



Optionality in NX-OS Software

- [Optionality in NX-OS software, on page 1](#)
- [Modular packages, on page 2](#)
- [NX-OS image boot modes, on page 3](#)
- [Red Hat Package Managers, on page 4](#)
- [Dandified YUM commands, on page 17](#)
- [Configure an FTP server and set up a local FTP YUM repository, on page 32](#)
- [Create user roles for install operation, on page 35](#)
- [Compacting Cisco NX-OS Software Images, on page 36](#)

Optionality in NX-OS software

Optionality is a feature in NX-OS software that

- uses modular packages for selective feature upgrades
- supports both base and full modes, and
- enables independent upgrade or removal of optional RPMs without service disruption.

Beginning with NXOS Release 9.2(1), NX-OS software image supports modular package management. NX-OS software now provides flexibility to add, remove, and upgrade the features selectively without changing the base NX-OS software.

Using modular NX-OS software provides several advantages:

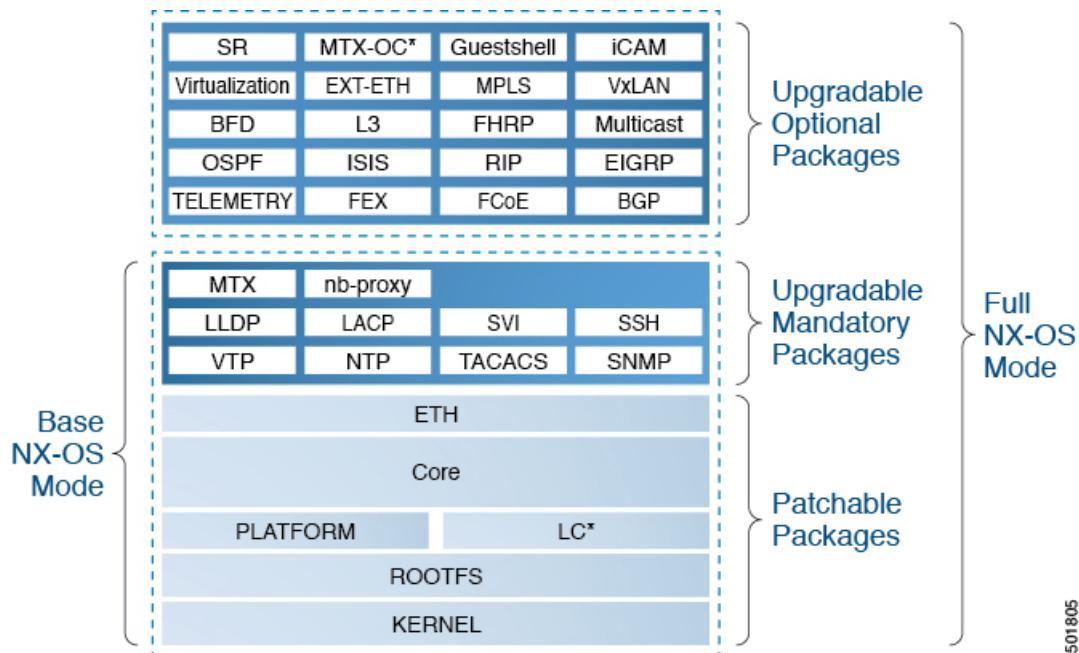
- Leaner NX-OS software
- Asynchronous delivery of the features and the fixes—provide quick fixes that are independent of the releases, including new features
- Reduced footprint of binaries and libraries at run time

Modes

NX-OS software is provisioned to boot the NX-OS software in two modes as described in the illustration:

- Base NX-OS mode
- Full NX-OS mode

Figure 1: Optionality in NX-OS software



- Base NX-OS mode contains:
 - Upgradable mandatory packages
 - Patchable packages
- Full NX-OS mode contains:
 - Upgradable optional packages
 - Upgradable mandatory packages
 - Patchable packages



Note The default mode is full NX-OS mode.

In base NX-OS mode, basic Layer 2 and Layer 3 features are available. All dynamic routing features (for example, BGP, OSPF, EIGRP, RIP, and ISIS) and other optional feature RPMs are not available by default. You have to install the optional feature RPMs on top of the base image.

In full NX-OS mode, all feature RPMs are installed during boot time when Ethernet plugin is activated by the plug-in manager. There is no change in the user behavior as compared to the previous releases.

Modular packages

A modular package is a software package that

- enables independent upgrades within the same release
- allows runtime removal without impacting system startup or other functions, and
- requires feature APIs to be used only after package installation.

The NX-OS software image is traditionally constructed with the packaging that forms a Linux distribution. It makes upgrading certain packages difficult as each package is large in size. This section describes a new package management for the NX-OS software image. Beginning with NX-OS Release 9.2(1), some NXOS features are considered as optional, for example, BGP, OSPF, VXLAN, MPLS, Segment Routing.

Each modular package has the following important characteristics:

- Upgrade functionality—The modular packages can be independently upgraded. The modular packages should be used from the same release as performing upgrades on these packages across multiple releases is not supported.
- Optionality—The modular packages are optional, for example, these packages can be removed or uninstalled at run time. The removal of the modular packages does not affect bringing-up the system and it does not affect any other functionality of the switches.



Note All APIs exported by the modular package should be used only after the installation of the feature.

RPM and DNF

RPM (Red Hat Package Manager) is the package management system used for packaging in the Linux Standard Base (LSB). The RPM command options are grouped into three subgroups for:

- Querying and verifying packages
- Installing, upgrading, and removing packages
- Performing miscellaneous functions

rpm is the command name for the main command that is used with RPM, whereas .rpm is the extension that is used for the RPM files.

Dandified YUM (Yellowdog Updater, Modified) or DNF is an open source command-line tool for RPM based Linux systems. It allows users and system administrators to easily install, update, remove, or search software packages on the systems. DNF adds the automatic updates and the package management, including dependency management, to the RPM systems. In addition to understanding the installed packages on a system, DNF works with the repositories that are collections of the packages and they are typically accessible over a network connection.

NX-OS image boot modes

You can boot the NX-OS image in base or full mode. The full boot mode installs the complete NX-OS software which is similar to the software of the previous releases. This is the default boot mode. The base boot mode has no optional RPMs installed.

To use the command line option, perform one of these steps depending on the mode.

- Use the **install reset nxos base** option to install the NX-OS image in the base boot mode using the VSH prompt. After reload, the switch is in the base mode with no optional packages installed.
- Use the **install reset nxos full** option to install the NX-OS image in the full boot mode using the VSH prompt. After reload, the switch is in the full mode with the optional packages automatically installed.

For more information, see *Using install commands for feature RPM operation* section.

Red Hat Package Managers

You can upgrade or downgrade Red Hat Package Manager (RPM) to a new software version using NX-OS install commands or DNF commands. An upgradable RPM can be optional or mandatory.



Note During the boot-up process of NX-OS, signed RPMs remain in memory while the image extraction stage takes place. However, this method is not the most efficient in terms of memory consumption. As of NX-OS Release 10.4(3)F, after the system reaches a stable state and adequate SSD space is accessible, the RPMs are transferred from memory to persistent storage. This feature is supported on N9K-C92348GC-X and all Nexus 9300 TOR switches.

See the following sections for more information about optional and mandatory RPMs.

Format of the RPM

This section describes the general format and naming convention of RPM files for NX-OS features.

The general format of a RPM is <name>-<version>-<release>.<arch>.rpm. The same format is followed for NX-OS feature RPMs.

- Name: package name, for example, BGP
- Version in <x.y.z.b> format: <major.minor.patch.build_number>, for example, 2.0.1.0
- Release: The branch from which the RPM is created, for example, 9.2.1
- Arch: The architecture type of the RPM, for example, lib32_n9000

This table provides more information on the naming convention, for example, fex-2.0.0.0-9.2.1.lib32_n9000.rpm.

