrative user IDs and passwords.

3 Verify you can log into the following components:

- vCenter Server
- NSX Manager Web UI

- Edge services gateway appliances
- Distributed logical router appliances
- NSX Controller appliances

4 Verify that VXLAN segments are functional.

Make sure to set the packet size correctly and include the "Don't Fragment" bit.

- Ping between two VMs that are on the same logical switch but on two different hosts.
  - From a Windows VM: `ping –l 1472 –f <dest VM>`
  - From a Linux VM: `ping –s 1472 –M do <dest VM>`
- Ping between two hosts' VTEP interfaces.
  - `ping ++netstack=vxlan –d –s 1572 <dest VTEP IP>`

  Note To get a host's VTEP IP, look up the vmknicPG IP address on the host's **Manage > Networking > Virtual Switches** page.

5 Validate North-South connectivity by pinging out from a VM.

6 Visually inspect the NSX environment to make sure that all status indicators are green/normal/deployed.

- Verify overall system status in the Dashboard: **Dashboard > Overview**.
- Verify NSX Manager and NSX Controller status: **Installation and Upgrade > Management**.
- Verify host preparation status: **Installation and Upgrade > Host Preparation**.
- Verify VXLAN transport status: **Installation and Upgrade > Logical Network Preparation > VXLAN Transport**.
- Verify Service Deployment status: **Installation and Upgrade > Service Deployments**.
- Verify logical switch status: **Logical Switches**.
- Verify NSX Edge status: **NSX Edges**.

7 Record BGP and OSPF states on the NSX Edge devices

- `show ip ospf neighbor`
- `show ip bgp neighbor`
- `show ip route`

8 Verify that syslog is configured.

See Specify a Syslog Server.

9 If possible, in the pre-upgrade environment, create new components and test their functionality.

- Create a new logical switch.
- Create a new edge services gateway and a new distributed logical router.

- Connect a VM to the new logical switch and test the functionality.

10 Validate netcpad and vsfwd user-world agent (UWA) connections.

- On an ESXi host, run `esxcli network vswitch dvs vmware vxlan network list --vds-name=<VDS_name>` and check the controller connection state.
- On NSX Manager, run the `show tech-support` command, and search for "5671" to ensure that all hosts are connected to NSX Manager.

11 (Optional) If you have a test environment, test the upgrade and post-upgrade functionality before upgrading a production environment.

Uninstall NSX Data Security

NSX Data Security was deprecated in NSX 6.2.3, and has been removed from NSX 6.3.0. You must uninstall NSX Data Security before upgrading to NSX 6.3.0 or later.

Procedure

1 In the **Installation and Upgrade** tab, click **Service Deployments**.

2 Select the NSX Data Security service and click the **Delete Service Deployment** ( ) icon.

3 In the Confirm Delete dialog box, click **Delete now** or select a date and time for the delete to take effect.

4 Click **OK**.

NSX Backup and Restore

Proper backup of all NSX Data Center for vSphere components is crucial to restore the system to its working state in the event of a failure.

The NSX Manager backup contains all of the NSX Data Center for vSphere configuration, including controllers, logical switching and routing entities, security, firewall rules, and everything else that you configure within the NSX Manager UI or API. The vCenter database and related elements like the virtual switches need to be backed up separately.

At a minimum, we recommend taking regular backups of NSX Manager and vCenter. Your backup frequency and schedule might vary based on your business needs and operational procedures. We recommend taking NSX backups frequently during times of frequent configuration changes.

NSX Manager backups can be taken on demand or on an hourly, daily, or weekly basis.

We recommend taking backups in the following scenarios:

- Before an NSX Data Center for vSphere or vCenter upgrade.
- After an NSX Data Center for vSphere or vCenter upgrade.
- After Day Zero deployment and initial configuration of NSX Data Center for vSphere components, such as after the creation of the NSX Controller cluster, logical switches, logical routers, edge services gateways, security, and firewall policies.

- After infrastructure or topology changes.
- After any major Day 2 change.

To provide an entire system state at a given time to roll back to, we recommend synchronizing NSX Data Center for vSphere component backups (such as NSX Manager) with your backup schedule for other interacting components, such as vCenter, cloud management systems, operational tools, and so on.

Back Up and Restore NSX Manager

NSX Manager backup and restore can be configured from the NSX Manager virtual appliance web interface or through the NSX Manager API. Backups can be scheduled on an hourly, daily or weekly basis.

The backup file is saved to a remote FTP or SFTP location that NSX Manager can access. NSX Manager data includes configuration, events, and audit log tables. Configuration tables are included in every backup.

Restore is only supported on the same NSX Manager version as the backup version. For this reason, it is important to create a new backup file before and after performing an NSX upgrade, one backup for the old version and another backup for the new version.

Back Up NSX Manager Data

You can back up NSX Manager data by performing an on-demand backup or a scheduled backup.

Procedure

1. Log in to the NSX Manager Virtual Appliance.
2. Under Appliance Management, click **Backups & Restore**.
3. To specify the backup location, click **Change** next to FTP Server Settings.
    a. Type the IP address or host name of the backup system.
    b. From the **Transfer Protocol** drop-down menu, select either **SFTP** or **FTP**, based on what the destination supports.
    c. Edit the default port if required.
    d. Type the user name and password required to login to the backup system.

e In the **Backup Directory** field, type the absolute path where backups will be stored.

Note If you do not provide backup directory, backup is stored to the default directory (home directory) of the FTP server.

To determine the absolute path, you can log in to the FTP server, navigate to the directory that you want to use, and run the present working directory command (`pwd`). For example:

```
PS C:\Users\Administrator> ftp 192.168.110.60
Connected to 192.168.110.60.
220 server-nfs FTP server ready.
User (192.168.110.60:(none)): admin
331 Password required for admin.
Password:
230 User admin logged in.
ftp> ls
200 PORT command successful.
150 Opening BINARY mode data connection for 'file list'.
datastore-01
226 Transfer complete.
ftp: 22 bytes received in 0.00Seconds 22000.00Kbytes/sec.
ftp> cd datastore-01
250 CWD command successful.
ftp> pwd
257 "/datastore-01" is current directory.
```

f Type a text string in **Filename Prefix**.

This text is prepended to each backup filename for easy recognition on the backup system. For example, if you type **ppdb**, the resulting backup is named as *ppdbHH_MM_SS_YYYY_Mon_Day*.

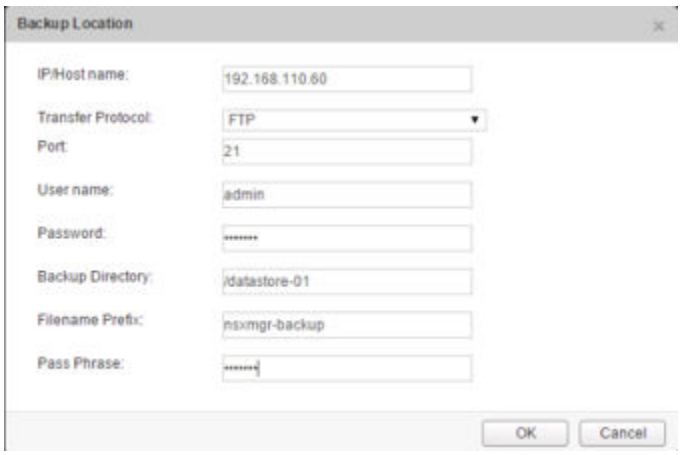
Note Files in the Backup Directory must be limited to 100. If number of files in the directory exceeds the limit, you will receive a warning message.

g Type the pass phrase to secure the backup.

You will need this pass phrase to restore the backup.

h Click **OK**.

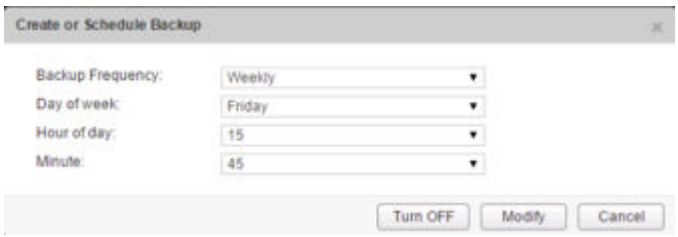
For example:



4 For an on-demand backup, click **Backup**.

A new file is added under **Backup History**.

5 For scheduled backups, click **Change** next to Scheduling.



a From the **Backup Frequency** drop-down menu, select **Hourly**, **Daily**, or **Weekly**. The Day of Week, Hour of Day, and Minute drop-down menus are disabled based on the selected frequency. For example, if you select Daily, the Day of Week drop-down menu is disabled as this field is not applicable to a daily frequency.

b For a weekly backup, select the day of the week the data should be backed up.

c For a weekly or daily backup, select the hour at which the backup should begin.

d Select the minute to begin and click **Schedule**.

6 To exclude logs and flow data from being backed up, click **Change** next to Exclude.

a Select the items you want to exclude from the backup.

b Click **OK**.

7 Save your FTP server IP/hostname, credentials, directory details, and pass phrase. This information is needed to restore the backup.

Restore an NSX Manager Backup

Restoring NSX Manager causes a backup file to be loaded on an NSX Manager appliance. The backup file must be saved to a remote FTP or SFTP location that NSX Manager can access. NSX Manager data includes configuration, events, and audit log tables.

Important Back up your current data before restoring a backup file.

Prerequisites

Before restoring NSX Manager data, we recommend reinstalling the NSX Manager appliance. Running the restore operation on an existing NSX Manager appliance might work, too, but is not supported. The assumption is that the existing NSX Manager has failed, and therefore a new NSX Manager appliance is deployed.

The best practice is to take note of the current settings for the old NSX Manager appliance so that they can be used to specify IP information and backup location information for the newly deployed NSX Manager appliance.

Procedure

1. Take note of all settings on the existing NSX Manager appliance. Also, note down FTP server settings.
2. Deploy a new NSX Manager appliance.

   The version must be the same as the backed up NSX Manager appliance.
3. Log in to the new NSX Manager appliance.
4. Under Appliance Management, click **Backups & Restore**.
5. In FTP Server Settings, click **Change** and add the FTP server settings.

   The **Host IP Address**, **User Name**, **Password**, **Backup Directory**, **Filename Prefix**, and **Pass Phrase** fields in the Backup Location screen must identify the location of the backup to be restored.

   The **Backup History** section displays the backup folder.

   Note If the backup folder does not appear in the **Backup History** section, verify the FTP server settings. Check if you can connect to FTP server and view the backup folder.
6. In the **Backup History** section, select the required backup folder to restore, and click **Restore**.

   Restoring the NSX Manager data begins.

NSX configuration is restored to the NSX Manager.

Caution After restoring an NSX Manager backup, you might need to take additional action to ensure correct operation of NSX Edge appliances and logical switches. See Restore NSX Edges and Resolve Out of Sync Errors on Logical Switches.

Restore NSX Edges

All NSX Edge configurations (logical routers and edge services gateways) are backed up as part of NSX Manager data backup.

Taking individual NSX Edge backups is not supported.

If you have an intact NSX Manager configuration, you can recreate an inaccessible or failed Edge appliance VM by redeploying the NSX Edge (click **Redeploy NSX Edge ( )** in the vSphere Web Client). See "Redeploy NSX Edge" in the *NSX Administration Guide*.

Caution After restoring an NSX Manager backup, you might need to take additional action to ensure correct operation of NSX Edge appliances.

- Edge appliances created after last backup are not removed during restore. You must delete the VM manually.
- Edge appliances deleted after the last backup are not restored unless redeployed.
- If both the configured and current locations of an NSX Edge appliance saved in the backup no longer exist when the backup is restored, operations such as redeploy, migrate, enable or disable HA will fail. You must edit the appliance configuration and provide valid location information. Use `PUT /api/4.0/edges/{edgeId}/appliances` to edit the appliance location configuration (*resourcePoolId*, *datastoreId*, *hostId* and *vmFolderId* as necessary). See "Working With NSX Edge Appliance Configuration" in the *NSX API Guide*.

If any of the following changes have occurred since the last NSX Manager backup, the restored NSX Manager configuration and the configuration present on the NSX Edge appliance will differ. You must **Force Sync** the NSX Edge to revert these changes on the appliance and ensure correct operation of the NSX Edge. See "Force Sync NSX Edge with NSX Manager" in the *NSX Administration Guide*.

- Changes made via Distributed Firewall for preRules for NSX Edge firewall.
- Changes in grouping objects membership.

If any of the following changes have occurred since the last NSX Manager backup, the restored NSX Manager configuration and the configuration present on the NSX Edge appliance will differ. You must **Redeploy** the NSX Edge to revert these changes on the appliance and ensure correct operation of the NSX Edge. See "Redeploy NSX Edge" in the *NSX Administration Guide*.

- Changes in Edge appliance settings:
  - HA enabled or disabled
  - appliance moved from deployed to undeployed state
  - appliance moved from undeployed to deployed state
  - resource reservation settings have been changed
- Changes in Edge appliance vNic settings:
  - add, remove, or disconnect vNic
  - port groups
  - trunk ports
  - fence parameters
  - shaping policy

Resolve Out of Sync Errors on Logical Switches

If logical switch changes have occurred between taking the NSX Manager backup and restoring the backup, logical switches might report being out of sync.

