



## Optionality in Cisco NX-OS Software

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This chapter describes optionality in Cisco NX-OS software.

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## Optionality in Cisco NX-OS Software

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

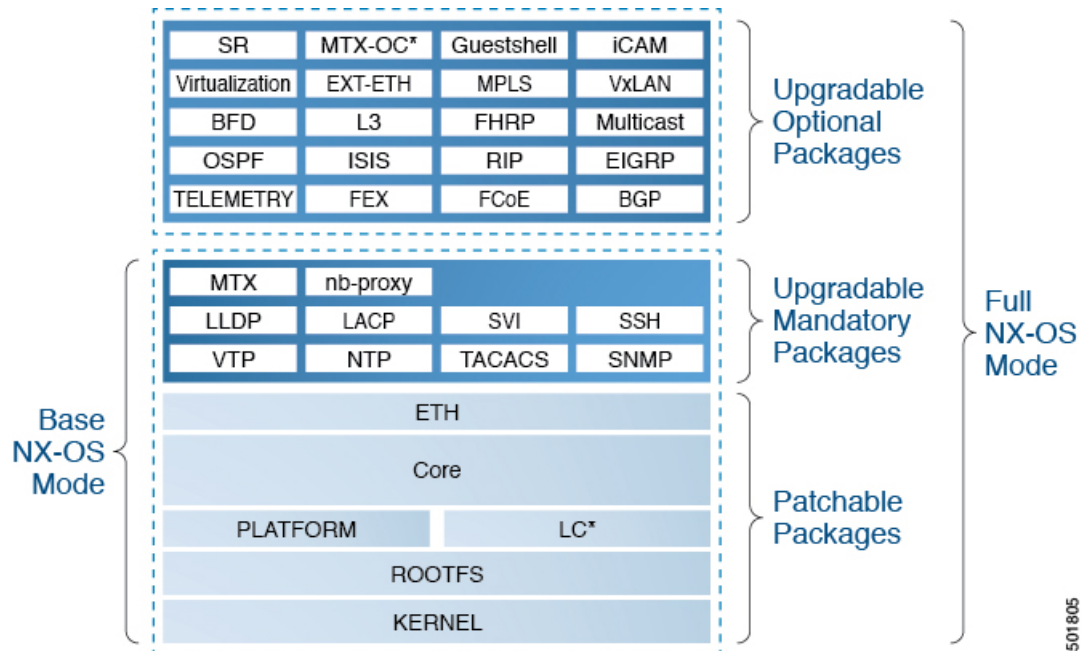
The advantages for using modular Cisco NX-OS software are:

- Lean NX-OS software
- Asynchronous delivery of the features and the fixes: Quick fixes are provided that are independent of the releases, including new features.
- Reduced footprint of binaries and libraries at run time

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

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

Figure 1: Optionality in Cisco NX-OS Software



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- 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 plugin manager. There is no change in the user behavior as compared to the previous releases.

## Using Modular Packages

The Cisco NX-OS software image is traditionally constructed with the packaging that forms a Cisco Linux distribution. It makes upgrading certain packages difficult as each package is large in size.

This section describes a new package management for the Cisco NX-OS software image. Beginning with Cisco 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.



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

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### RPM and YUM

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.

YUM (Yellowdog Updater, Modified) 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. YUM 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, YUM works with the repositories that are collections of the packages and they are typically accessible over a network connection.

## List of Cisco NX-OS Software Packages

The Cisco NX-OS software image consists of the third party packages.

- Upgradable optional packages
- Upgradable mandatory packages
- Patchable packages

### Upgradable Optional Packages

Each upgradable optional package has the following important characteristics:

- It can be independently upgraded.

- These packages are optional, for example, these packages can be removed or uninstalled at runtime. The removal of the upgradable optional packages does not affect bringing-up the system and it does not affect any other functionality on the switches.



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**Note** Use all the APIs that are exported by the optional package only after detecting the presence of the feature.

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- These packages can be upgraded, downgraded, activated, or deactivated.