Table 1: RPM naming convention

RPM Naming Convention	Description
Example: fex-2.0.0.0-9.2.1.lib32_n9000.rpm	
fex	Indicates the name of the component.
2	Indicates that the RPM is not backward compatible. Configuration loss takes place during an upgrade.

RPM Naming Convention	Description
Example: fex-2.0.0.0-9.2.1.lib32_n9000.rpm	
0	Indicates the incremental API changes/command changes/Schema changes with backward compatibility. It is applicable to the new features on top of the existing capabilities. No configuration is lost during an upgrade.
0	Indicates a bug fix without any functionality change. No configuration is lost during an upgrade.
0	This number tracks how many times the component has changed during the development cycle of a release. This value will be 0 for all the release images.
9.2.1	Indicates the release number or the distribution version for the RPM. It aligns to the NVR format. Since the feature RPM is only applicable to a NXOS release, this field has NXOS release version number present.
lib32_n9000	Indicates the architecture type of the RPM.

Optional RPMs and their associated features

The optional RPMs are the RPMs that can be installed to enable the features without affecting the native NX-OS behavior or they can be removed using the **install deactivate** command from the switch.

Optional RPMs, for example, EIGRP are not a part of the base software. They can be added, upgraded, and removed as required using either **dnf** or **install** commands from the switch.

This table contains the list of the optional RPMs and their associated features.

Table 2: List of optional RPMs and their associated features

Package Name	Associated Features
APP HOSTING	feature app-hosting
BGP	feature bgp
BFD	feature bfd
Container-tracker	feature container-tracker
EIGRP	feature eigrp

Package Name	Associated Features
Ext-Eth	<ul style="list-style-type: none"> • feature openflow • feature evb • feature imp • feature netflow • feature sla_sender • feature sla_responder • feature sla_twamp-server • feature sflow
EXT_ETH_LOWMEM	<ul style="list-style-type: none"> • feature evb • feature netflow
FCoE	<ul style="list-style-type: none"> • feature-set fcoe • feature-set fcoe-npv
FEX	feature-set fex
FHRP	<ul style="list-style-type: none"> • feature hsrp • feature vrrpv3
HW TELEMETRY	feature hw telemetry
iCAM	feature icam
ISIS	feature isis
MPLS	<ul style="list-style-type: none"> • feature mpls segment-routing • feature mpls evpn
Multicast	<ul style="list-style-type: none"> • feature pim • feature pim6 • feature msdp • feature ngmvpn
NIA	NA
NXSDK	NA

Package Name	Associated Features
OSPF	<ul style="list-style-type: none"> • feature ospf • feature ospfv3
RIP	feature rip
SDAA	NA
Services	feature catena
SR	feature mpls segment-routing traffic-engineering
TELEMETRY	feature telemetry
Virtualization	NA
VM Tracker	feature vmtracker
VXLAN	<ul style="list-style-type: none"> • feature nv overlay • feature fabric forwarding

Guidelines for NX-OS feature RPM installation

The NX-OS system RPM repositories are present in NX-OS Series switches for RPM management.



Note Avoid manually copying the RPMs to system repositories. Instead use the install or DNF commands.

Table 3: RPM repositories that are present in the switches

Repository Name	Repository Path	Description
groups-repo	/rpms	Part of the bundled NX-OS image. It is used to keep all the RPMs that are bundled as part of the NX-OS image. All RPMs based in this repository are known as base RPMs.

Repository Name	Repository Path	Description
localdb	/bootflash/.rpmstore/patching/localrepo	<p>Used for RPM persistency. When a user adds a NX-OS feature RPM as part of install add command, the RPM is copied to this location and it is persisted during the reloads. User has the responsibility to clean the repository.</p> <p>To add a RPM to this repository, use install add command.</p> <p>To remove a RPM from this repository, use install remove command.</p> <p>DNF commands can be used to populate the repository too.</p> <p>The maximum space for the repository is 200Mb along with the patching repository for Nexus 9000 Series switches except Nexus 3000 Series switches. For Nexus 3000 Series switches, the maximum space for the repository is 20 Mb only.</p>
patching	/bootflash/.rpmstore/patching/patchrepo	Used for RPM persistency. When a user adds a NX-OS patch RPM to the switch, the patch RPM is copied to this repository.
thirdparty	/bootflash/.rpmstore/thirdparty	Used for RPM persistency when a user adds a third party RPM.

The `groups-repo` and `localdb` repositories hold the NX-OS feature RPMs that should be installed during the system boot or during activation. DNF commands or **install** command can be used for the installation or the removal of these RPMs.

The listed rules are applied to the feature RPM installation procedure during boot or install time:

- Only RPMs with the same NX-OS release number should be selected for the installation.
- Base RPMs cannot be added to the `localdb` repository.

Guidelines for third-party RPM installation

In releases prior to 10.1(x), you can install any third-party package on the device, even if it is not provided or signed by Cisco.

Starting with release 10.1(x) any third-party package that is not signed by Cisco is not allowed to be installed on the device. However, if you wish to bypass this and install the software, you can configure the device to

enable the third-party software installation. The configuration persists as a normal configuration and can be verified by using the **running-config** command. Following this configuration, you can install any third-party software with the known risks.

Install command options for feature and third-party RPMs

Use the reference table for using install commands for the feature RPM operations.

Table 4: Reference for install commands for the feature RPM operations

Command	Description
install reset	<p>This operation removes all the patches, persisted configurations, upgraded packages, third-party installed packages, unsaved configurations, and reloads the switch's previous mode (Full/Base) with the default packages.</p> <p>The install reset command also performs write erase operation. The following message is displayed at the prompt:</p> <pre data-bbox="964 931 1339 956">switch(config)# install reset</pre> <hr/> <p>WARNING!! This operation will remove all patches, upgraded packages, persisted etc configs, third party packages installed, startup configuration(write erase) and reload the switch with default packages.</p> <hr/> <p>Do you want to proceed with reset operation? (y/n) ? [n]</p>
install reset nxos base	<p>This operation installs NX-OS in base mode by removing all patches, upgraded packages, persisted etc configurations, third-party packages installed, startup configuration (write erase), and reloads the switch with the default packages.</p>
install reset nxos full	<p>This operation installs NX-OS with full mode by removing all patches, upgraded packages, persisted etc configs, third-party packages installed, startup configuration (write erase), and reloads the switch with the default packages (with mandatory and optional RPMs).</p>
install add <>	<p>Adds an RPM file to the respective repository and updates the repository (patch/feature/third-party).</p>
install activate <rpm name>	<p>Installs an RPM that is present in the repository.</p>
install commit <rpm name>	<p>Used for the patch RPMs. Makes the patch persist during the reload.</p>

Install command options for feature and third-party RPMs

Command	Description
install deactivate <rpm name>	<p>Uninstalls an RPM.</p> <p>Beginning with NX-OS Release 10.1(1), when you use this command to deactivate RPMs, the options to either downgrade to the base version of RPM or to uninstall RPM appear. You can select the option that you desire and the operation will proceed.</p>
install remove <rpm name>	<p>Removes an RPM file from the repository and updates the repository.</p>
sh install active	<p>Displays the list of the installed RPMs in the system apart from base rootfs RPMs. (features/patch/third-party).</p>
sh install inactive	<p>Displays the list of the RPMs that are present in the repository but they are not installed.</p>
sh install packages	<p>Lists all the RPMs that are installed including rootfs RPMs.</p>