Procedure

1. Log in to the vSphere Web Client.
2. Navigate to **Networking & Security > Logical Switches**.
3. If present, click the **Out of sync** link in the Status column to display error details.
4. Click **Resolve** to recreate missing backing port groups for the logical switch.

Back Up vSphere Distributed Switches

You can export vSphere Distributed Switch and distributed port group configurations to a file.

Export the vSphere Distributed Switch configuration to create a backup before preparing the cluster for VXLAN. For detailed instructions about exporting a vSphere Distributed Switch configuration, see http://kb.vmware.com/kb/2034602.

Back Up vCenter

To secure your NSX deployment, it is important to back up the vCenter database and take snapshots of the VMs.

Refer to the vCenter documentation for your vCenter version for vCenter backup and restore procedures and best practices.

For vCenter Backups, see the following:

- The *vSphere Installation and Setup* documentation for your version of vSphere
- http://kb.vmware.com/kb/2110294

For VM snapshots, see http://kb.vmware.com/kb/1015180.

Managing NSX Manager Backups Created During Upgrade

When you upgrade NSX Manager to NSX 6.4.1 or later, a backup is taken and saved locally as part of the upgrade process. You must contact VMware customer support to restore this backup. This automatic backup is intended as a failsafe in case the regular backup fails.

After NSX Manager is successfully upgraded, new commands are available in privileged (**enable**) mode to allow you to manage the backup files. You can use these commands to list, copy, or delete the backup files.

If you don't delete them, the backup files remain in place until the next upgrade. When the next upgrade is started, the backup files are deleted, and a new backup is taken.

show backup

List the backup files.

```
nsxmgr-01a.corp.local# show backup
total 3040
-rw-r--r-- 1 root root 3102752 Mar 23 01:12 backup_file
-rw-r--r-- 1 root root     230 Mar 23 01:12 backup_metadata
```

export backup

Copy the backup files to another location.

```
nsxmgr-01a.corp.local# export backup scp root@backup-server:/backups
Exporting...
Password:
backup_file                                   100% 3030KB  19.8MB/s   00:00
backup_metadata                               100%  230    27.3KB/s   00:00
nsxmgr-01a.corp.local#
```

delete backup

Delete the backup files. Only delete the backup if you are sure that you no longer need it.

```
nsxmgr-01a.corp.local# delete backup
Do you want to delete the backup files (y|N)y
nsxmgr-01a.corp.local#
```

Download the Upgrade Bundle and Check the MD5

The upgrade bundle contains all the files needed to upgrade the NSX Data Center for vSphere infrastructure. Before upgrading NSX Manager you will first need to download the upgrade bundle for the version you wish to upgrade to.

You can download the NSX Data Center for vSphere upgrade bundle from the VMware download site: https://my.vmware.com/group/vmware/downloads. Select **Networking & Security** from the Products drop-down menu.

Prerequisites

An MD5 checksum tool.

Procedure

1. Download the upgrade bundle to a location NSX Manager can browse to. The name of the upgrade bundle file has a format similar to `VMware-NSX-Manager-upgrade-bundle-`*`releaseNumber`*`-`*`NSXbuildNumber`*`.tar.gz`.

2 Verify the NSX Manager upgrade filename ends with tar.gz.

   Some browsers might alter the file extension. For example if the download filename is:

   VMware-NSX-Manager-upgrade-bundle-6.x.x-xxxxx.gz

   Change it to:

   VMware-NSX-Manager-upgrade-bundle-6.x.x-xxxxx.tar.gz

   Otherwise, after uploading the upgrade bundle, the following error message appears: "Invalid upgrade bundle file VMware-NSX-Manager-upgrade-bundle-6.x.x-xxxxx,gz, upgrade file name has extension tar.gz."

3 Use an MD5 checksum tool to compare the upgrade bundle's official MD5 sum shown on the VMware Web site with the MD5 sum calculated by the checksum tool.

   a In the MD5 checksum tool, browse to the upgrade bundle.

   b Use the tool to calculate the checksum of the bundle.

   c Paste in the checksum listed on the VMware Web site.

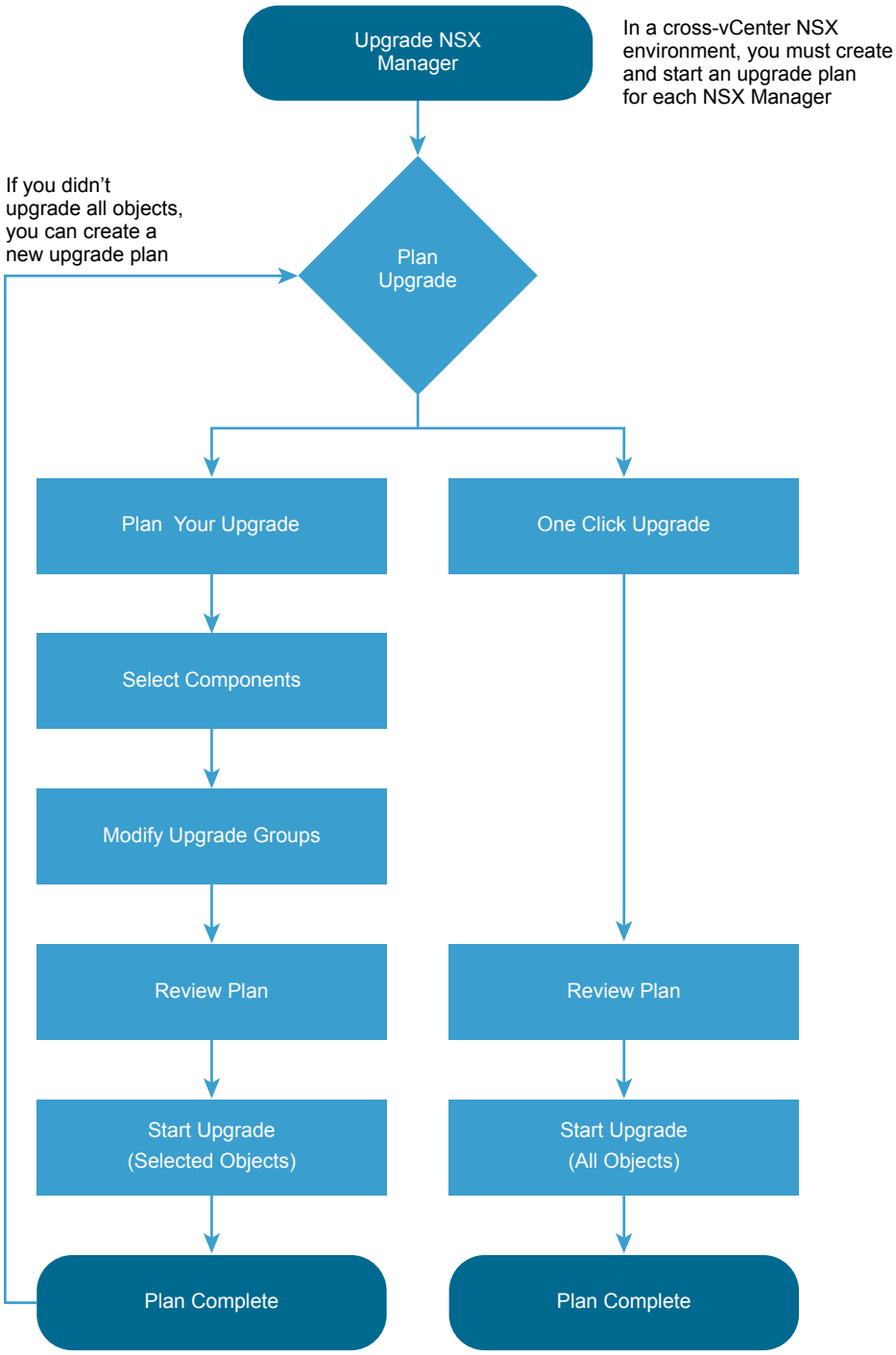
   d Use the tool to compare the two checksums.

   If the two checksums do not match, repeat the upgrade bundle download.

Upgrade NSX Using Upgrade Coordinator

When you upgrade using Upgrade Coordinator, you can select to perform a **One Click Upgrade**, where everything is upgraded during one upgrade session. Or you can select to **Plan Your Upgrade**, and customize which components are upgraded, and organize component objects into upgrade groups.

Upgrade Coordinator performs checks and displays relevant warnings and errors before and during the upgrades.



Procedure

1 Upgrade NSX Manager Before Creating an Upgrade Plan

You must upgrade the NSX Manager through its web interface before you can create an upgrade plan for the other NSX Data Center for vSphere components. If you are upgrading a cross-vCenter NSX environment, you must upgrade all NSX Manager appliances before creating the upgrade plan.

2 Plan and Start an Upgrade

When you plan an upgrade, you have two options: the system can create an upgrade plan, which includes all components, or you can create a custom upgrade plan, and select which components are upgraded.

3 Monitor and Troubleshoot Your Upgrade

Warnings and errors are displayed during the upgrade process. You might need to address problems so the upgrade can finish successfully.

4 Modify an In-Progress Upgrade Plan

You can pause an in-progress upgrade plan. If an object upgrade is in progress when the plan is paused, the object upgrade continues until it succeeds or fails. Then the upgrade plan pauses. You can modify the paused plan (replan) or resume it.

5 NSX Services That Do Not Support Direct Upgrade

Some NSX services do not support a direct upgrade. In these cases, you must uninstall and reinstall the services.

6 Post-Upgrade Tasks

After all components are upgraded, complete all post-upgrade tasks.

Upgrade NSX Manager Before Creating an Upgrade Plan

You must upgrade the NSX Manager through its web interface before you can create an upgrade plan for the other NSX Data Center for vSphere components. If you are upgrading a cross-vCenter NSX environment, you must upgrade all NSX Manager appliances before creating the upgrade plan.

During the upgrade, you can choose to join the Customer Experience Improvement Program (CEIP) for NSX Data Center for vSphere. See Customer Experience Improvement Program in the *NSX Administration Guide* for more information about the program, including how to join or leave the program.

If you are upgrading from NSX 6.3.0 or later, uploading the upgrade bundle and starting the upgrade can happen independently. To start an upgrade from a previously uploaded upgrade bundle, navigate to **Home > Upgrade** and click **Begin Upgrade**.

When you upgrade NSX Manager to NSX 6.4.1 or later, a backup is automatically taken and saved locally as part of the upgrade process. See Managing NSX Manager Backups Created During Upgrade for information about managing these backup files.

- If the automatic backup taken during the upgrade fails, the upgrade will not continue. Contact VMware customer support for assistance.
- The automatic backup is intended as a failsafe in case your regular backup fails.
  - Always take a regular NSX Manager backup before upgrading. See Back Up NSX Manager Data for more information. You can restore this backup without assistance from VMware customer support.
  - If you need to restore the automatic backup, you must contact VMware customer support.

Prerequisites

- Validate the NSX Manager file system usage, and perform a cleanup if file system usage is at 100 percent.
  a Log in to NSX Manager and run `show filesystems` to show the filesystem usage.
  b If the usage is 100 percent, enter privileged (enable) mode, and run the `purge log manager` and `purge log system` commands.
  c Reboot the NSX Manager appliance for the log cleanup to take effect.
- Verify the NSX Manager virtual appliance reserved memory meets the system requirements before upgrading.

  See System Requirements for NSX Data Center for vSphere.
- If you have Data Security in your environment, uninstall it before upgrading NSX Manager. See Uninstall NSX Data Security. Data Security has been removed from NSX 6.3.x.
- Back up your current configuration and download technical support logs before upgrading. See NSX Backup and Restore.
- Download the upgrade bundle and check the MD5. See Download the Upgrade Bundle and Check the MD5.
- Make sure that you understand the operational impact of the NSX Manager upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- Determine which NSX Managers must be upgraded in the same maintenance window.
  - If you have a cross-vCenter NSX environment, you must upgrade the primary and all secondary NSX Managers to the same NSX version in a single maintenance window.
  - If you have multiple NSX Managers connected to vCenter Server systems that use the same SSO server, not all combinations of NSX Manager version are supported. You must plan the upgrade of your NSX Managers so that you have a supported configuration at the end of the maintenance window
    - All NSX Managers using the same version of NSX is supported.
    - NSX Managers using different version of NSX is supported if at least one NSX Manager has NSX 6.4.0 or later installed, and all other NSX Managers have NSX 6.3.3 or later installed.

Procedure

1 Log in to the NSX Manager virtual appliance.

2 From the home page, click **Upgrade**.

3 Click **Upgrade**, then click **Choose File** and browse to the `VMware-NSX-Manager-upgrade-bundle-`*releaseNumber*`-`*NSXbuildNumber*`.tar.gz` file. Click **Continue** to start the upload.

  The upload status displays in the browser window.

4 If you want to start the upgrade later, click **Close** in the Upgrade dialog box.

  When you are ready to start the upgrade, navigate to **Home > Upgrade** and click **Begin Upgrade**.

5 In the Upgrade dialog box, select whether you want to enable SSH, and whether you want to participate in VMware's Customer Experience Improvement Program ("CEIP"). Click **Upgrade** to start the upgrade.

   The upgrade status displays in the browser window.

   Note The Upgrade dialog box displays a message indicating that the automatic backup has been taken.

   Wait until the upgrade procedure finishes and the NSX Manager login page appears.

6 Log in to the NSX Manager virtual appliance again, and from the home page click **Upgrade**. Confirm that the upgrade state is **Complete**, and the version and build number on the top right matches the upgrade bundle you just installed.

After the NSX Manager is upgraded, create a new NSX Manager backup file. See NSX Backup and Restore. The previous NSX Manager backup is only valid for the previous release.

Plan and Start an Upgrade

When you plan an upgrade, you have two options: the system can create an upgrade plan, which includes all components, or you can create a custom upgrade plan, and select which components are upgraded.

Upgrade Coordinator creates default upgrade groups which contain objects of the same type. For example, a host cluster upgrade group contains host cluster objects. You can edit the upgrade groups to control which objects are upgraded in an upgrade session. See Manage Upgrade Groups for more information.

Table 1-2. Managing Which Components and Objects Are Upgraded

Component	Can the component be omitted from upgrade?	Can the component upgrade groups be modified?	More information
NSX Controller cluster	No. Upgrade is mandatory.	No. All controllers are upgraded.	
Host Clusters	Yes	Yes	
Universal Routers	Yes	Yes	Cross-vCenter NSX environments only.
NSX Edges	Yes	Yes	Logical Distributed Routers and Edge Services Gateways.
Service VMs	Yes	Yes	Guest Introspection Service VMs only. Partner service VMs must be upgraded separately.

If a component is included in the upgrade plan, all upgrade groups of that type must be upgraded before the next component type can be upgraded. For example, if NSX Edges are included in your upgrade plan, you must upgrade all NSX Edge upgrade groups before Service VMs can be upgraded.

An upgrade plan controls the upgrade of components and objects that are managed by a specific NSX Manager.

In a cross-vCenter NSX environment, you must create an upgrade plan for each NSX Manager to upgrade all components in the environment. Create and complete an upgrade plan for the primary NSX Manager first, including upgrading any Universal Logical Distributed Routers, before creating a plan for the secondary NSX Managers.

You can create upgrade plans for all secondary NSX Managers in a cross-vCenter NSX environment from the vCenter Server system registered with the primary NSX Manager.

Prerequisites

- Verify that the NSX Manager appliance has been upgraded. If you are upgrading a cross-vCenter NSX environment, you must upgrade all NSX Manager appliances before creating the upgrade plan.

Procedure

1. Navigate to **Networking & Security > Installation and Upgrade > Upgrade**.
2. If you are upgrading a cross-vCenter NSX environment, select an NSX Manager from the NSX Manager drop-down menu.

   When you select a secondary NSX Manager, you are prompted to enter the NSX Manager user name and password.
3. Review and address any warnings displayed on the components panel.
4. Click **Plan Upgrade**.
5. Select an upgrade plan:
   - To manage which components are upgraded, select **Plan Your Upgrade**. Follow the prompts to create an upgrade plan.
   - To upgrade everything without configuration, select **One Click Upgrade**.
6. If you select **Plan Your Upgrade**, customize your upgrade.
   a. Select components to upgrade.
   b. Select upgrade pause options.

      You can select to pause between components, for example between the NSX Controller cluster upgrade and the host cluster upgrade. You can select to pause on errors.
   c. Follow the prompts to configure upgrade groups. See Manage Upgrade Groups for more information.
7. Review your upgrade plan.
   - If you selected **Plan Your Upgrade**, your custom upgrade plan is displayed.
   - If you selected **One Click Upgrade**, all components are selected, and the upgrade does not pause between components, or on error.
8. Click **START UPGRADE** to start the upgrade.

What to do next

View the status of the upgrade on the upgrade page. See Monitor and Troubleshoot Your Upgrade.

If you want to pause the upgrade, or modify the plan after it has started, click **PAUSE**. See Modify an In-Progress Upgrade Plan.

If the environment contains any objects that have not been upgraded, you can plan additional upgrades to upgrade them.

If you are upgrading a cross-vCenter NSX environment, create additional upgrade plans to upgrade components managed by other NSX Managers in the environment.

Manage Upgrade Groups

Host clusters, universal logical distributed routers (cross-vCenter NSX environments only), NSX Edges, and Service VMs are arranged into upgrade groups, and all upgrade groups are included in the upgrade plan by default.

You can add, edit, and delete upgrade groups.

You can add an object to an upgrade group only if it does not already belong to an upgrade group.

If you are splitting an upgrade over multiple maintenance windows, you might want to add objects to upgrade groups, and exclude them. The objects are part of the upgrade plan, but are not upgraded in this upgrade session. After the upgrade has finished, you can create a new upgrade plan, and include them.

If you do not want to upgrade an object, you can remove it from all upgrade groups.

Procedure

1. Navigate to the **Plan Host Clusters**, **Plan Universal Routers**, **Plan NSX Edges**, or **Plan Service VMs** panel of the **Upgrade Components** wizard.
2. (Optional) Change the upgrade order for upgrade groups of this component type. For example, if you are modifying the host cluster upgrade groups from the **Plan Host Clusters** panel, this would define whether multiple host clusters upgrade groups are upgraded at the same time or not.
   - Select **Parallel** to upgrade multiple upgrade groups at the same time.
   - Select **Serial** to upgrade one upgrade group at a time.
3. (Optional) If a component type is configured for serial upgrade order, you can change the order of the upgrade groups. Select a group, and click **UP** or **DOWN** to change the order.
4. (Optional) To exclude or include an upgrade group, select the upgrade group and click **EXCLUDE** or **INCLUDE**.
5. (Optional) To edit an upgrade group, select the group and click **Edit**.
   - Change the name of the upgrade group.
   - Add or change the description of the upgrade group.

- Change the upgrade order for the objects in this upgrade group. For example, if you are modifying a host cluster upgrade group from the **Edit Upgrade Group** window, this would define whether multiple host clusters in that host cluster upgrade group are upgraded at the same time or not.
  - Select **Parallel** to upgrade multiple objects at the same time.
  - Select **Serial** to upgrade one object at a time.
- Add or remove objects from the upgrade group.

Monitor and Troubleshoot Your Upgrade

Warnings and errors are displayed during the upgrade process. You might need to address problems so the upgrade can finish successfully.

You can view the status of the upgrade from the **Upgrade** page.

Click **View Details** in the Upgrade Plan Progress section to get more information about the upgrade status. If the upgrade fails, error information is displayed here.

Errors might also be displayed on the configuration interface for each component.

Table 1-3. Finding Component Upgrade Status Information

Component	Upgrade status information
Controller Cluster	From the **Management** tab, look for errors in the NSX Controller nodes section.
Host Clusters	From the **Host Preparations** tab, look for errors in the Installation Status column. If the status is Not Ready, click **Not Ready** to see more information. Look for host problems in **Hosts and Clusters**. For example, a host might need to be manually evacuated before it can enter maintenance mode.
NSX Edges	From the **NSX Edges** page, click **Failed** to get more information on failed upgrades.
Service VMs	From the **Service Deployments** tab, look for errors in the Installation Status column. If the status is Not Ready, click **Not Ready** to see more information.

To see if host resources are causing upgrade problems, check for hosts errors in **Home > Hosts and Clusters**.

For more troubleshooting information, see "Troubleshooting NSX Infrastructure" in the *NSX Troubleshooting Guide*.

Modify an In-Progress Upgrade Plan

You can pause an in-progress upgrade plan. If an object upgrade is in progress when the plan is paused, the object upgrade continues until it succeeds or fails. Then the upgrade plan pauses. You can modify the paused plan (replan) or resume it.

Procedure

1 From the **Upgrade** page, click **Pause**.

2 You can resume the upgrade plan, or modify the plan before proceeding.

- To resume the upgrade plan, click **RESUME**.
- To modify the upgrade plan, click **REPLAN**.

  Follow the prompts to modify your upgrade plan.

NSX Services That Do Not Support Direct Upgrade

Some NSX services do not support a direct upgrade. In these cases, you must uninstall and reinstall the services.

VMware Partner Security Virtual Appliances

Check the partner documentation to verify if the partner security virtual appliance can be upgraded.

Post-Upgrade Tasks

After all components are upgraded, complete all post-upgrade tasks.

Procedure

1 Create a current backup of the NSX Manager after the upgrade.

2 Check that the NSX VIB has been installed on the hosts.

```
esxcli software vib get --vibname esx-nsxv
```

If Guest Introspection has been installed, also check that this VIB is present on the hosts:

```
esxcli software vib get --vibname epsec-mux
```

3 Resynchronize the host message bus.

You can use the following API call to perform the resynchronization on each cluster.

```
POST https://<nsx-mgr-ip>/api/4.0/firewall/forceSync/<cluster-id>
```

See the *NSX API Guide* for more information.

Upgrade NSX

To upgrade NSX Data Center for vSphere, you must upgrade the NSX components in the order in which they are documented in this guide.

NSX Data Center for vSphere components must be upgraded in the following order:

1 NSX Manager appliance

2 NSX Controller cluster

3 Host clusters

4 NSX Edge (see Note)

5 Guest Introspection

Note Edge Services Gateways can be upgraded at any time after the NSX Manager upgrade. However, logical routers cannot be upgraded until the NSX Controller cluster and host clusters have been upgraded. See Operational Impacts of NSX Upgrades for more information about upgrade dependencies.

The upgrade process is managed by the NSX Manager. If the upgrade of a component fails or is interrupted and you need to repeat or restart the upgrade, the process begins from the point at which it stopped; it does not start over from the beginning.

The upgrade status is updated for each node and at the cluster level.

1 Upgrade NSX Manager

   The first step in the NSX Data Center for vSphere infrastructure upgrade process is the NSX Manager appliance upgrade.

2 Upgrade the NSX Controller Cluster

   The controllers in your environment are upgraded at the cluster level. If an upgrade is available for a controller node, an upgrade link appears in the NSX Manager.

3 Upgrade Host Clusters

   After upgrading NSX Manager and NSX Controllers, you can update the appropriate clusters in your environment.

4 Upgrade NSX Edge

   During the upgrade process, a new Edge virtual appliance is deployed alongside the existing one.

5 Upgrade Guest Introspection

   It is important to upgrade Guest Introspection to match the NSX Manager version.

6 NSX Services That Do Not Support Direct Upgrade

   Some NSX services do not support a direct upgrade. In these cases, you must uninstall and reinstall the services.

7 Post-Upgrade Tasks

   After all components are upgraded, complete all post-upgrade tasks.

Upgrade NSX Manager

The first step in the NSX Data Center for vSphere infrastructure upgrade process is the NSX Manager appliance upgrade.

During the upgrade, you can choose to join the Customer Experience Improvement Program (CEIP) for NSX Data Center for vSphere. See Customer Experience Improvement Program in the *NSX Administration Guide* for more information about the program, including how to join or leave the program.

If you are upgrading from NSX 6.3.0 or later, uploading the upgrade bundle and starting the upgrade can happen independently. To start an upgrade from a previously uploaded upgrade bundle, navigate to **Home > Upgrade** and click **Begin Upgrade**.

When you upgrade NSX Manager to NSX 6.4.1 or later, a backup is automatically taken and saved locally as part of the upgrade process. See Managing NSX Manager Backups Created During Upgrade for information about managing these backup files.

- If the automatic backup taken during the upgrade fails, the upgrade will not continue. Contact VMware customer support for assistance.
- The automatic backup is intended as a failsafe in case your regular backup fails.
  - Always take a regular NSX Manager backup before upgrading. See Back Up NSX Manager Data for more information. You can restore this backup without assistance from VMware customer support.
  - If you need to restore the automatic backup, you must contact VMware customer support.

Prerequisites

- Validate the NSX Manager file system usage, and perform a cleanup if file system usage is at 100 percent.
  a Log in to NSX Manager and run `show filesystems` to show the filesystem usage.
  b If the usage is 100 percent, enter privileged (enable) mode, and run the `purge log manager` and `purge log system` commands.
  c Reboot the NSX Manager appliance for the log cleanup to take effect.
- Verify the NSX Manager virtual appliance reserved memory meets the system requirements before upgrading.

  See System Requirements for NSX Data Center for vSphere.
- If you have Data Security in your environment, uninstall it before upgrading NSX Manager. See Uninstall NSX Data Security. Data Security has been removed from NSX 6.3.x.
- Back up your current configuration and download technical support logs before upgrading. See NSX Backup and Restore.
- Download the upgrade bundle and check the MD5. See Download the Upgrade Bundle and Check the MD5.
- Make sure that you understand the operational impact of the NSX Manager upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- Determine which NSX Managers must be upgraded in the same maintenance window.
  - If you have a cross-vCenter NSX environment, you must upgrade the primary and all secondary NSX Managers to the same NSX version in a single maintenance window.