Command	Description
[no] system software allow third-party	<p>Beginning with NX-OS Release 10.1(1) the third-party RPM installations are not allowed to be installed on the device by default. This command bypasses this restriction and configures the device to enable the third-party software installation.</p> <p>The following command shows the error message when you activate third-party RPM without applying the third-party configuration:</p> <pre>switch(config)# install activate pbwMonitor-1.0-1.5.0.x86_64.rpm</pre> <p>Install operation 193 failed because package is not signed by Cisco. Enable TPS installation using 'system software allow third-party' CLI at Tue Nov 17 04:23:10 2020</p> <p>The following command shows activating third-party RPM installations after applying the configuration:</p> <pre>switch(config)# system software allow third-party switch(config)# 2020 Nov 17 04:25:41 switch %\$ VDC-1 %\$ %USER-2-SYSTEM_MSG: <<%PATCH-INSTALLER-2-TPS_FEATURE_ENABLED>> User has enabled TPS installation - patch_installer switch(config)# install activate pbwMonitor-1.0-1.5.0.x86_64.rpm [#####] 100% Install operation 194 completed successfully at Tue Nov 17 04:25:58 2020</pre> <p>The following command shows disabling the third-party configuration:</p> <pre>switch(config)# no system software allow third-party switch(config)# 2020 Nov 17 04:27:17 switch %\$ VDC-1 %\$ %USER-2-SYSTEM_MSG: <<%PATCH-INSTALLER-2-TPS_FEATURE_DISABLED>> User has disabled TPS installation - patch_installer</pre>



Note If you are using ISSU or upgrading to NX-OS Release 10.1.1 release from an earlier version, you must manually apply the third-party configuration within the first 30 minutes after the upgrade to ensure the third-party RPMs get installed.

Use install commands for digital signature support

Use the install commands for digital signature support.

Procedure

Step 1 Import and add a GPG (GNU Privacy Guard) key from a file located in the bootflash using the **install add bootflash:<keyfile> gpg-key** command.

Example:

```
switch# install add bootflash:RPM-GPG-KEY-puppetlabs gpg-key
[#####] 100%
Install operation 304 completed successfully at Thu Jun 19 16:40:28 2018
```

Release RPMs are signed with GPG (GNU Privacy Guard) key. The public GPG key is present at **/etc/pki/rpm-gpg/arm-Nexus9k-rel.gpg**. To add other public keys from different sources, use the steps in this section.

Step 2 Use one of the two steps to verify whether the RPM file is a signed or non-signed file.

- Verify that the package is a signed file using the **install verify package <package-name>** command.
- Verify that the RPM file is a signed file using the **install verify bootflash:<RPM file>** command.

Example:

```
switch# install verify bootflash:vxlan-2.0.0.0-9.2.1.lib32_n9000.rpm
RSA signed
switch#
```

Query all installed RPMs

Perform this step to query all the installed RPMs

Procedure

Query all the installed RPMs using the **show install packages** command.

Example:

```
switch# show install packages

Boot Image:
NXOS Image: bootflash:/nxos.9.2.1.bin

-----
Installed Packages
attr.x86_64 2.4.47-r0.0 installed Unsigned
aufs-util.x86_64 3.14+git0+b59a2167a1-r0.0 installed Unsigned
base-files.n9000 3.0.14-r89.0 installed Unsigned
base-passwd.lib32_x86 3.5.29-r0.1.0 installed Unsigned
bash.lib32_x86 4.3.30-r0.0 installed Unsigned
bfd.lib32_n9000 2.0.0.0-9.2.1 installed Signed
bgp.lib32_n9000 2.0.0.0-9.2.1 installed Signed
binutils.x86_64 2.25.1-r0.0 installed Unsigned
bridge-utils.x86_64 1.5-r0.0 installed Unsigned
busybox.x86_64 1.23.2-r0.0 installed Unsigned
busybox-udhcpc.x86_64 1.23.2-r0.0 installed Unsigned
```

```

bzip2.x86_64 1.0.6-r5.0 installed Unsigned
ca-certificates.all 20150426-r0.0 installed Unsigned
cgroup-lite.x86_64 1.1-r0.0 installed Unsigned
chkconfig.x86_64 1.3.58-r7.0 installed Unsigned
container-tracker.lib32_n9000 2.0.0.0-9.2.1 installed Signed
containerd-docker.x86_64 0.2.3+gita8187dbd3b7ad67d8e5e3a15115d3eef43a7ed1-r0.0
installed Unsigned
core.lib32_n9000 2.0.0.0-9.2.1 installed Signed
coreutils.lib32_x86 8.24-r0.0 installed Unsigned
cpio.x86_64 2.12-r0.0 installed Unsigned
cracklib.lib32_x86 2.9.5-r0.0 installed Unsigned
cracklib.x86_64 2.9.5-r0.0 installed Unsigned
createrepo.x86_64 0.4.11-r9.0 installed Unsigned
cronie.x86_64 1.5.0-r0.0 installed Unsigned
curl.lib32_x86 7.60.0-r0.0 installed Unsigned
db.x86_64 6.0.30-r0.0 installed Unsigned
dbus-1.lib32_x86 1.8.20-r0.0 installed Unsigned
dhcp-client.x86_64 4.3.2-r0.0 installed Unsigned
dhcp-server.x86_64 4.3.2-r0.0 installed Unsigned
switch#

```

Install RPMs using the one-step procedure

The commands for both install and upgrade RPMs are the same. Use this one-step procedure to install the RPMs.

Procedure

Step 1 Install and activate the RPM using the **install add <rpm> activate** command.

Example:

```

switch# install add bootflash:chef.rpm activate
Adding the patch (/chef.rpm)
[#####] 100%
Install operation 868 completed successfully at Tue May 8 11:20:10 2018

Activating the patch (/chef.rpm)
[#####] 100%
Install operation 869 completed successfully at Tue May 8 11:20:20 2018

```

Step 2 Verify the output of the **show install active** command.

Example:

```

switch# show install active
Boot Image:
    NXOS Image: bootflash:/nxos.9.2.1.bin

Active Packages:
bgp-2.0.1.0-9.2.1.lib32_n9000
chef-12.0.0alpha.2+20150319234423.git.1608.b6eb10f-1.e15.x86_64

Active Base Packages:
    lacp-2.0.0.0-9.2.1.lib32_n9000
    lldp-2.0.0.0-9.2.1.lib32_n9000
    mta-device-2.0.0.0-9.2.1.lib32_n9000
    mta-grpc-agent-2.0.0.0-9.2.1.lib32_n9000

```

Install RPMs using the two-step procedure

```

mtx-infra-2.0.0.0-9.2.1.lib32_n9000
mtx-netconf-agent-2.0.0.0-9.2.1.lib32_n9000
mtx-restconf-agent-2.0.0.0-9.2.1.lib32_n9000
mtx-telemetry-2.0.0.0-9.2.1.lib32_n9000
ntp-2.0.0.0-9.2.1.lib32_n9000
nxos-ssh-2.0.0.0-9.2.1.lib32_n9000
snmp-2.0.0.0-9.2.1.lib32_n9000
svi-2.0.0.0-9.2.1.lib32_n9000
tacacs-2.0.0.0-9.2.1.lib32_n9000
ftp-2.0.0.0-9.2.1.lib32_n9000

```

Install RPMs using the two-step procedure

The commands for both install and upgrade RPMs are the same. Use this two-step procedure to install the RPMs.

Procedure

Step 1 Install the RPM using the **install add <rpm>** command.

Example:

```

switch# install add bootflash:vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm
[#####] 100%
Install operation 892 completed successfully at Thu Jun 7 13:56:38 2018

```

Step 2 Verify using the **show install inactive** command.

Example:

```

switch(config)# show install inactive | grep vxlan
vxlan-2.0.1.0-9.2.1.lib32_n9000

```

Step 3 Activate the RPM using the **install activate <rpm>** command.

Example:

```

switch# install activate vxlan
[#####] 100%
Install operation 891 completed successfully at Thu Jun 7 13:53:07 2018

```

Step 4 Verify using the **show install active** command.

Example:

```

switch# show install active | grep vxlan
vxlan-2.0.0.0-9.2.1.lib32_n9000
switch# show install inactive | grep vxlan
switch#

```

Upgrade the RPMs

The commands for both install and upgrade RPMs are the same. Perform this procedure to upgrade the RPMs:

Procedure

Step 1 Install the RPM using the **install add <rpm>activate upgrade** command.