- If you have multiple NSX Managers connected to vCenter Server systems that use the same SSO server, not all combinations of NSX Manager version are supported. You must plan the upgrade of your NSX Managers so that you have a supported configuration at the end of the maintenance window
  - All NSX Managers using the same version of NSX is supported.
  - NSX Managers using different version of NSX is supported if at least one NSX Manager has NSX 6.4.0 or later installed, and all other NSX Managers have NSX 6.3.3 or later installed.

Procedure

1. Log in to the NSX Manager virtual appliance.
2. From the home page, click **Upgrade**.
3. Click **Upgrade**, then click **Choose File** and browse to the `VMware-NSX-Manager-upgrade-bundle-`*releaseNumber*`-`*NSXbuildNumber*`.tar.gz` file. Click **Continue** to start the upload.

   The upload status displays in the browser window.
4. If you want to start the upgrade later, click **Close** in the Upgrade dialog box.

   When you are ready to start the upgrade, navigate to **Home > Upgrade** and click **Begin Upgrade**.
5. In the Upgrade dialog box, select whether you want to enable SSH, and whether you want to participate in VMware's Customer Experience Improvement Program ("CEIP"). Click **Upgrade** to start the upgrade.

   The upgrade status displays in the browser window.

   Note The Upgrade dialog box displays a message indicating that the automatic backup has been taken.

   Wait until the upgrade procedure finishes and the NSX Manager login page appears.
6. Log in to the NSX Manager virtual appliance again, and from the home page click **Upgrade**. Confirm that the upgrade state is **Complete**, and the version and build number on the top right matches the upgrade bundle you just installed.

After upgrading NSX Manager, you must log out and log back in to the vSphere Web Client and vSphere Client.

If the NSX plug-in does not display correctly in the vSphere Web Client or vSphere Client, clear your browser cache and history. If this step is not done, you might see an error similar to "An internal error has occurred - Error #1009" when making NSX configuration changes in the vSphere Web Client.

If the **Networking and Security** tab does not appear in the vSphere Web Client or vSphere Client, restart the related service:

Table 1-4. Client Service Commands

Client Service	vCenter Server Appliance	vCenter Server for Windows

Restart vSphere Web Client
On vSphere 6.0, 6.5, and 6.7
	`> shell.set --enabled True`
	`> shell`
	`# service-control --stop vsphere-client`
	`# service-control --start vsphere-client`
		`> cd C:\Program Files\VMware\vCenter Server\bin`
		`> service-control --stop vspherewebclientsvc`
		`> service-control --start vspherewebclientsvc`

Restart vSphere Client
On vSphere 6.5, and 6.7
	`> shell.set --enabled True`
	`> shell`
	`# service-control --stop vsphere-ui`
	`# service-control --start vsphere-ui`
		`> cd C:\Program Files\VMware\vCenter Server\bin`
		`> service-control --stop vsphere-ui`
		`> service-control --start vsphere-ui`

Use different Web Clients to manage vCenter Servers running different versions of NSX Managers to avoid unexpected errors when different versions of NSX plug-ins are running.

After the NSX Manager is upgraded, create a new NSX Manager backup file. See NSX Backup and Restore. The previous NSX Manager backup is only valid for the previous release.

Upgrade the NSX Controller Cluster

The controllers in your environment are upgraded at the cluster level. If an upgrade is available for a controller node, an upgrade link appears in the NSX Manager.

Upgrade the controllers during a maintenance window.

The NSX Controller upgrade causes an upgrade file to be downloaded to each controller node. The controllers are upgraded one at a time. While an upgrade is in progress, the **Upgrade Available** link is not clickable, and API calls to upgrade the controller cluster are blocked until the upgrade is complete.

If you deploy new controllers before the existing controllers are upgraded, they are deployed as the old version. Controller nodes must be the same version to join a cluster.

Important In NSX 6.3.3 the underlying operating system of the NSX Controller changes. When the operating system of the old and new controllers is the same, the controller upgrades is an in-place software upgrade. When you upgrade from NSX 6.3.2 or earlier to NSX 6.3.3 or later, the operating systems are different and so an in-place upgrade cannot be performed. Instead the existing controllers are deleted one at a time, and new Photon OS-based controllers are deployed using the same IP addresses.

When the controllers are deleted, any associated DRS anti-affinity rules are deleted. You must create new anti-affinity rules in vCenter to prevent the new controller VMs from residing on the same host.

Prerequisites

- Ensure that all the controllers are in the normal state. Upgrading is not possible when one or more of the controllers are in the disconnected state. To reconnect a disconnected controller, try resetting the controller virtual appliance. In the **Hosts and Clusters** view, right-click the controller and select **Power > Reset**. For more information about troubleshooting the NSX Controller cluster, see "NSX Controller Cluster Failures" in the *NSX Troubleshooting Guide*.
- A valid NSX Controller cluster contains three controller nodes. Log in to the three controller nodes and run the **show control-cluster status** command.

```
controller-node# show control-cluster status

Type                Status                                    Since
--------------------------------------------------------------------------------
Join status:        Join complete                             05/04 02:36:03
Majority status:    Connected to cluster majority             05/19 23:57:23
Restart status:     This controller can be safely restarted   05/19 23:57:12
Cluster ID:         ff3ebaeb-de68-4455-a3ca-4824e31863a8
Node UUID:          ff3ebaeb-de68-4455-a3ca-4824e31863a8

Role                Configured status   Active status
--------------------------------------------------------------------------------
api_provider        enabled             activated
persistence_server  enabled             activated
switch_manager      enabled             activated
logical_manager     enabled             activated
directory_server    enabled             activated
```

  - For Join status, verify that the controller node is reporting Join Complete.
  - For Majority status, verify that the controller is connected to the cluster majority.
  - For Cluster ID, all the controller nodes in a cluster have the same cluster ID.
  - For Configured status and Active status, verify that the all the controller roles have the status of enabled and activated.
- Make sure that you understand the operational impact of the NSX Controller upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- The NSX Controller cluster must contain three controller nodes. If it has fewer than three, you must add additional nodes before starting the upgrade. See "Deploy NSX Controller Cluster" in the *NSX Installation Guide* for steps to add controller nodes.

Procedure

1. Log in to the vSphere Web Client.
2. Navigate to **Networking & Security > Installation and Upgrade > Management > NSX Managers**.

3 Click **Upgrade Available** in the **Controller Cluster Status** column.

   The controllers in your environment are upgraded and rebooted one at a time. After you initiate the upgrade, the system downloads the upgrade file, upgrades each controller, reboots each controller, and updates the upgrade status of each controller.

4 Monitor the progress of the upgrade.

   - You can view the cluster upgrade progress in the **Upgrade Status** column in **Installation and Upgrade > Management > NSX Managers**.
   - You can view the upgrade progress of each individual controller node in the **Upgrade Status** column in **Installation and Upgrade > Management > Controller Nodes**.

When the upgrade is complete, the **Software Version** column in the NSX Controller nodes section displays `6.4.`*`buildNumber`* for each controller. Rerun the **show control-cluster status** command to make sure that the controllers can create a majority. If the NSX Controller cluster majority is not achieved, review the controller and NSX Manager logs.

The average upgrade time for each upgrade is 6–8 minutes. If the upgrade does not finish within the timeout period (30 minutes), the **Upgrade Status** column displays **Failed**. Click **Upgrade Available** in the NSX Manager section again to resume the upgrade process from the point where it stopped.

If network problems are preventing a successful upgrade within the 30-minute timeout period, work with VMware Support to diagnose and resolve any underlying problems.

If the controller upgrade fails, check connectivity between the controllers and the NSX Manager.

There is a scenario in which the first controller upgrades successfully, and the second controller does not. Assuming you have three controllers in a cluster, the first controller is successfully upgraded to the new version, and the second controller is being upgraded. If the upgrade of the second controller fails, the second controller might be left in a disconnected state. At the same time, the first and third controllers now have two different versions (one upgraded, one not) and are therefore unable to form a majority. At this point, the upgrade cannot be relaunched. To work around this scenario, create another controller. The newly created controller has the older NSX version (matching controller three) and can form a majority with controller three. At this point, you can relaunch the upgrade procedure. See "Redeploy an NSX Controller" in the *NSX Troubleshooting Guide* for instructions on creating another controller.

Upgrade Host Clusters

After upgrading NSX Manager and NSX Controllers, you can update the appropriate clusters in your environment.

Upgrading the host clusters upgrades the NSX VIBs.

If you are upgrading from NSX 6.2.x, hosts must be rebooted to finish the upgrade.

- If the cluster has DRS enabled, when you click **Resolve all** DRS attempts to reboot the hosts in a controlled fashion that keeps the VMs running. VMs are moved to other hosts in the cluster and the hosts enter maintenance mode and are rebooted.

- If the cluster does not have DRS enabled, you must power off or vMotion the VMs manually before beginning the upgrade. When you click **Resolve all** the hosts enter maintenance mode and are rebooted.

If you are upgrading from NSX 6.3.0 or later, the hosts must enter maintenance mode to finish the upgrade. Rebooting is not required.

- If the cluster has DRS enabled, when you click **Resolve all** DRS attempts to put the hosts into maintenance mode in a controlled fashion that allows the VMs to continue running. VMs are moved to other hosts in the cluster and the hosts enter maintenance mode.
- If the cluster does not have DRS enabled, you must power off or vMotion the VMs manually before beginning the upgrade. You must manually put the hosts into maintenance mode to complete the upgrade.

In NSX 6.3.5 and later you can view the EAM status on the **Host Preparation** tab.

Prerequisites

- Upgrade NSX Manager and the NSX Controller cluster.
- Log out of and log back in to the vSphere Web Client after upgrading NSX Manager and before upgrading the host clusters.
- Verify that the current vSphere and ESXi versions are compatible with the NSX Data Center for vSphere version you are upgrading to. See the VMware Interoperability Matrix at https://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php#interop&93=&2=&1=.
- Make sure that you understand the operational impact of a host cluster upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- Make sure the fully qualified domain names (FQDNs) of all hosts can be resolved.
- If DRS is disabled, power off or vMotion the VMs manually before beginning the upgrade.
- If DRS is enabled, the running VMs are moved automatically during the host cluster upgrade. Before beginning the upgrade, make sure that DRS can work in your environment.
  - Make sure that DRS is enabled on the host clusters.
  - Make sure that vMotion functions correctly.
  - Check the host connection state with vCenter.
  - Check that you have a minimum three ESXi hosts in each host cluster. During an NSX upgrade, a host cluster with only one or two hosts is more likely to have problems with DRS admission control. For a successful NSX upgrade, ensure that each host cluster has at least three hosts. If a cluster contains fewer than three hosts, manually evacuate the hosts.
  - In a small cluster with only two or three hosts, if you have created anti-affinity rules stating that certain VMs must reside on separate hosts, DRS might fail to move the VMs during the upgrade. Either add additional hosts to the cluster or disable the anti-affinity rules during the upgrade and reenable them after the upgrade is finished. To disable an anti-affinity rule, navigate to **Hosts and Clusters > *Cluster* > Manage > Settings > VM/Host Rules**. Edit the rule and deselect **Enable rule**.

- Log into one of the hosts in the cluster and run the `esxcli software vib list` command.

  The VIBs present will depend on the ESXi and NSX versions, and therefore might change as part of the upgrade. Note the current version of the installed VIBs:

ESXi version	NSX version	VIBs installed
6.0 or later	6.3.2 or earlier	■ esx-vsip ■ esx-vxlan
6.0 or later	6.3.3 or later	■ esx-nsxv

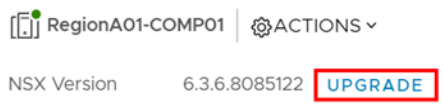
  Note Some versions of NSX Data Center for vSphere have additional VIBs which are removed during the upgrade.

  - If you are upgrading from NSX 6.2.x where the version is NSX 6.2.4 or later, prepared hosts have an extra VIB, esx-vdpi.

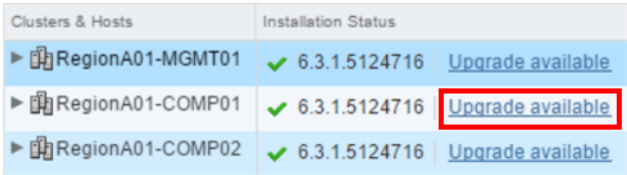
Procedure

1. In the vSphere Web Client, navigate to **Home > Networking & Security > Installation and Upgrade**, select the **Host Preparation** tab.
2. For each cluster that you want to upgrade, click **Upgrade** or **Upgrade available**.

   If you are upgrading to NSX 6.4.1, click **Upgrade** for the cluster.

   If you are upgrading to NSX 6.4.0, click **Upgrade Available** for the cluster.

   The cluster displays `Installing NSX` or `Installing`, and the hosts display `In Progress`.
3. The cluster and host status displays `Not Ready`. Click **Not Ready** to display more information. Click **Resolve all** to attempt to finish the VIB installation.

   The hosts are put in maintenance mode, and rebooted if necessary, to finish the upgrade.

   The cluster displays `Installing NSX` or `Installing`.

   When the upgrade is finished, each host displays a green check mark and the upgraded NSX version.

4 If the **Resolve** action fails when DRS is enabled, the hosts might require manual intervention to enter maintenance mode (for example, due to HA requirements or DRS rules). In this case, the upgrade process stops and the cluster displays `Not Ready` again. Click **Not Ready** to display more information. Check the hosts in the **Hosts and Clusters** view, make sure that the hosts are powered on, connected, and contain no running VMs. Then retry the **Resolve** action.

   The cluster displays `Installing NSX` or `Installing`.

   When the upgrade is finished, each host displays a green check mark and the upgraded NSX version.

5 If the **Resolve** action fails when DRS is disabled and you are upgrading from NSX 6.3.0 or later with ESXi 6.0 or later, you must manually put the hosts into maintenance mode to finish the upgrade.

   a Put the evacuated hosts in maintenance mode.

      In **Hosts and Clusters**, right-click each host and select **Maintenance Mode > Enter Maintenance Mode**.

   b Navigate to **Networking & Security > Installation and Upgrade > Host Preparation** to monitor the upgrade.

      The upgrade automatically starts when the hosts enter maintenance mode. The cluster displays `Installing NSX` or `Installing`. If you do not see the status, refresh the page.

      When the upgrade is finished, each host displays a green check mark and the upgraded NSX version.

   c Take the hosts out of maintenance mode.

      In **Hosts and Clusters**, right-click each host and select **Maintenance Mode > Exit Maintenance Mode**.

To confirm the host update, log into one of the hosts in the cluster and run the `esxcli software vib list` command. Make sure that the appropriate VIBs have been updated to the expected version.

If a host fails to upgrade, perform the following troubleshooting steps:

- Check the ESX Agent Manager on vCenter, and look for alerts and errors.
- Log in to the host, check the `/var/log/esxupdate.log` log file, and look for recent alerts and errors.
- Ensure that DNS and NTP are configured on the host.

See "Host Preparation" in the *NSX Troubleshooting Guide* for more troubleshooting steps.

Upgrade NSX Edge

During the upgrade process, a new Edge virtual appliance is deployed alongside the existing one.

When the new Edge is ready, the old Edge's vNICs are disconnected and the new Edge's vNICs are connected. The new Edge then sends gratuitous ARP (GARP) packets to update the ARP cache of connected switches. When HA is deployed, the upgrade process is performed two times.

This process can temporarily affect packet forwarding. You can minimize the impact by configuring the Edge to work in ECMP mode.

OSPF adjacencies are withdrawn during upgrade if graceful restart is not enabled.

Prerequisites

- Verify that NSX Manager has been upgraded.
- Verify that the NSX Controller cluster and host preparation have been upgraded before upgrading logical routers.
- Verify that there is a local segment ID pool, even if you have no plans to create NSX logical switches.
- If you have any vCloud Networking and Security 5.5 or earlier vShield Edge appliances, you must upgrade them to NSX 6.2.x or later before upgrading to NSX 6.4.
- Verify the hosts have enough resources to deploy additional NSX Edge Services Gateway appliances during the upgrade, particularly if you are upgrading multiple NSX Edge appliances in parallel. See the System Requirements for NSX Data Center for vSphere for the resources required for each NSX Edge size.
  - For a single NSX Edge instance, there are two NSX Edge appliances of the appropriate size in the poweredOn state during upgrade.
  - For an NSX Edge instance with high availability, both replacement appliances are deployed before replacing the old appliances. This means there are four NSX Edge appliances of the appropriate size in the poweredOn state during upgrade of a given NSX Edge. Once the NSX Edge instance is upgraded, either of the HA appliances could become active.
- Verify that the host clusters listed in the configured location and live location for all NSX Edge appliances are prepared for NSX and that their messaging infrastructure status is `GREEN`.

  You must do this even if you do not intend to upgrade all NSX Edge appliances to NSX 6.4.

  If the configured location is not available, for example, because the cluster has been removed since the NSX Edge appliance was created, then verify the live location only.
  - Find the ID of the original configured location (*configuredResourcePool* > *id*) and the current live location (*resourcePoolId*) with the `GET https://NSX-Manager-IP-Address/api/4.0/edges/{edgeId}/appliances` API request.
  - Find the host preparation status and the messaging infrastructure status for those clusters with the `GET https://NSX-Manager-IP-Address/api/2.0/nwfabric/status?resource={resourceId}` API request, where *resourceId* is the ID of the configured and live location of the NSX Edge appliances found previously.
    - Look for the status corresponding to the *featureId* of `com.vmware.vshield.vsm.nwfabric.hostPrep` in the response body. The status must be `GREEN`.

      ```
      <nwFabricFeatureStatus>
        <featureId>com.vmware.vshield.vsm.nwfabric.hostPrep</featureId>
        <featureVersion>6.3.1.5124716</featureVersion>
        <updateAvailable>false</updateAvailable>
      ```

```
  <status>GREEN</status>
  <installed>true</installed>
  <enabled>true</enabled>
  <allowConfiguration>false</allowConfiguration>
</nwFabricFeatureStatus>
```

- Look for the status corresponding to the *featureId* of `com.vmware.vshield.vsm.messagingInfra` in the response body. The status must be `GREEN`.

```
<nwFabricFeatureStatus>
  <featureId>com.vmware.vshield.vsm.messagingInfra</featureId>
  <updateAvailable>false</updateAvailable
  <status>GREEN</status>
  <installed>true</installed>
  <enabled>true</enabled>
  <allowConfiguration>false</allowConfiguration>
</nwFabricFeatureStatus>
```

If the hosts are not prepared for NSX, do the following:

- Navigate to **Installation and Upgrade > Host Preparation** and prepare the hosts for NSX.
- Verify that the messaging infrastructure is GREEN.
- Redeploy the NSX Edges on the host.

If the hosts are not prepared for NSX, do the following:

- Navigate to **Installation > Host Preparation** and prepare the hosts for NSX.
- Verify that the messaging infrastructure is GREEN.
- Redeploy the NSX Edges on the host.

- Understand the operational impact of the NSX Edge upgrade while the upgrade is in progress. See "Operational Impacts of NSX Upgrades" in the *NSX Upgrade Guide*.

Procedure

1. In the vSphere Web Client, select **Networking & Security > NSX Edges**.
2. For each NSX Edge instance, select **Upgrade Version** from the **Actions ( )** menu.

   If the upgrade fails with the error message "Failed to deploy edge appliance," make sure that the host on which the NSX Edge appliance is deployed is connected and not in maintenance mode.

After the NSX Edge is upgraded successfully, the **Status** is Deployed, and the **Version** column displays the new NSX version.

If an Edge fails to upgrade and does not roll back to the old version, click the **Redeploy NSX Edge** icon. A new NSX Edge appliance is deployed, which has the same version of NSX as the NSX Manager. No further upgrade is needed.

What to do next

After you upgrade your 6.2.4 or earlier NSX Edges to 6.2.5 or later, you must turn off vSphere Virtual Machine Startup for each NSX Edge in a cluster where vSphere HA is enabled and Edges are deployed. To do this, open the vSphere web client and find the ESXi host where NSX Edge virtual machine resides. Click **Manage > Settings** and under Virtual Machines, select VM Startup/Shutdown, click **Edit**, and make sure that the virtual machine is in Manual mode (that is, make sure it is not added to the Automatic Startup/Shutdown list).

Upgrade Guest Introspection

It is important to upgrade Guest Introspection to match the NSX Manager version.

Note The Guest Introspection service VMs can be upgraded from the vSphere Web Client. You do not need to delete the service VM after the upgrade of the NSX Manager to upgrade it. If you do delete the service VM, the Service Status is shown as `Failed` because the Agent VM is missing. Click **Resolve** to deploy a new service VM, then click **Upgrade Available** to deploy the latest Guest Introspection service VM.

In NSX 6.3.5 and later you can view the EAM status on the **Service Deployments** tab.

Prerequisites

Verify NSX Manager, controllers, prepared host clusters, and NSX Edges are upgraded.

Procedure

1. In the **Installation and Upgrade** tab, click **Service Deployments**.

   The **Installation Status** column says **Upgrade Available**.
2. Select the Guest Introspection deployment that you want to upgrade, and click **Upgrade**.
3. Follow the UI prompts to configure the Guest Introspection upgrade.

   Table 1-5. Guest Introspection Upgrade Settings

Setting	Example Value
Datastore	ds-site-a-nfs01
Network	vds-site-a_Management
Schedule	Upgrade now or specify a date and time

   After Guest Introspection is upgraded, the installation status is `Succeeded` and service status is `Up`. Guest Introspection service virtual machines are visible in the vCenter Server inventory.

   If you have vSphere 6.5 or later installed and you upgrade Guest Introspection service VMs to NSX 6.4, the VMs are renamed to reflect the hostname or IP of the host on which they are deployed. For example, Guest Introspection(esx-01a.corp.local).

After Guest Introspection is upgraded for a particular cluster, you can upgrade any partner solutions. If partner solutions are enabled, refer to the upgrade documentation provided by the partner. Even if the partner solution is not upgraded, protection is maintained.

NSX Services That Do Not Support Direct Upgrade

Some NSX services do not support a direct upgrade. In these cases, you must uninstall and reinstall the services.

VMware Partner Security Virtual Appliances

Check the partner documentation to verify if the partner security virtual appliance can be upgraded.

Post-Upgrade Tasks

After all components are upgraded, complete all post-upgrade tasks.

Procedure

1. Create a current backup of the NSX Manager after the upgrade.
2. Check that the NSX VIB has been installed on the hosts.

   ```
   esxcli software vib get --vibname esx-nsxv
   ```

   If Guest Introspection has been installed, also check that this VIB is present on the hosts:

   ```
   esxcli software vib get --vibname epsec-mux
   ```

3. Resynchronize the host message bus.

   You can use the following API call to perform the resynchronization on each cluster.

   ```
   POST https://<nsx-mgr-ip>/api/4.0/firewall/forceSync/<cluster-id>
   ```

   See the *NSX API Guide* for more information.

Upgrade NSX in a Cross-vCenter NSX Environment

To upgrade NSX Data Center for vSphere in a cross-vCenter environment, you must upgrade the NSX components in the order in which they are documented in this guide.

NSX Data Center for vSphere components must be upgraded in the following order:

1 Primary NSX Manager appliance

2 All secondary NSX Manager appliances

3 NSX Controller cluster

4 Host clusters

5 NSX Edge

6 Guest Introspection

The upgrade process is managed by the NSX Manager. If the upgrade of a component fails or is interrupted and you need to repeat or restart the upgrade, the process begins from the point at which it stopped; it does not start over from the beginning.

The upgrade status is updated for each node and at the cluster level.

1 Upgrade the Primary NSX Manager in Cross-vCenter NSX

   The first step in the NSX Data Center for vSphere infrastructure upgrade process is the primary NSX Manager appliance upgrade.

2 Upgrade all Secondary NSX Manager Appliances in Cross-vCenter NSX

   You must upgrade all secondary NSX Manager appliances before upgrading any other NSX Data Center for vSphere components.

3 Upgrade NSX Controller Cluster in Cross-vCenter NSX

   The controllers in your environment are upgraded at the cluster level. If an upgrade is available for the NSX Controller cluster, an upgrade link appears next to the primary NSX Manager in the **Networking & Security > Installation and Upgrade > Management** panel.

4 Upgrade Host Clusters in Cross-vCenter NSX

   After upgrading all NSX Manager appliances and the NSX Controller cluster, you should update all host clusters in the cross-vCenter NSX environment.

5 Upgrade NSX Edge in Cross-vCenter NSX

   During the upgrade process, a new Edge virtual appliance is deployed alongside the existing one.

6 Upgrade Guest Introspection in Cross-vCenter NSX

   It is important to upgrade Guest Introspection to match the NSX Manager version.

7 NSX Services That Do Not Support Direct Upgrade

   Some NSX services do not support a direct upgrade. In these cases, you must uninstall and reinstall the services.

8 Post-Upgrade Tasks

   After all components are upgraded, complete all post-upgrade tasks.

Upgrade the Primary NSX Manager in Cross-vCenter NSX

The first step in the NSX Data Center for vSphere infrastructure upgrade process is the primary NSX Manager appliance upgrade.

Caution Running with NSX Manager appliances of different versions in a cross-vCenter NSX environment is not supported. Once you upgrade the primary NSX Manager appliance, you must upgrade the secondary NSX Manager appliances.

During the NSX Manager upgrade in a cross-vCenter NSX environment, do not make any changes to universal objects until the primary and all secondary NSX Managers are upgraded. This includes create, update, or delete of universal objects, and operations involving universal objects (for example, apply a universal security tag to a VM).

During the upgrade, you can choose to join the Customer Experience Improvement Program (CEIP) for NSX Data Center for vSphere. See Customer Experience Improvement Program in the *NSX Administration Guide* for more information about the program, including how to join or leave the program.

If you are upgrading from NSX 6.3.0 or later, uploading the upgrade bundle and starting the upgrade can happen independently. To start an upgrade from a previously uploaded upgrade bundle, navigate to **Home > Upgrade** and click **Begin Upgrade**.