Example:

```
switch(config)# install add bootflash:bgp-2.0.2.0-9.2.1.lib32_n9000.rpm activate upgrade

Adding the patch (/bgp-2.0.2.0-9.2.1.lib32_n9000.rpm)
[#####] 100%
Install operation 870 completed successfully at Tue May 8 11:22:30 2018

Activating the patch (/bgp-2.0.2.0-9.2.1.lib32_n9000.rpm)
[#####] 100%
Install operation 871 completed successfully at Tue May 8 11:22:40 2018
```

Step 2 Verify the output using the **show install active** command.

Example:

```
switch(config)# show install active

Boot Image:
NXOS Image: bootflash:/nxos.9.2.1.bin

Active Packages:
bgp-2.0.2.0-9.2.1.lib32_n9000
chef-12.0.0alpha.2+20150319234423.git.1608.b6eb10f-1.el5.x86_64

Active Base Packages:
lacp-2.0.0.0-9.2.1.lib32_n9000
lldp-2.0.0.0-9.2.1.lib32_n9000
mtx-device-2.0.0.0-9.2.1.lib32_n9000
mtx-grpc-agent-2.0.0.0-9.2.1.lib32_n9000
mtx-infra-2.0.0.0-9.2.1.lib32_n9000
mtx-netconf-agent-2.0.0.0-9.2.1.lib32_n9000
mtx-restconf-agent-2.0.0.0-9.2.1.lib32_n9000
mtx-telemetry-2.0.0.0-9.2.1.lib32_n9000
ntp-2.0.0.0-9.2.1.lib32_n9000
nxos-ssh-2.0.0.0-9.2.1.lib32_n9000
snmp-2.0.0.0-9.2.1.lib32_n9000
svi-2.0.0.0-9.2.1.lib32_n9000
tacacs-2.0.0.0-9.2.1.lib32_n9000
vtp-2.0.0.0-9.2.1.lib32_n9000
```

Downgrade RPMs

The downgrade procedure needs a special command attribute. Downgrade the RPMs using the one-step procedure.

Procedure**Step 1** Downgrade the RPM using the **install add <rpm>activate downgrade** command.**Example:**

```
switch(config)# install add bootflash:bgp-2.0.1.0-9.2.1.lib32_n9000.rpm activate downgrade

Adding the patch (/bgp-2.0.1.0-9.2.1.lib32_n9000.rpm)
[#####] 100%
Install operation 872 completed successfully at Tue May 8 11:24:43 2018

Activating the patch (/bgp-2.0.1.0-9.2.1.lib32_n9000.rpm)
[#####] 100%
Install operation 873 completed successfully at Tue May 8 11:24:52 2018
```

Step 2 Verify the output using the **show install active** command.**Example:**

```
switch(config)# show install active
Boot Image:
  NXOS Image: bootflash:/nxos.9.2.1.bin

Active Packages:
  bgp-2.0.1.0-9.2.1.lib32_n9000
  chef-12.0.0.Alpha.2+20150319234423.git.1608.b6eb10f-1.e15.x86_64

Active Base Packages:
  lacp-2.0.0.0-9.2.1.lib32_n9000
  lldp-2.0.0.0-9.2.1.lib32_n9000
  mtx-device-2.0.0.0-9.2.1.lib32_n9000
  mtx-grpc-agent-2.0.0.0-9.2.1.lib32_n9000
  mtx-infra-2.0.0.0-9.2.1.lib32_n9000
  mtx-netconf-agent-2.0.0.0-9.2.1.lib32_n9000
  mtx-restconf-agent-2.0.0.0-9.2.1.lib32_n9000
  mtx-telemetry-2.0.0.0-9.2.1.lib32_n9000
  ntp-2.0.0.0-9.2.1.lib32_n9000
  nxos-ssh-2.0.0.0-9.2.1.lib32_n9000
  snmp-2.0.0.0-9.2.1.lib32_n9000
  svi-2.0.0.0-9.2.1.lib32_n9000
  tacacs-2.0.0.0-9.2.1.lib32_n9000
  vtp-2.0.0.0-9.2.1.lib32_n9000
switch(config) #
```

Uninstall the RPMs

Perform this procedure to uninstall the RPMs.

ProcedureDowngrade to the base version of RPM, if one exists in the groups-repo (/rpms), or uninstall the RPM completely from the switch using the **install deactivate <rpm>** command.

- To downgrade to the base version, enter **y**.
- To completely uninstall the RPM, enter **n** in the command prompt.

Example:

```
switch(config)# install deactivate bgp
Base RPM found. Do you want to downgrade to base version(y/n) [n] y
Downgrading to the base version
[#####] 100%
Install operation 190 completed successfully at Tue Nov 17 04:10:40 2020
```

Example:

```
switch(config)# install deactivate bgp
Base RPM found. Do you want to downgrade to base version(y/n) [n] n
=====
WARNING!!
This operation will remove 'bgp-3.0.0.0-9.4.1.lib32_n9000' related configuration from
running-configuration
on successful completion. Update startup-configuration accordingly.
=====
[#####] 100%
Install operation 9 completed successfully at Tue Nov 17 05:05:59 2020
```

Remove the RPMs

Perform this procedure to remove the RPMs.

Procedure

Remove the RPM from the repository using the **install remove <rpm>** command.

Example:

```
switch(config)# show install inactive | grep vxlan
vxlan-2.0.0.0-9.2.1.lib32_n9000
switch(config)# install remove vxlan

Proceed with removing vxlan? (y/n)? [n] y
[#####] 100%
Install operation 890 Removal of base rpm package is not permitted at Thu Jun 7 13:52:15 2018
```

Dandified YUM commands

In Nexus 9000 switches, DNF (Dandified YUM) is the package manager used to manage modular software components (RPMs) within the NX-OS environment. Beginning with NX-OS Release 10.1(x), DNF replaced YUM as the primary tool for the Optionality feature, allowing you to install, upgrade, or remove specific

features (such as Layer 3, BGP, or OSPF) without performing a full system binary upgrade or reloading the switch.



Note DNF commands do not support CTRL+C. Install commands do support CTRL+C. If DNF commands are aborted using CTRL+C, manual cleanup must be performed using `/isan/bin/patching_utils.py --unlock`.

Package operations with DNF commands

This section describes how to perform package operations using the DNF commands.

This section describes how to perform package operations using the DNF commands:



Note

- DNF commands are accessed only from the BASH shell on the box and they are not allowed from the NX-OS VSH terminal.
- Make sure that as a sudo user, you have access to the super user privileges.

Find the base version RPM of the image

The base RPM version is the pre-installed RPM that is archived in the system image.