When you upgrade NSX Manager to NSX 6.4.1 or later, a backup is automatically taken and saved locally as part of the upgrade process. See Managing NSX Manager Backups Created During Upgrade for information about managing these backup files.

- If the automatic backup taken during the upgrade fails, the upgrade will not continue. Contact VMware customer support for assistance.
- The automatic backup is intended as a failsafe in case your regular backup fails.
  - Always take a regular NSX Manager backup before upgrading. See Back Up NSX Manager Data for more information. You can restore this backup without assistance from VMware customer support.
  - If you need to restore the automatic backup, you must contact VMware customer support.

Prerequisites

- Validate the NSX Manager file system usage, and perform a cleanup if file system usage is at 100 percent.
  a Log in to NSX Manager and run `show filesystems` to show the filesystem usage.
  b If the usage is 100 percent, enter privileged (enable) mode, and run the `purge log manager` and `purge log system` commands.
  c Reboot the NSX Manager appliance for the log cleanup to take effect.
- Verify the NSX Manager virtual appliance reserved memory meets the system requirements before upgrading.

  See System Requirements for NSX Data Center for vSphere.
- If you have Data Security in your environment, uninstall it before upgrading NSX Manager. See Uninstall NSX Data Security. Data Security has been removed from NSX 6.3.x.
- Back up your current configuration and download technical support logs before upgrading. See NSX Backup and Restore.
- Download the upgrade bundle and check the MD5. See Download the Upgrade Bundle and Check the MD5.

- Make sure that you understand the operational impact of the NSX Manager upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- Determine which NSX Managers must be upgraded in the same maintenance window.
  - If you have a cross-vCenter NSX environment, you must upgrade the primary and all secondary NSX Managers to the same NSX version in a single maintenance window.
  - If you have multiple NSX Managers connected to vCenter Server systems that use the same SSO server, not all combinations of NSX Manager version are supported. You must plan the upgrade of your NSX Managers so that you have a supported configuration at the end of the maintenance window
    - All NSX Managers using the same version of NSX is supported.
    - NSX Managers using different version of NSX is supported if at least one NSX Manager has NSX 6.4.0 or later installed, and all other NSX Managers have NSX 6.3.3 or later installed.

Procedure

1. Log in to the NSX Manager virtual appliance.
2. From the home page, click **Upgrade**.
3. Click **Upgrade**, then click **Choose File** and browse to the `VMware-NSX-Manager-upgrade-bundle-releaseNumber-NSXbuildNumber.tar.gz` file. Click **Continue** to start the upload.

   The upload status displays in the browser window.
4. If you want to start the upgrade later, click **Close** in the Upgrade dialog box.

   When you are ready to start the upgrade, navigate to **Home > Upgrade** and click **Begin Upgrade**.
5. In the Upgrade dialog box, select whether you want to enable SSH, and whether you want to participate in VMware's Customer Experience Improvement Program ("CEIP"). Click **Upgrade** to start the upgrade.

   The upgrade status displays in the browser window.

   Note The Upgrade dialog box displays a message indicating that the automatic backup has been taken.

   Wait until the upgrade procedure finishes and the NSX Manager login page appears.
6. Log in to the NSX Manager virtual appliance again, and from the home page click **Upgrade**. Confirm that the upgrade state is **Complete**, and the version and build number on the top right matches the upgrade bundle you just installed.

If you are logged in to the vSphere Web Client during the upgrade, you will see synchronization issue warnings on the **Networking and Security > Installation and Upgrade > Management** page. This is because you have NSX Manager appliances with different versions of NSX. You must upgrade the secondary NSX Manager appliances before proceeding with any other part of the upgrade.

After upgrading NSX Manager, you must log out and log back in to the vSphere Web Client and vSphere Client.

If the NSX plug-in does not display correctly in the vSphere Web Client or vSphere Client, clear your browser cache and history. If this step is not done, you might see an error similar to "An internal error has occurred - Error #1009" when making NSX configuration changes in the vSphere Web Client.

If the **Networking and Security** tab does not appear in the vSphere Web Client or vSphere Client, restart the related service:

Table 1-6. Client Service Commands

Client Service	vCenter Server Appliance	vCenter Server for Windows

Restart vSphere Web Client
On vSphere 6.0, 6.5, and 6.7
	`> shell.set --enabled True`
	`> shell`
	`# service-control --stop vsphere-client`
	`# service-control --start vsphere-client`
		`> cd C:\Program Files\VMware\vCenter Server\bin`
		`> service-control --stop vspherewebclientsvc`
		`> service-control --start vspherewebclientsvc`

Restart vSphere Client
On vSphere 6.5, and 6.7
	`> shell.set --enabled True`
	`> shell`
	`# service-control --stop vsphere-ui`
	`# service-control --start vsphere-ui`
		`> cd C:\Program Files\VMware\vCenter Server\bin`
		`> service-control --stop vsphere-ui`
		`> service-control --start vsphere-ui`

Use different Web Clients to manage vCenter Servers running different versions of NSX Managers to avoid unexpected errors when different versions of NSX plug-ins are running.

After the NSX Manager is upgraded, create a new NSX Manager backup file. See NSX Backup and Restore. The previous NSX Manager backup is only valid for the previous release.

Upgrade all Secondary NSX Manager Appliances in Cross-vCenter NSX

You must upgrade all secondary NSX Manager appliances before upgrading any other NSX Data Center for vSphere components.

Complete the following steps to upgrade a secondary NSX Manager appliance. Repeat these steps for all secondary NSX Manager appliances in the cross-vCenter NSX environment.

During the NSX Manager upgrade in a cross-vCenter NSX environment, do not make any changes to universal objects until the primary and all secondary NSX Managers are upgraded. This includes create, update, or delete of universal objects, and operations involving universal objects (for example, apply a universal security tag to a VM).

During the upgrade, you can choose to join the Customer Experience Improvement Program (CEIP) for NSX Data Center for vSphere. See Customer Experience Improvement Program in the *NSX Administration Guide* for more information about the program, including how to join or leave the program.

If you are upgrading from NSX 6.3.0 or later, uploading the upgrade bundle and starting the upgrade can happen independently. To start an upgrade from a previously uploaded upgrade bundle, navigate to **Home > Upgrade** and click **Begin Upgrade**.

When you upgrade NSX Manager to NSX 6.4.1 or later, a backup is automatically taken and saved locally as part of the upgrade process. See Managing NSX Manager Backups Created During Upgrade for information about managing these backup files.

- If the automatic backup taken during the upgrade fails, the upgrade will not continue. Contact VMware customer support for assistance.
- The automatic backup is intended as a failsafe in case your regular backup fails.
  - Always take a regular NSX Manager backup before upgrading. See Back Up NSX Manager Data for more information. You can restore this backup without assistance from VMware customer support.
  - If you need to restore the automatic backup, you must contact VMware customer support.

Prerequisites

- Verify that the primary NSX Manager is upgraded.
- Validate the NSX Manager file system usage, and perform a cleanup if file system usage is at 100 percent.
  a Log in to NSX Manager and run `show filesystems` to show the filesystem usage.
  b If the usage is 100 percent, enter privileged (enable) mode, and run the `purge log manager` and `purge log system` commands.
  c Reboot the NSX Manager appliance for the log cleanup to take effect.
- Verify the NSX Manager virtual appliance reserved memory meets the system requirements before upgrading.

  See System Requirements for NSX Data Center for vSphere.
- If you have Data Security in your environment, uninstall it before upgrading NSX Manager. See Uninstall NSX Data Security. Data Security has been removed from NSX 6.3.x.
- Back up your current configuration and download technical support logs before upgrading. See NSX Backup and Restore.
- Download the upgrade bundle and check the MD5. See Download the Upgrade Bundle and Check the MD5.
- Make sure that you understand the operational impact of the NSX Manager upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- Determine which NSX Managers must be upgraded in the same maintenance window.
  - If you have a cross-vCenter NSX environment, you must upgrade the primary and all secondary NSX Managers to the same NSX version in a single maintenance window.

- If you have multiple NSX Managers connected to vCenter Server systems that use the same SSO server, not all combinations of NSX Manager version are supported. You must plan the upgrade of your NSX Managers so that you have a supported configuration at the end of the maintenance window
  - All NSX Managers using the same version of NSX is supported.
  - NSX Managers using different version of NSX is supported if at least one NSX Manager has NSX 6.4.0 or later installed, and all other NSX Managers have NSX 6.3.3 or later installed.

Procedure

1. Log in to the NSX Manager virtual appliance.
2. From the home page, click **Upgrade**.
3. Click **Upgrade**, then click **Choose File** and browse to the `VMware-NSX-Manager-upgrade-bundle-`*releaseNumber*`-`*NSXbuildNumber*`.tar.gz` file. Click **Continue** to start the upload.

   The upload status displays in the browser window.
4. If you want to start the upgrade later, click **Close** in the Upgrade dialog box.

   When you are ready to start the upgrade, navigate to **Home > Upgrade** and click **Begin Upgrade**.
5. In the Upgrade dialog box, select whether you want to enable SSH, and whether you want to participate in VMware's Customer Experience Improvement Program ("CEIP"). Click **Upgrade** to start the upgrade.

   The upgrade status displays in the browser window.

   Note The Upgrade dialog box displays a message indicating that the automatic backup has been taken.

   Wait until the upgrade procedure finishes and the NSX Manager login page appears.
6. Log in to the NSX Manager virtual appliance again, and from the home page click **Upgrade**. Confirm that the upgrade state is **Complete**, and the version and build number on the top right matches the upgrade bundle you just installed.

After upgrading NSX Manager, you must log out and log back in to the vSphere Web Client and vSphere Client.

If the NSX plug-in does not display correctly in the vSphere Web Client or vSphere Client, clear your browser cache and history. If this step is not done, you might see an error similar to "An internal error has occurred - Error #1009" when making NSX configuration changes in the vSphere Web Client.

If the **Networking and Security** tab does not appear in the vSphere Web Client or vSphere Client, restart the related service:

Table 1-7. Client Service Commands

Client Service	vCenter Server Appliance	vCenter Server for Windows

Restart vSphere Web Client
On vSphere 6.0, 6.5, and 6.7
	`> shell.set --enabled True`
	`> shell`
	`# service-control --stop vsphere-client`
	`# service-control --start vsphere-client`
		`> cd C:\Program Files\VMware\vCenter Server\bin`
		`> service-control --stop vspherewebclientsvc`
		`> service-control --start vspherewebclientsvc`

Restart vSphere Client
On vSphere 6.5, and 6.7
	`> shell.set --enabled True`
	`> shell`
	`# service-control --stop vsphere-ui`
	`# service-control --start vsphere-ui`
		`> cd C:\Program Files\VMware\vCenter Server\bin`
		`> service-control --stop vsphere-ui`
		`> service-control --start vsphere-ui`

Use different Web Clients to manage vCenter Servers running different versions of NSX Managers to avoid unexpected errors when different versions of NSX plug-ins are running.

After the NSX Manager is upgraded, create a new NSX Manager backup file. See NSX Backup and Restore. The previous NSX Manager backup is only valid for the previous release.

Upgrade NSX Controller Cluster in Cross-vCenter NSX

The controllers in your environment are upgraded at the cluster level. If an upgrade is available for the NSX Controller cluster, an upgrade link appears next to the primary NSX Manager in the **Networking & Security > Installation and Upgrade > Management** panel.

Upgrade the controllers during a maintenance window.

The NSX Controller upgrade causes an upgrade file to be downloaded to each controller node. The controllers are upgraded one at a time. While an upgrade is in progress, the **Upgrade Available** link is not clickable, and API calls to upgrade the controller cluster are blocked until the upgrade is complete.

If you deploy new controllers before the existing controllers are upgraded, they are deployed as the old version. Controller nodes must be the same version to join a cluster.

Important In NSX 6.3.3 the underlying operating system of the NSX Controller changes. When the operating system of the old and new controllers is the same, the controller upgrades is an in-place software upgrade. When you upgrade from NSX 6.3.2 or earlier to NSX 6.3.3 or later, the operating systems are different and so an in-place upgrade cannot be performed. Instead the existing controllers are deleted one at a time, and new Photon OS-based controllers are deployed using the same IP addresses.

When the controllers are deleted, any associated DRS anti-affinity rules are deleted. You must create new anti-affinity rules in vCenter to prevent the new controller VMs from residing on the same host.