Use the `ls /rpms` command to find the base version RPM of the image.

```
switch# ls /rpms
```

```
bfd-2.0.0.0-9.2.1.lib32_n9000.rpm
ins_tor_sdk_t2-1.0.0.0-9.2.0.77.lib32_n9000.rpm
mtx-netconf-agent-2.0.0.0-9.2.1.lib32_n9000.rpm    snmp-2.0.0.0-9.2.1.lib32_n9000.rpm
bgp-2.0.0.0-9.2.1.lib32_n9000.rpm
ins_tor_sdk_t3-1.0.0.0-9.2.0.77.lib32_n9000.rpm
mtx-restconf-agent-2.0.0.0-9.2.1.lib32_n9000.rpm  sr-2.0.0.0-9.2.1.lib32_n9000.rpm
container-tracker-2.0.0.0-9.2.1.lib32_n9000.rpm  isis-2.0.0.0-9.2.1.lib32_n9000.rpm
          mtx-telemetry-2.0.0.0-9.2.1.lib32_n9000.rpm  svi-2.0.0.0-9.2.1.lib32_n9000.rpm
eigrp-2.0.0.0-9.2.1.lib32_n9000.rpm            lacp-2.0.0.0-9.2.1.lib32_n9000.rpm
          nbproxy-2.0.0.0-9.2.1.lib32_n9000.rpm
tacacs-2.0.0.0-9.2.1.lib32_n9000.rpm
ext-eth-2.0.0.0-9.2.1.lib32_n9000.rpm          lldp-2.0.0.0-9.2.1.lib32_n9000.rpm
          ntp-2.0.0.0-9.2.1.lib32_n9000.rpm
telemetry-2.3.4.0-9.2.1.lib32_n9000.rpm
fcoe-2.0.0.0-9.2.1.lib32_n9000.rpm          mcast-2.0.0.0-9.2.1.lib32_n9000.rpm
          nxos-ssh-2.0.0.0-9.2.1.lib32_n9000.rpm
virtualization-2.0.0.0-9.2.1.lib32_n9000.rpm
fex-2.0.0.0-9.2.1.lib32_n9000.rpm          mpls-2.0.0.0-9.2.1.lib32_n9000.rpm
          ospf-2.0.0.0-9.2.1.lib32_n9000.rpm    vtp-2.0.0.0-9.2.1.lib32_n9000.rpm
fhrp-2.0.0.0-9.2.1.lib32_n9000.rpm          mta-device-2.0.0.0-9.2.1.lib32_n9000.rpm
          repodata
vxlan-2.0.0.0-9.2.1.lib32_n9000.rpm
guestshell-2.0.0.0-9.2.1.lib32_n9000.rpm
          rip-2.0.0.0-9.2.1.lib32_n9000.rpm
icam-2.0.0.0-9.2.1.lib32_n9000.rpm          mta-grpc-agent-2.0.0.0-9.2.1.lib32_n9000.rpm
          services-2.0.0.0-9.2.1.lib32_n9000.rpm
                                         mta-infra-2.0.0.0-9.2.1.lib32_n9000.rpm
```

Check the list of the installed RPMs

Use the **dnf list installed** command to query the feature and third party RPMs and grep a specific RPM.

Here is an example for feature RPMs.

```
bash-4.2# dnf list installed | grep lib32_n9000
```

bfd.lib32_n9000	2.0.0.0-9.2.1	@groups-repo
core.lib32_n9000	2.0.0.0-9.2.1	installed
eth.lib32_n9000	2.0.0.0-9.2.1	installed
guestshell.lib32_n9000	2.0.0.0-9.2.1	@groups-repo
lacp.lib32_n9000	2.0.0.0-9.2.1	installed
linecard2.lib32_n9000	2.0.0.0-9.2.1	installed
lldp.lib32_n9000	2.0.0.0-9.2.1	installed
mcast.lib32_n9000	2.0.0.0-9.2.1	@groups-repo
mtx-device.lib32_n9000	2.0.0.0-9.2.1	installed
mtx-grpc-agent.lib32_n9000	2.0.0.0-9.2.1	installed
mtx-infra.lib32_n9000	2.0.0.0-9.2.1	installed
mtx-netconf-agent.lib32_n9000	2.0.0.0-9.2.1	installed
mtx-restconf-agent.lib32_n9000	2.0.0.0-9.2.1	installed
mtx-telemetry.lib32_n9000	2.0.0.0-9.2.1	installed
nbproxy.lib32_n9000	2.0.0.0-9.2.1	installed
ntp.lib32_n9000	2.0.0.0-9.2.1	installed
nxos-ssh.lib32_n9000	2.0.0.0-9.2.1	installed
ospf.lib32_n9000	2.0.0.0-9.2.1	@groups-repo
platform.lib32_n9000	2.0.0.0-9.2.1	installed
snmp.lib32_n9000	2.0.0.0-9.2.1	installed
svi.lib32_n9000	2.0.0.0-9.2.1	installed
tacacs.lib32_n9000	2.0.0.0-9.2.1	installed
tor.lib32_n9000	2.0.0.0-9.2.0.77	installed
virtualization.lib32_n9000	2.0.1.0-9.2.1	@localdb
vtp.lib32_n9000	2.0.0.0-9.2.1	installed
vxlan.lib32_n9000	2.0.0.0-9.2.1	@groups-repo
...		

Get details of the installed RPMs

The **dnf info <rpmname>** command lists out the detailed information of the installed RPM.

```
dnf info vxlan
```

```
Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
groups-repo
```

```
           | 1.1 kB  00:00 ...
localdb

           | 951 B   00:00 ...
patching

           | 951 B   00:00 ...
thirdparty

           | 951 B   00:00 ...
Installed Packages
Name      : vxlan
Arch     : lib32_n9000
Version  : 2.0.0.0
Release  : 9.2.1
Size     : 6.4 M
Repo     : installed
```

Install RPMs

```
From repo      : groups-repo
Summary       : Cisco NXOS VxLAN
URL          : http://cisco.com/
License       : Proprietary
Description   : Provides VxLAN support
```

Install RPMs

Installing the RPMs downloads the RPMs and copies the respective program to the switches. This is an example for installing the RPMs from a remote server (that is reachable in the network).

```
bash-4.3# dnf install
http://10.0.0.2/modularity/rpms/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm
```

```
Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
groups-repo
localdb
localdb/primary
localdb
patching
thirdparty
Setting up Install Process
vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm
Examining /var/tmp/yum-root-RaANgb/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm:
vxlan-2.0.1.0-9.2.1.lib32_n9000
Marking /var/tmp/yum-root-RaANgb/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm to be installed
Resolving Dependencies
--> Running transaction check
-->> Package vxlan.lib32_n9000 0:2.0.1.0-9.2.1 will be installed
-->> Finished Dependency Resolution

Dependencies Resolved
```

Package	Arch	Version
Repository		Size
Installing:		
vxlan	lib32_n9000	2.0.1.0-9.2.1
	/vxlan-2.0.1.0-9.2.1.lib32_n9000	6.4 M
Transaction Summary		
Install	1 Package	
Total size: 6.4 M		
Installed size: 6.4 M		
Is this ok [y/N]: y		
Downloading Packages:		
Running Transaction Check		
Running Transaction Test		
Transaction Test Succeeded		
Running Transaction		
Installing : vxlan-2.0.1.0-9.2.1.lib32_n9000		
1/1		

```
starting pre-install package version mgmt for vxlan
pre-install for vxlan complete
starting post-install package version mgmt for vxlan
post-install for vxlan complete
```

```
Installed:
  vxlan.lib32_n9000 0:2.0.1.0-9.2.1
```

Complete!

This is an example for installing the RPMs from local bootflash.

```
sudo dnf install /bootflash/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm
```

```
Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
groups-repo
```

```
          | 1.1 kB  00:00 ...
localdb

          | 951 B   00:00 ...
patching

          | 951 B   00:00 ...
thirdparty

          | 951 B   00:00 ...
Setting up Install Process
Examining /bootflash/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm: vxlan-2.0.1.0-9.2.1.lib32_n9000
Marking /bootflash/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm as an update to
vxlan-2.0.0.0-9.2.1.lib32_n9000
Resolving Dependencies
--> Running transaction check
--> Package vxlan.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
--> Package vxlan.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
--> Finished Dependency Resolution
```

Dependencies Resolved

Package Version	Arch	Repository
		Size
Updating: vxlan 2.0.1.0-9.2.1	lib32_n9000	/vxlan-2.0.1.0-9.2.1.lib32_n9000
	6.4 M	

Transaction Summary

Upgrade 1 Package

```
Total size: 6.4 M
Is this ok [y/N]: y
Downloading Packages:
Running Transaction Check
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Updating  : vxlan-2.0.1.0-9.2.1.lib32_n9000
```

Upgrade RPMs

```

1/2
starting pre-install package version mgmt for vxlan
pre-install for vxlan complete
starting post-install package version mgmt for vxlan
post-install for vxlan complete
  Cleanup    : vxlan-2.0.0.0-9.2.1.lib32_n9000

```

2/2

```

Updated:
vxlan.lib32_n9000 0:2.0.1.0-9.2.1

```

Complete!

This is an example for installing the RPM if it is available in a repository.

```
dnf install eigrp
```

Upgrade RPMs

This topic provides examples for upgrading RPMs from a remote server (that is reachable in the network).

```

bash-4.3# dnf upgrade
http://10.0.0.2/modularity/rpms/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm

Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
groups-repo
| 1.1 kB 00:00 ...
localdb
| 951 B 00:00 ...
patching
| 951 B 00:00 ...
thirdparty
| 951 B 00:00 ...

Setting up Upgrade Process
vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm
| 1.6 MB 00:00
Examining /var/tmp/yum-root-RaANgb/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm:
vxlan-2.0.1.0-9.2.1.lib32_n9000
Marking /var/tmp/yum-root-RaANgb/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm as an update to
vxlan-2.0.0.0-9.2.1.lib32_n9000
Resolving Dependencies
--> Running transaction check
--> Package vxlan.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
--> Package vxlan.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
--> Finished Dependency Resolution

Dependencies Resolved

```

Package	Arch	Version
Repository		Size
<hr/>		
Updating:		
vxlan	lib32_n9000	2.0.1.0-9.2.1
	/vxlan-2.0.1.0-9.2.1.lib32_n9000	6.4 M
<hr/>		
Transaction Summary		
Upgrade	1 Package	

```

Total size: 6.4 M
Is this ok [y/N]: y
Downloading Packages:
  Running Transaction Check
  Running Transaction Test
  Transaction Test Succeeded
  Running Transaction
** Found 1 pre-existing rpmdb problem(s), 'yum check' output follows:
busybox-1.23.2-r0.0.x86_64 has missing requires of busybox-syslog
  Updating    : vxlan-2.0.1.0-9.2.1.lib32_n9000
                                                               1/2
  starting pre-install package version mgmt for vxlan
  pre-install for vxlan complete
  starting post-install package version mgmt for vxlan
  post-install for vxlan complete
  Cleanup      : vxlan-2.0.0.0-9.2.1.lib32_n9000
                                                               2/2

Updated:
  vxlan.lib32_n9000 0:2.0.1.0-9.2.1

```

Complete!

This is an example for upgrading the RPMs from local bootflash.

```
sudo dnf upgrade /bootflash/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm
```

```

Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
groups-repo

localdb                                | 1.1 kB     00:00 ...
patching                                | 951 B      00:00 ...
thirdparty                               | 951 B      00:00 ...
                                             | 951 B      00:00 ...
Setting up Upgrade Process
Examining /bootflash/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm: vxlan-2.0.1.0-9.2.1.lib32_n9000
Marking /bootflash/vxlan-2.0.1.0-9.2.1.lib32_n9000.rpm as an update to
vxlan-2.0.0.0-9.2.1.lib32_n9000
Resolving Dependencies
--> Running transaction check
--> Package vxlan.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
--> Package vxlan.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
--> Finished Dependency Resolution

Dependencies Resolved

```

Package Version	Arch	Repository
Size		
Updating: vxlan 2.0.1.0-9.2.1	lib32_n9000	/vxlan-2.0.1.0-9.2.1.lib32_n9000
	6.4 M	

Downgrade RPMs

```

Transaction Summary
=====
Upgrade      1 Package

Total size: 6.4 M
Is this ok [y/N]: y
Downloading Packages:
  Running Transaction Check
  Running Transaction Test
  Transaction Test Succeeded
  Running Transaction
    Updating      : vxlan-2.0.1.0-9.2.1.lib32_n9000
      1/2
      starting pre-install package version mgmt for vxlan
      pre-install for vxlan complete
      starting post-install package version mgmt for vxlan
      post-install for vxlan complete
    Cleanup      : vxlan-2.0.0.0-9.2.1.lib32_n9000
      2/2

  Updated:
    vxlan.lib32_n9000 0:2.0.1.0-9.2.1

```

Complete!

This is an example for upgrading the RPMs if it is available in any repository.

dnf upgrade eigrp

Downgrade RPMs

This topic provides example for downgrading the RPMs from a remote server (that is reachable in the network).

```

sudo dnf
  downgrade vxlan-2.0.0.0-9.2.1.lib32_n9000

Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
Setting up Downgrade Process
groups-repo

localdb                               | 1.1 kB     00:00 ...
localdb
localdb/primary                         | 951 B      00:00 ...
localdb/primary
localdb                               | 1.3 kB     00:00 ...
localdb
patching                               | 951 B      00:00 ...
patching
thirdparty                            | 951 B      00:00 ...
thirdparty
Resolving Dependencies
--> Running transaction check

```

```
---> Package vxlan.lib32_n9000 0:2.0.0.0-9.2.1 will be a downgrade
---> Package vxlan.lib32_n9000 0:2.0.1.0-9.2.1 will be erased
--> Finished Dependency Resolution
```

Dependencies Resolved

Package	Version	Arch	Repository
		Size	
Downgrading:			
vxlan	2.0.0.0-9.2.1	lib32_n9000	groups-repo
Transaction Summary			
Downgrade	1 Package		
Total download size: 1.6 M			
Is this ok [y/N]: y			
Downloading Packages:			
Running Transaction Check			
Running Transaction Test			
Transaction Test Succeeded			
Running Transaction			
Installing : vxlan-2.0.0.0-9.2.1.lib32_n9000			
1/2			
starting pre-install package version mgmt for vxlan			
pre-install for vxlan complete			
starting post-install package version mgmt for vxlan			
post-install for vxlan complete			
Cleanup : vxlan-2.0.1.0-9.2.1.lib32_n9000			
2/2			
Removed:			
vxlan.lib32_n9000 0:2.0.1.0-9.2.1			
Installed:			
vxlan.lib32_n9000 0:2.0.0.0-9.2.1			

Complete!

This is an example for downgrading the RPMs from local bootflash.

dnf downgrade /bootflash/eigrp-2.0.0-9.2.1.lib32_n9000.rpm

This is an example for downgrading the RPMs if it is available in any repository.

dnf downgrade eigrp

Delete RPMs

Deleting the RPMs de-installs the RPMs and removes any configuration commands of the feature. Use the **dnf erase <rpm>** command to delete the RPMs.

```

bash-4.2# sudo dnf erase vxlan

Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
Setting up Remove Process
Resolving Dependencies
--> Running transaction check
--> Package vxlan.lib32_n9000 0:2.0.1.0-9.2.1 will be erased
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package   Arch   Version   RepositorySize
=====
Removing:
vxlan      lib32_n9000   2.0.1.0-9.2.1   @/vxlan-2.0.1.0-9.2.1.lib32_n9000 6.4 M
Transaction Summary
=====
Remove1 Package

Installed size: 6.4 M
Is this ok [y/N]: y
Downloading Packages:
Running Transaction Check
Running Transaction Test
Transaction Test Succeeded
Running Transaction
Erasing   : vxlan-2.0.1.0-9.2.1.lib32_n9000 1/1
starting pre-remove package version mgmt for vxlan
pre-remove for vxlan complete

Removed:
vxlan.lib32_n9000 0:2.0.1.0-9.2.1

Complete!

```

Support for DNF groups

The DNF group is a feature that

- simplifies the management of the packages for the administrators
- provides greater flexibility, and
- allows administrators to manage collections of packages as logical groups.

The support for DNF groups is part of the package management.

The administrators can group a list of packages (RPMs) into a logical group and they can perform various operations. The group commands that DNF supports include

- **grouplist**
- **groupinfo**
- **groupinstall**
- **groupremove**, and
- **groupupdate**.

The DNF groups can be broadly classified as Layer 2, Layer 3, routing, and management.