Prerequisites

- Ensure that all the controllers are in the normal state. Upgrading is not possible when one or more of the controllers are in the disconnected state. To reconnect a disconnected controller, try resetting the controller virtual appliance. In the **Hosts and Clusters** view, right-click the controller and select **Power > Reset**. For more information about troubleshooting the NSX Controller cluster, see "NSX Controller Cluster Failures" in the *NSX Troubleshooting Guide*.
- A valid NSX Controller cluster contains three controller nodes. Log in to the three controller nodes and run the **show control-cluster status** command.

```
controller-node# show control-cluster status

Type                Status                                          Since
--------------------------------------------------------------------------------
Join status:        Join complete                                   05/04 02:36:03
Majority status:    Connected to cluster majority                   05/19 23:57:23
Restart status:     This controller can be safely restarted         05/19 23:57:12
Cluster ID:         ff3ebaeb-de68-4455-a3ca-4824e31863a8
Node UUID:          ff3ebaeb-de68-4455-a3ca-4824e31863a8

Role                Configured status   Active status
--------------------------------------------------------------------------------
api_provider        enabled             activated
persistence_server  enabled             activated
switch_manager      enabled             activated
logical_manager     enabled             activated
directory_server    enabled             activated
```

  - For Join status, verify that the controller node is reporting Join Complete.
  - For Majority status, verify that the controller is connected to the cluster majority.
  - For Cluster ID, all the controller nodes in a cluster have the same cluster ID.
  - For Configured status and Active status, verify that the all the controller roles have the status of enabled and activated.
- Make sure that you understand the operational impact of the NSX Controller upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- The NSX Controller cluster must contain three controller nodes. If it has fewer than three, you must add additional nodes before starting the upgrade. See "Deploy NSX Controller Cluster" in the *NSX Installation Guide* for steps to add controller nodes.

Procedure

1 Click **Upgrade Available** in the **Controller Cluster Status** column.

  The controllers in your environment are upgraded and rebooted one at a time. After you initiate the upgrade, the system downloads the upgrade file, upgrades each controller, reboots each controller, and updates the upgrade status of each controller.

2 Monitor the progress of the upgrade.

- You can view the cluster upgrade progress in the **Upgrade Status** column in **Installation and Upgrade > Management > NSX Managers**.
- You can view the upgrade progress of each individual controller node in the **Upgrade Status** column in **Installation and Upgrade > Management > Controller Nodes**.

When the upgrade is complete, the **Software Version** column in the NSX Controller nodes section displays `6.4.`*`buildNumber`* for each controller. Rerun the **show control-cluster status** command to make sure that the controllers can create a majority. If the NSX Controller cluster majority is not achieved, review the controller and NSX Manager logs.

After upgrading controllers, one or more controller nodes may be assigned a new controller ID. This behavior is expected and depends on when the secondary NSX Manager polls the nodes.

The average upgrade time for each upgrade is 6–8 minutes. If the upgrade does not finish within the timeout period (30 minutes), the **Upgrade Status** column displays **Failed**. Click **Upgrade Available** in the NSX Manager section again to resume the upgrade process from the point where it stopped.

If network problems are preventing a successful upgrade within the 30-minute timeout period, work with VMware Support to diagnose and resolve any underlying problems.

If the controller upgrade fails, check connectivity between the controllers and the NSX Manager.

There is a scenario in which the first controller upgrades successfully, and the second controller does not. Assuming you have three controllers in a cluster, the first controller is successfully upgraded to the new version, and the second controller is being upgraded. If the upgrade of the second controller fails, the second controller might be left in a disconnected state. At the same time, the first and third controllers now have two different versions (one upgraded, one not) and are therefore unable to form a majority. At this point, the upgrade cannot be relaunched. To work around this scenario, create another controller. The newly created controller has the older NSX version (matching controller three) and can form a majority with controller three. At this point, you can relaunch the upgrade procedure. See "Redeploy an NSX Controller" in the *NSX Troubleshooting Guide* for instructions on creating another controller.

Upgrade Host Clusters in Cross-vCenter NSX

After upgrading all NSX Manager appliances and the NSX Controller cluster, you should update all host clusters in the cross-vCenter NSX environment.

Upgrading the host clusters upgrades the NSX VIBs.

If you are upgrading from NSX 6.2.x, hosts must be rebooted to finish the upgrade.

- If the cluster has DRS enabled, when you click **Resolve all** DRS attempts to reboot the hosts in a controlled fashion that keeps the VMs running. VMs are moved to other hosts in the cluster and the hosts enter maintenance mode and are rebooted.
- If the cluster does not have DRS enabled, you must power off or vMotion the VMs manually before beginning the upgrade. When you click **Resolve all** the hosts enter maintenance mode and are rebooted.

If you are upgrading from NSX 6.3.0 or later, the hosts must enter maintenance mode to finish the upgrade. Rebooting is not required.

- If the cluster has DRS enabled, when you click **Resolve all** DRS attempts to put the hosts into maintenance mode in a controlled fashion that allows the VMs to continue running. VMs are moved to other hosts in the cluster and the hosts enter maintenance mode.
- If the cluster does not have DRS enabled, you must power off or vMotion the VMs manually before beginning the upgrade. You must manually put the hosts into maintenance mode to complete the upgrade.

In NSX 6.3.5 and later you can view the EAM status on the **Host Preparation** tab.

Prerequisites

- Upgrade NSX Manager and the NSX Controller cluster.
- Log out of and log back in to the vSphere Web Client after upgrading NSX Manager and before upgrading the host clusters.
- Verify that the current vSphere and ESXi versions are compatible with the NSX Data Center for vSphere version you are upgrading to. See the VMware Interoperability Matrix at https://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php#interop&93=&2=&1=.
- Make sure that you understand the operational impact of a host cluster upgrade while the upgrade is in progress. See Operational Impacts of NSX Upgrades.
- Make sure the fully qualified domain names (FQDNs) of all hosts can be resolved.
- If DRS is disabled, power off or vMotion the VMs manually before beginning the upgrade.
- If DRS is enabled, the running VMs are moved automatically during the host cluster upgrade. Before beginning the upgrade, make sure that DRS can work in your environment.
  - Make sure that DRS is enabled on the host clusters.
  - Make sure that vMotion functions correctly.
  - Check the host connection state with vCenter.
  - Check that you have a minimum three ESXi hosts in each host cluster. During an NSX upgrade, a host cluster with only one or two hosts is more likely to have problems with DRS admission control. For a successful NSX upgrade, ensure that each host cluster has at least three hosts. If a cluster contains fewer than three hosts, manually evacuate the hosts.
  - In a small cluster with only two or three hosts, if you have created anti-affinity rules stating that certain VMs must reside on separate hosts, DRS might fail to move the VMs during the upgrade. Either add additional hosts to the cluster or disable the anti-affinity rules during the upgrade and reenable them after the upgrade is finished. To disable an anti-affinity rule, navigate to **Hosts and Clusters > *Cluster* > Manage > Settings > VM/Host Rules**. Edit the rule and deselect **Enable rule**.
- Log into one of the hosts in the cluster and run the `esxcli software vib list` command.

The VIBs present will depend on the ESXi and NSX versions, and therefore might change as part of the upgrade. Note the current version of the installed VIBs:

ESXi version	NSX version	VIBs installed
6.0 or later	6.3.2 or earlier	■ esx-vsip ■ esx-vxlan
6.0 or later	6.3.3 or later	■ esx-nsxv

Note Some versions of NSX Data Center for vSphere have additional VIBs which are removed during the upgrade.

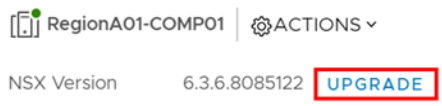
- If you are upgrading from NSX 6.2.x where the version is NSX 6.2.4 or later, prepared hosts have an extra VIB, esx-vdpi.

Procedure

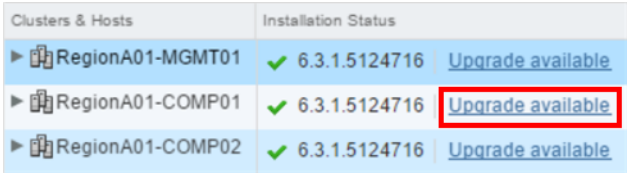
1 In the vSphere Web Client, navigate to **Home > Networking & Security > Installation and Upgrade**, select the **Host Preparation** tab.

2 For each cluster that you want to upgrade, click **Upgrade** or **Upgrade available**.

If you are upgrading to NSX 6.4.1, click **Upgrade** for the cluster.



If you are upgrading to NSX 6.4.0, click **Upgrade Available** for the cluster.



The cluster displays `Installing NSX` or `Installing`, and the hosts display `In Progress`.

3 The cluster and host status displays `Not Ready`. Click **Not Ready** to display more information. Click **Resolve all** to attempt to finish the VIB installation.

The hosts are put in maintenance mode, and rebooted if necessary, to finish the upgrade.

The cluster displays `Installing NSX` or `Installing`.

When the upgrade is finished, each host displays a green check mark and the upgraded NSX version.

4 If the **Resolve** action fails when DRS is enabled, the hosts might require manual intervention to enter maintenance mode (for example, due to HA requirements or DRS rules). In this case, the upgrade process stops and the cluster displays `Not Ready` again. Click **Not Ready** to display more information. Check the hosts in the **Hosts and Clusters** view, make sure that the hosts are powered on, connected, and contain no running VMs. Then retry the **Resolve** action.

   The cluster displays `Installing NSX` or `Installing`.

   When the upgrade is finished, each host displays a green check mark and the upgraded NSX version.

5 If the **Resolve** action fails when DRS is disabled and you are upgrading from NSX 6.3.0 or later with ESXi 6.0 or later, you must manually put the hosts into maintenance mode to finish the upgrade.

   a Put the evacuated hosts in maintenance mode.

      In **Hosts and Clusters**, right-click each host and select **Maintenance Mode > Enter Maintenance Mode**.

   b Navigate to **Networking & Security > Installation and Upgrade > Host Preparation** to monitor the upgrade.

      The upgrade automatically starts when the hosts enter maintenance mode. The cluster displays `Installing NSX` or `Installing`. If you do not see the status, refresh the page.

      When the upgrade is finished, each host displays a green check mark and the upgraded NSX version.

   c Take the hosts out of maintenance mode.

      In **Hosts and Clusters**, right-click each host and select **Maintenance Mode > Exit Maintenance Mode**.

To confirm the host update, log into one of the hosts in the cluster and run the `esxcli software vib list` command. Make sure that the appropriate VIBs have been updated to the expected version.

If a host fails to upgrade, perform the following troubleshooting steps:

- Check the ESX Agent Manager on vCenter, and look for alerts and errors.
- Log in to the host, check the `/var/log/esxupdate.log` log file, and look for recent alerts and errors.
- Ensure that DNS and NTP are configured on the host.

See "Host Preparation" in the *NSX Troubleshooting Guide* for more troubleshooting steps.

Upgrade NSX Edge in Cross-vCenter NSX

During the upgrade process, a new Edge virtual appliance is deployed alongside the existing one.

When the new Edge is ready, the old Edge's vNICs are disconnected and the new Edge's vNICs are connected. The new Edge then sends gratuitous ARP (GARP) packets to update the ARP cache of connected switches. When HA is deployed, the upgrade process is performed two times.

This process can temporarily affect packet forwarding. You can minimize the impact by configuring the Edge to work in ECMP mode.

OSPF adjacencies are withdrawn during upgrade if graceful restart is not enabled.

Upgrade NSX Edges in all NSX installations in the cross-vCenter NSX environment.

Prerequisites

- Verify that NSX Manager has been upgraded.
- Verify that the NSX Controller cluster and host preparation have been upgraded before upgrading logical routers.
- Verify that there is a local segment ID pool, even if you have no plans to create NSX logical switches.
- If you have any vCloud Networking and Security 5.5 or earlier vShield Edge appliances, you must upgrade them to NSX 6.2.x or later before upgrading to NSX 6.4.
- Verify the hosts have enough resources to deploy additional NSX Edge Services Gateway appliances during the upgrade, particularly if you are upgrading multiple NSX Edge appliances in parallel. See the System Requirements for NSX Data Center for vSphere for the resources required for each NSX Edge size.
  - For a single NSX Edge instance, there are two NSX Edge appliances of the appropriate size in the poweredOn state during upgrade.
  - For an NSX Edge instance with high availability, both replacement appliances are deployed before replacing the old appliances. This means there are four NSX Edge appliances of the appropriate size in the poweredOn state during upgrade of a given NSX Edge. Once the NSX Edge instance is upgraded, either of the HA appliances could become active.
- Verify that the host clusters listed in the configured location and live location for all NSX Edge appliances are prepared for NSX and that their messaging infrastructure status is `GREEN`.

  You must do this even if you do not intend to upgrade all NSX Edge appliances to NSX 6.4.

  If the configured location is not available, for example, because the cluster has been removed since the NSX Edge appliance was created, then verify the live location only.
  - Find the ID of the original configured location (*configuredResourcePool* > *id*) and the current live location (*resourcePoolId*) with the `GET https://NSX-Manager-IP-Address/api/4.0/edges/{edgeId}/appliances` API request.

- Find the host preparation status and the messaging infrastructure status for those clusters with the `GET https://NSX-Manager-IP-Address/api/2.0/nwfabric/status?resource={resourceId}` API request, where *resourceId* is the ID of the configured and live location of the NSX Edge appliances found previously.
  - Look for the status corresponding to the *featureId* of `com.vmware.vshield.vsm.nwfabric.hostPrep` in the response body. The status must be `GREEN`.