Grouplist command for listing available package groups

In Linux, number of packages are bundled to particular group. Instead of installing individual packages with dnf, you can install particular group that will install all the related packages that belongs to the group. For example to list all the available groups, use the **dnf grouplist** command:

List all available package groups in Linux using the **dnf grouplist** command.

```
bash-4.4# dnf grouplist
Last metadata expiration check: 0:00:00 ago on Fri 08 Mar 2024 12:26:33 PM UTC.
] --- B/s | 0 B --- ETA
Available Groups:
  management
  routing
  L2
  L3
bash-4.4#
```

Groupmembers command for displaying package group contents

Display the description and the contents of a package group using the **dnf groupinfo** command.

The command lists out the feature members of the group.

```
bash-4.4# dnf groupinfo 12
Last metadata expiration check: 0:00:00 ago on Fri 08 Mar 2024 12:27:44 PM UTC.
] --- B/s | 0 B --- ETA
Group: L2
Mandatory Packages:
  lacp
  lldp
  svi
  vtp
bash-4.4#
```

Groupinstall command for install and upgrade of member RPM

This command is for both install and upgrade of the members RPM. If the member is not installed, it installs the highest version available. If the member is already installed and higher RPM is available, it upgrades that member.

```
bash-4.4# dnf groupinstall 13
Last metadata expiration check: 0:00:00 ago on Fri 08 Mar 2024 12:38:05 PM UTC.
] --- B/s | 0 B --- ETA
Not a redundant system. Nothing todo
Dependencies resolved.
```

Group	Packages
Marking packages as installed by the group:	
@L3	bfd
Is this ok [y/N]: y	
Complete!	
Install operation 10 completed successfully at Fri Mar 8 12:38:08 2024.	
[#####]	100%

Groupupdate command for updating package groups

Groupupdate command for updating package groups

Update any existing installed group packages using the **dnf groupupdate** command.

```
bash-4.4# dnf groupupdate 13
```

```
Last metadata expiration check: 0:00:00 ago on Wed 13 Mar 2024 12:30:11 PM UTC.
] --- B/s | 0 B --- ETA
Dependencies resolved.
```

Group	Packages
Marking packages as installed by the group: @L3	bfd

Package	Arch	Version
	Repository	Size
Installing group packages: bfd	lib32_64_n9000	2.0.0.0-10.4.3
	groups-repo	562 k

Transaction Summary		
Install 1 Package		
Total size: 562 k		
Installed size: 2.3 M		
Is this ok [y/N]: y		
Downloading Packages:		
Running transaction check		
Transaction check succeeded.		
Running transaction test		
Transaction test succeeded.		
Running transaction		
Preparing :		1/1
Running scriptlet: bfd-2.0.0.0-10.4.3.lib32_64_n9000		1/1
starting pre-install package version mgmt for bfd		
pre-install for bfd complete		
Installing : bfd-2.0.0.0-10.4.3.lib32_64_n9000		1/1
Running scriptlet: bfd-2.0.0.0-10.4.3.lib32_64_n9000		1/1
starting post-install package version mgmt for bfd		
post-install for bfd complete		
Verifying : bfd-2.0.0.0-10.4.3.lib32_64_n9000		1/1
Installed:		
bfd.lib32_64_n9000 2.0.0.0-10.4.3		
Complete!		
Install operation 14 completed successfully at Wed Mar 13 12:30:23 2024.		
[#####] 100%		

Grouperase command for deleting groups

Delete the groups or all the RPM members of the group using the **dnf grouperase** command.

```
bash-4.4# dnf grouperase 13
Dependencies resolved.
```

Group	Packages
Marking packages as removed by the group: @L3	bfd

Package	Arch	Version
Repository		Size
Removing: bfd	lib32_64_n9000	2.0.0.0-10.4.3
	@System	2.3 M

Transaction Summary			
Remove 1 Package			
Freed space: 2.3 M			
Is this ok [y/N]: y			
Running transaction check			
Transaction check succeeded.			
Running transaction test			
Transaction test succeeded.			
Running transaction			
Preparing :			
1/1			
Running scriptlet: bfd-2.0.0.0-10.4.3.lib32_64_n9000			
starting pre-remove package version mgmt for bfd			
pre-remove for bfd complete			
Erasing : bfd-2.0.0.0-10.4.3.lib32_64_n9000			
1/1			
Running scriptlet: bfd-2.0.0.0-10.4.3.lib32_64_n9000			
1/1			
starting post-remove package version mgmt for bfd			
post-remove for bfd complete			
Verifying : bfd-2.0.0.0-10.4.3.lib32_64_n9000			
1/1			
Removed:			
bfd.lib32_64_n9000 2.0.0.0-10.4.3			Complete!
Install operation 11 completed successfully at Fri Mar 8 12:38:41 2024.			
[#####] 100%			

```
bash-4.4#
```

Find repositories

The **dnf repolist all** command lists the repositories that the switch has along with the number of RPMs it has to those repositories.

Installed DNF version

```
bash-4.3# dnf repolist all

Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
protect-packages
groups-repo

localdb | 1.1 kB 00:00 ...
patching | 951 B 00:00 ...
thirdparty | 951 B 00:00 ...
repo id | 951 B 00:00 ...
repo name
groups-repo status
Groups-RPM Database enabled: 37
localdb Local RPM Database enabled: 6
patching Patch-RPM Database enabled: 0
thirdparty Thirdparty RPM Database enabled: 0
open-nxos open-nxos disabled
repolist: 43
```

Installed DNF version

To view the installed version of DNF use the **dnf --version** command.

```
dnf --version

3.4.3
Installed: rpm-5.4.14-r0.0.x86_64 at 2018-06-02 13:04
Built : Wind River <info@windriver.com> at 2018-04-27 08:36
Committed: Wind River <info@windriver.com> at 2018-04-27

Installed: yum-3.4.3-r9.0.x86_64 at 2018-06-02 13:05
Built : Wind River <info@windriver.com> at 2018-04-27 08:36
Committed: Wind River <info@windriver.com> at 2018-04-27
```

Mapping of NX-OS commands to the DNF commands

See the table for mapping the NX-OS commands to the DNF commands:

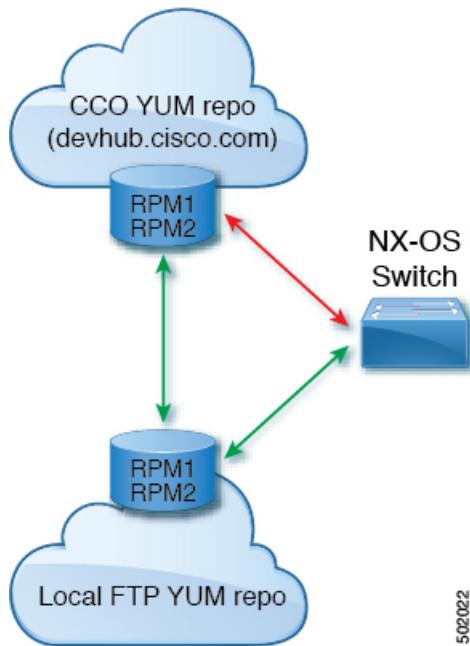
Table 5: Patching command reference

NX-OS Commands	DNF Commands
show install inactive	dnf list --patch-only available
show install active	dnf list --patch-only installed
show install committed	dnf list --patch-only committed
show install packages	dnf list --patch-only
show install pkg-info	dnf info --patch-only
show install log	dnf history --show-patch-log where log_cmd: <ul style="list-style-type: none"> • opid= - Log that is specific to an operation ID. • last - Shows the latest operation log. • reverse – Shows the log in reverse order. • detail – Show detailed log. • from= - Shows logging from a specific operation ID.
clear install log	dnf history --clear-patch-log= where clear_log_cmd: <ul style="list-style-type: none"> • all - Clears the complete log. • - Clears the logs above this operation ID.
install add	dnf install --add bootflash:/
install remove	dnf install --remove
install remove inactive	dnf install --remove all
install activate	dnf install --no-persist --nocommit Note By default, all packages are activated and committed.
install deactivate	dnf erase --nocommit Note By default, all packages are deactivated and committed.
install commit	dnf install --commit
Install commit	dnf install --commit all

Configure an FTP server and set up a local FTP YUM repository

For setting up a local FTP YUM repository, you have to first create an FTP server, create a local FTP YUM repository, and configure the NX-OS switch to reach the FTP server as outlined in this illustration.

Figure 2: Configure an FTP server and set up a local FTP YUM repository



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Note For NX-OS Release 10.1(1), visit <https://devhub.cisco.com/artifactory/open-nxos/10.1.1/> for **open-nxos** repository.

Create an FTP server on Red Hat Enterprise Linux 7 (RHEL7) Virtual Machine

Complete the following steps to create an FTP server on Red Hat Enterprise Linux 7 (RHEL7) Virtual Machine (VM):

Procedure

- Step 1** Install vsftpd, an FTP server, using the **dnf install vsftpd** command.
- Step 2** Start the FTP server using the **systemctl start vsftpd** command.
- Step 3** Check the status of the FTP server using the **systemctl status vsftpd** command.
- Step 4** Provide access to the FTP services from the external systems and open port 21 using the **firewall-cmd --zone=public --permanent --add-port=21/tcp** command.
- Step 5** Add the FTP service using the **firewall-cmd --zone=public --permanent --add-service=ftp** command.

Step 6 Reload the server using the **firewall-cmd --reload** command.

Step 7 Host a file in the FTP server (for example, test.txt) and attempt Wget of that file using the **wget ftp://< ip of FTP server > / test.txt** command.

Note

The **/var/ftp/** directory is the default home directory of the FTP server.

Create a local FTP YUM repository

Complete the steps provided in this procedure to synchronize the external repository RPMs to the FTP server and create a local FTP YUM repository.

Procedure

Step 1 Create a repository file using the **touch/etc/yum.repos.d/local.repo** command.

Create a repository file under **/etc/yum.repos.d/** , for example, creates **local.repo** repository and adds the base URL.

Example:

```
bash-4.3# touch /etc/yum.repos.d/local.repo
```

Step 2 Edit the repository file and copy the localrepo details using the **vim /etc/yum.repos.d/local.repo** command.

Note

Modify the base URL to the required repository URL.

Example:

```
bash-4.3# vim /etc/yum.repos.d/local.repo
```

```
[localrepo]
name=localrepo
baseurl=
https://devhub.cisco.com/artifactory/open-nxos/7.0-3-I2-1/x86_64/
enabled=1
gpgcheck=0
sslverify=0
```

Step 3 Verify the local repository data to proceed further using the **cat /etc/yum.repos.d/local.repo** command.

Example:

```
bash-4.3# cat /etc/yum.repos.d/local.repo
```

```
[localrepo]
name=localrepo
baseurl=
https://devhub.cisco.com/artifactory/open-nxos/7.0-3-I2-1/x86_64/
enabled=1
gpgcheck=0
sslverify=0
```

Step 4 Check the reachability of the repository using the **dnf repolist** command.

Configure a switch to reach an FTP server

Example:

```
bash-4.3# dnf repolist
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
* base: mirror.dhakacom.com
* extras: mirror.dhakacom.com
* updates: mirror.dhakacom.com
repo id repo name status
base/7/x86_64 CentOS-7 - Base 9,911
extras/7/x86_64 CentOS-7 - Extras 313
localrepo localrepo 687
updates/7/x86_64 CentOS-7 - Updates 711
repolist: 11,622
```

Step 5 Synchronize all the packages from the external repository to the FTP server home directory using the **nohup reposync -r <repo-name mentioned in the local.repo> -p <directory path to sync> &** command.

Example:

```
nohup reposync -r localrepo -p /var/ftp/ &
```

This command creates a directory with the name **local.repo** inside **/var/ftp/** and downloads all the packages from **devhub.cisco.com** to the directory.

Step 6 Check the status of the synchronization using the **tail -f nouhup.out** command.

- ls /var/ftp/localrepo**
- cd /var/ftp/localrepo/ && createrepo .**

Configure a switch to reach an FTP server

Complete the following steps to configure a switch to reach an FTP server:

Procedure

Step 1 Log in as a sudo user using the **run bash sudo su** command.

Step 2 Verify that the FTP server can be reached using the **ip netns exec management ping <ip_address>** command.

This command checks the reachability of the FTP server address from the switch using the **ping** command.

Step 3 Create a repository file using the **touch/etc/yum/repos.d/ftp.repo** command.

This command creates a repository file under **/etc/yum/repos.d/**, for example, it creates the **ftp.repo** repository.

Example:

```
bash-4.3# touch /etc/yum/repos.d/ftp.repo
```

Step 4 Edit the repository file and copy the ftp repo details using the **vim /etc/yum/repos.d/ftp.repo** command.

Note

Modify the base URL to the required ftp server IP.

Example:

```
bash-4.3# vim /etc/yum/repos.d/ftp.repo
```

```
[ftp]
name=ftp
baseurl=
ftp://198.51.100.1/localrepo/
enabled=1
gpgcheck=0
sslverify=0
```

Step 5 Create a repository file on the switch with the FTP server address as the URL using the **cat /etc/yum/repos.d/ftp.repo** command.

Example:

```
bash-4.3# cat /etc/yum/repos.d/ftp.repo
[ftp]
name=ftp
baseurl=ftp://198.51.100.1/localrepo/
enabled=1
gpgcheck=0
sslverify=0
```

Step 6 To use the Bash shell prompt, run the **ip netns exec management bash** command.

Step 7 Check the reachability of the newly created repository using the **dnfrepolist** command.

Example:

```
bash-4.3# dnf repolist
Loaded plugins: downloadonly, importpubkey, localrpmDB, patchaction, patching,
: protect-packages
groups-repo | 1.1 kB 00:00 ...
localdb | 951 B 00:00 ...
patching | 951 B 00:00 ...
thirdparty | 951 B 00:00 ...
thirdparty/primary | 758 B 00:00 ...
thirdparty 1/1
repo id repo name status
groups-repo Groups-RPM Database 37
localdb Local RPM Database 0
patching Patch-RPM Database 0
thirdparty Thirdparty RPM Database 1
ftp ftp 686
repolist: 724
```

Step 8 List the available packages in the new repository using the **dnf list available** command.

Create user roles for install operation

The **install** command is only available to the users of admin role. The **install** command can be available to a user by RBAC. For more information about RBAC configuration guidelines, see [Guidelines and Limitations for User Accounts and RBAC](#).

Compacting Cisco NX-OS Software Images



Note This feature is deprecated from Cisco NX-OS Release 10.5(2)F

Cisco NX-OS software image compaction reduces the size of the image file before completing a copy request. Use SCP, HTTP, or HTTPS as the source and bootflash or USB as the destination. The following example uses SCP and bootflash:

```
switch# copy scp://user@scpserver.cisco.com//download/nxos64.10.1.1.bin
bootflash:nxos64.10.1.1.bin compact vrf management use-kstack

user1@10.65.42.196's password:
nxos64.10.1.1.bin 100% 1501MB 8.4MB/s 02:58
Copy complete, now saving to disk (please wait)...
Copy complete.
```

The **compact** keyword compacts the NX-OS image before copying the file to the supervisor module.



Note Software image compaction is only supported on SCP, HTTP, or HTTPS. If you attempt compaction with any other protocol, the system returns the following error:

```
Compact option is allowed only with source as scp/http/https and destination
as bootflash or usb
```



Note Compacted images are not supported with LXC boot mode.



Note Software image compaction is only supported on Cisco Nexus 9300-series platform switches.