    ```
    <nwFabricFeatureStatus>
      <featureId>com.vmware.vshield.vsm.nwfabric.hostPrep</featureId>
      <featureVersion>6.3.1.5124716</featureVersion>
      <updateAvailable>false</updateAvailable>
      <status>GREEN</status>
      <installed>true</installed>
      <enabled>true</enabled>
      <allowConfiguration>false</allowConfiguration>
    </nwFabricFeatureStatus>
    ```

  - Look for the status corresponding to the *featureId* of `com.vmware.vshield.vsm.messagingInfra` in the response body. The status must be `GREEN`.

    ```
    <nwFabricFeatureStatus>
      <featureId>com.vmware.vshield.vsm.messagingInfra</featureId>
      <updateAvailable>false</updateAvailable
      <status>GREEN</status>
      <installed>true</installed>
      <enabled>true</enabled>
      <allowConfiguration>false</allowConfiguration>
    </nwFabricFeatureStatus>
    ```

  If the hosts are not prepared for NSX, do the following:

  - Navigate to **Installation and Upgrade > Host Preparation** and prepare the hosts for NSX.
  - Verify that the messaging infrastructure is GREEN.
  - Redeploy the NSX Edges on the host.

  If the hosts are not prepared for NSX, do the following:

  - Navigate to **Installation > Host Preparation** and prepare the hosts for NSX.
  - Verify that the messaging infrastructure is GREEN.
  - Redeploy the NSX Edges on the host.
- Understand the operational impact of the NSX Edge upgrade while the upgrade is in progress. See "Operational Impacts of NSX Upgrades" in the *NSX Upgrade Guide*.
- If you are upgrading from NSX 6.0.x and you have L2 VPN enabled on an NSX Edge you must delete the L2 VPN configuration before you upgrade. Once you have upgraded, you can reconfigure L2 VPN. See "L2 VPN Overview" in the *NSX Installation Guide*.

Procedure

1 In the vSphere Web Client, select **Networking & Security > NSX Edges**.

2 For each NSX Edge instance, select **Upgrade Version** from the **Actions ( )** menu.

If the upgrade fails with the error message "Failed to deploy edge appliance," make sure that the host on which the NSX Edge appliance is deployed is connected and not in maintenance mode.

After the NSX Edge is upgraded successfully, the **Status** is Deployed, and the **Version** column displays the new NSX version.

If an Edge fails to upgrade and does not roll back to the old version, click the **Redeploy NSX Edge** icon. A new NSX Edge appliance is deployed, which has the same version of NSX as the NSX Manager. No further upgrade is needed.

What to do next

After you upgrade your 6.2.4 or earlier NSX Edges to 6.2.5 or later, you must turn off vSphere Virtual Machine Startup for each NSX Edge in a cluster where vSphere HA is enabled and Edges are deployed. To do this, open the vSphere web client and find the ESXi host where NSX Edge virtual machine resides. Click **Manage > Settings** and under Virtual Machines, select VM Startup/Shutdown, click **Edit**, and make sure that the virtual machine is in Manual mode (that is, make sure it is not added to the Automatic Startup/Shutdown list).

Upgrade Guest Introspection in Cross-vCenter NSX

It is important to upgrade Guest Introspection to match the NSX Manager version.

Note The Guest Introspection service VMs can be upgraded from the vSphere Web Client. You do not need to delete the service VM after the upgrade of the NSX Manager to upgrade it. If you do delete the service VM, the Service Status is shown as `Failed` because the Agent VM is missing. Click **Resolve** to deploy a new service VM, then click **Upgrade Available** to deploy the latest Guest Introspection service VM.

In NSX 6.3.5 and later you can view the EAM status on the **Service Deployments** tab.

Prerequisites

Verify NSX Manager, controllers, prepared host clusters, and NSX Edges are upgraded.

Procedure

1 In the **Installation and Upgrade** tab, click **Service Deployments**.

The **Installation Status** column says **Upgrade Available**.

2 Select the Guest Introspection deployment that you want to upgrade, and click **Upgrade**.

3 Follow the UI prompts to configure the Guest Introspection upgrade.

Table 1-8. Guest Introspection Upgrade Settings

Setting	Example Value
Datastore	ds-site-a-nfs01
Network	vds-site-a_Management
Schedule	Upgrade now or specify a date and time

After Guest Introspection is upgraded, the installation status is `Succeeded` and service status is `Up`. Guest Introspection service virtual machines are visible in the vCenter Server inventory.

If you have vSphere 6.5 or later installed and you upgrade Guest Introspection service VMs to NSX 6.4, the VMs are renamed to reflect the hostname or IP of the host on which they are deployed. For example, Guest Introspection(esx-01a.corp.local).

What to do next

After Guest Introspection is upgraded for a particular cluster, you can upgrade any partner solutions. If partner solutions are enabled, refer to the upgrade documentation provided by the partner. Even if the partner solution is not upgraded, protection is maintained.

NSX Services That Do Not Support Direct Upgrade

Some NSX services do not support a direct upgrade. In these cases, you must uninstall and reinstall the services.

VMware Partner Security Virtual Appliances

Check the partner documentation to verify if the partner security virtual appliance can be upgraded.

Post-Upgrade Tasks

After all components are upgraded, complete all post-upgrade tasks.

Procedure

1 Create a current backup of the NSX Manager after the upgrade.

2 Check that the NSX VIB has been installed on the hosts.

```
esxcli software vib get --vibname esx-nsxv
```

If Guest Introspection has been installed, also check that this VIB is present on the hosts:

```
esxcli software vib get --vibname epsec-mux
```

3 Resynchronize the host message bus.

You can use the following API call to perform the resynchronization on each cluster.

```
POST https://<nsx-mgr-ip>/api/4.0/firewall/forceSync/<cluster-id>
```

See the *NSX API Guide* for more information.

Upgrading vSphere in an NSX Environment 2

If you want to upgrade both NSX Data Center for vSphere and vSphere, complete the NSX Data Center for vSphere upgrade first, and then complete the vSphere upgrade.

Check the VMware Product Interoperability Matrix to verify which versions of vSphere and ESXi are compatible with your NSX Data Center for vSphere installation. See http://www.vmware.com/resources/compatibility/sim/interop_matrix.php.

See the appropriate version of the vSphere documentation for detailed instructions on upgrading vSphere, including the *vSphere Upgrade Guide* and the *Installing and Administering VMware vSphere Update Manager Guide*.

When you upgrade ESXi on a host, you must also install new NSX VIBs on the host to be compatible with the new ESXi version. NSX Data Center for vSphere workloads cannot run on the upgraded host until the NSX VIBs are updated.

This chapter includes the following topics:

Upgrade to ESXi 6.5 or 6.7 in an NSX Environment

NSX VIBs are specific to the version of ESXi that is installed on the host. If you upgrade ESXi, you must install new NSX VIBs appropriate for the new ESXi version.

When you upgrade to ESXi 6.5 or later with NSX 6.4 installed, vMotion of VMs to VXLAN prepared vSphere Distributed Switches on the upgraded host is blocked until the new NSX VIBs have been installed.

VMware recommends using vSphere Upgrade Manager to upgrade hosts to ESXi 6.5 or later in an NSX 6.4 environment.

Important You must upgrade one host at a time. Do not select a cluster or datacenter to remediate when you to upgrade ESXi.

Whatever method you use to upgrade ESXi, you should follow this workflow. On one host at a time, do the following:

1 Upgrade ESXi

   Once the ESXi upgrade completes, the host exits maintenance mode, however, you cannot move VMs connected to logical switches to the host until the next step has completed.

2 Upgrade NSX VIBs

   Once the VIBs are upgraded and the host has been removed from maintenance mode, you can move VMs connected to logical switches to the host.

Prerequisites

- **Important** Some versions of NSX 6.4 and vSphere 6.5 and 6.7 are not interoperable. You must check the VMware Product Interoperability Matrix to verify which versions of vSphere and ESXi are compatible with your NSX Data Center for vSphere installation. See http://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php.
- Verify NSX 6.4 is installed.
- Check the NSX release notes to get information about NSX and vSphere interoperability. See https://docs.vmware.com/en/VMware-NSX-for-vSphere/index.html.
- Read the appropriate version of the vSphere documentation for detailed instructions on upgrading vSphere, including the *vSphere Upgrade Guide* and the *Installing and Administering VMware vSphere Update Manager Guide*.
- Verify Platform Services Controller and vCenter Server systems are upgraded to the new vSphere version.
- Verify vSphere Update Manager is installed and configured.
- Make sure the fully qualified domain names (FQDNs) of all hosts can be resolved.
- If DRS is disabled, power off or vMotion the VMs manually before beginning the upgrade.
- If DRS is enabled, the running VMs are moved automatically during the host cluster upgrade. Before beginning the upgrade, make sure that DRS can work in your environment.
  - Make sure that DRS is enabled on the host clusters.
  - Make sure that vMotion functions correctly.
  - Check the host connection state with vCenter.
  - Check that you have a minimum three ESXi hosts in each host cluster. During an NSX upgrade, a host cluster with only one or two hosts is more likely to have problems with DRS admission control. For a successful NSX upgrade, ensure that each host cluster has at least three hosts. If a cluster contains fewer than three hosts, manually evacuate the hosts.

- In a small cluster with only two or three hosts, if you have created anti-affinity rules stating that certain VMs must reside on separate hosts, DRS might fail to move the VMs during the upgrade. Either add additional hosts to the cluster or disable the anti-affinity rules during the upgrade and reenable them after the upgrade is finished. To disable an anti-affinity rule, navigate to **Hosts and Clusters > *Cluster* > Manage > Settings > VM/Host Rules**. Edit the rule and deselect **Enable rule**.

Procedure

1 In the vSphere Web Client, navigate to **Update Manager > *Update Manager Object* > Manage**.

2 Follow the instructions in *Import Host Upgrade Images and Create Host Upgrade Baselines* to import a host upgrade image and create a host upgrade baseline.

   a Click the **ESXi Images** tab, click **Import ESXi Image** and browse to the image you want to upload.

   b Click the **Host Baselines** tab and click **New Baseline**. Use the New Baseline wizard to create a new Baseline, selecting **Host Upgrade** as the Baseline type.

3 Upgrade one host at a time. Repeat these steps for each host.

   a Navigate to **Hosts and Clusters** and select a host to upgrade. Do not select a cluster or datacenter.

   b Right click the host and select **Update Manager > Attach Baseline...**. Use the Attach Baseline or Baseline Group wizard to select a baseline. See *Attach Baselines and Baseline Groups to Objects* in the vSphere documentation for full instructions.

   c Right click the host and select **Update Manager > Remediate...**. Use the Remediate wizard to select a baseline. See *Remediate Hosts Against an Upgrade Baseline* in the vSphere documentation for full instructions.

   d If the host has status `Not connected` after the reboot, connect the host. Right click the host and select **Connection > Connect**.

   e To verify the upgrade is complete, right click the host and select **Update Manager > Scan for Updates...**. Select the **Upgrades** check box to scan for upgrade compliance. If the Compliance Status is Compliant, the upgrade is complete.

   See *Manually Initiate a Scan of ESXi Hosts* in the vSphere documentation for full instructions.

   f Navigate to **Networking & Security > Installation and Upgrade > Host Preparation**.

g Locate the host on which you upgraded ESXi. The Installation Status or NSX Installation column displays **Not Ready**.

Click **Not Ready** to see more information.

h Select the host and click **Actions > Resolve** to trigger NSX VIB installation.

If the cluster has DRS enabled, DRS will attempt to put the host into maintenance mode in a controlled fashion that allows the VMs to continue running. If DRS fails for any reason, the **Resolve** action halts. In this case, you may need to move the VMs manually and then retry the **Resolve** action or put the host into maintenance mode manually.

Important If you manually put a host into maintenance mode to install the host VIBs, you must verify that the host VIB install has completed before you take the host out of maintenance mode. The **Host Preparation** page will display `Installing` even though the install is complete.

1 Check the Recent Tasks pane in the vSphere Web Client and verify all Install tasks have completed.

2 Connect to the host command line and run the `esxcli software vib list` command. The first part of the VIB version displays the version of ESXi for the VIB.

After upgrade to ESXi 6.5 with NSX 6.4:

```
[root@host-2:~] esxcli software vib list
...
esx-nsxv    6.5.0-0.0.XXXXXXX    VMware  VMwareCertified   2018-01-16
...
```

Redeploy Guest Introspection after ESXi Upgrade

If you upgrade ESXi on a cluster where Guest Introspection is deployed, you should check the Service Deployments tab to see if Guest Introspection needs to be redeployed.

Important You must complete the ESXi upgrade and associated NSX VIB upgrade before you redeploy Guest Introspection.

Prerequisites

- Complete ESXi upgrade.
- Complete NSX VIBs (Host Preparation) upgrade after the ESXi upgrade.

Procedure

1 Log in to the vSphere Web Client.

2 Click **Networking & Security** and then click **Installation and Upgrade**.

3 Click the **Service Deployments** tab.

4 If the Installation Status column shows `Succeeded`, redeploy is not required.

5 If the Installation Status column shows Not Ready, click the **Not Ready** link. Click **Resolve all** to redeploy Guest Introspection.