The upgradable optional packages contain some of the following items:

- BGP
- BFD
- EIGRP
- Ext-Eth
- FCoE
- FEX
- FHRP
- Guestshell
- ISIS
- L3
- MPLS
- MTX-OC
- Multicast
- OPENSSSH
- OSPF
- RIP
- SR
- TACACS+
- Telemetry
- Virtualization
- VXLAN

### Upgradable Mandatory Packages

The mandatory packages can only be upgraded or downgraded, but they cannot be deactivated. The status of the package can be active/install or inactive/uninstall. The upgradable mandatory packages contain the following:

- LACP
- LLDP
- MTX
- nb-proxy
- NTP
- SNMP
- SSH
- SVI
- TACACS
- VTP

#### Patchable Packages

The patchable packages contain the following:

- Kernel
- LC
- Network-infra (aka Eth)
- Platform
- Rootfs
- System-infra (aka Core)

## Booting the NX-OS Image in Base or Full Mode

You can now 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, see the following steps:

- 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 CLIs for Feature RPM Operation section.

## Support for ISSU

Beginning with Cisco NX-OS Release 9.2(1), there is no change in the ISSU on Cisco Nexus 9000 Series switches.

## Information About RPMs

RPMs can be upgraded or downgraded to a new software version using NXOS install commands or by using YUM commands. An upgradable RPM can be optional or mandatory.

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

## Optional RPMs and Their Associated Features

The optional RPMs are the RPMs that can be installed to enable the features without affecting the native NXOS 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 **yum** or **install** CLI commands from the switch.

See the following list of the optional RPMs and their associated features:

*Table 1: List of Optional RPMs and Their Associated Features*

Package Name	Associated Features
BGP	feature bgp
BFD	feature bfd
Container-tracker	feature container-tracker
EIGRP	feature eigrp
Ext-Eth	<ul style="list-style-type: none"> <li>• feature openflow</li> <li>• feature evb</li> <li>• feature imp</li> <li>• feature netflow</li> <li>• feature sla_sender</li> <li>• feature sla_responder</li> <li>• feature sla_twamp-server</li> <li>• feature sflow</li> </ul>
FCoE	<ul style="list-style-type: none"> <li>• feature-set fcoe</li> <li>• feature-set fcoe-npv</li> </ul>

Package Name	Associated Features
FEX	feature-set fex
FHRP	<ul style="list-style-type: none"> <li>• feature hsrp</li> <li>• feature vrrpv3</li> </ul>
iCAM	feature icam
ISIS	feature isis
MPLS	<ul style="list-style-type: none"> <li>• feature mpls segment-routing</li> <li>• feature mpls evpn</li> </ul>
Multicast	<ul style="list-style-type: none"> <li>• feature pim</li> <li>• feature pim6</li> <li>• feature msdp</li> <li>• feature ngmvpn</li> </ul>
OSPF	<ul style="list-style-type: none"> <li>• feature ospf</li> <li>• feature ospfv3</li> </ul>
RIP	feature rip
Services	feature catena
SR	feature mpls segment-routing traffic-engineering
TELEMETRY	feature telemetry
Virtualization	NA
VXLAN	<ul style="list-style-type: none"> <li>• feature nv overlay</li> <li>• feature fabric forwarding</li> </ul>

## Guidelines for NX-OS Feature RPM Installation

See the following NX-OS system RPM repositories that are present in the Cisco NX-OS Series switches for the RPM management.



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

Table 2: 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.
localdb	/bootflash/.rpmstore/patching/localrepo	Used for RPM persistency. When a user adds a NX-OS feature RPM as part of <b>install add</b> command, the RPM is copied to this location and it is persisted during the reloads. User has the responsibility to clean the repository.  To add a RPM to this repository, use <b>install add</b> command.  To remove a RPM from this repository, use <b>install remove</b> command.  YUM commands can be used to populate the repository too.  The maximum space for the repository is 200Mb along with the patching repository for Cisco Nexus 9000 Series switches except Cisco Nexus 3000 Series switches. For Cisco Nexus 3000 Series switches, the maximum space for the repository is 20 Mb only.
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. YUM commands or **install** command can be used for the installation or the removal of these RPMs.

The following 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.



## List of NX-OS Mandatory RPMs That Can Be Patched

See the list of the NX-OS mandatory RPMs that can be patched.

*Table 3: List of the NX-OS Mandatory RPMs that can be Patched*

Serial Number	RPM Name	Description
1	Core	NX-OS infrastructure software.
2	Platform	Cisco NX-OS platform specific software and some Linux modified software.
3	Eth	Cisco NX-OS features that are tightly coupled with the infrastructure.
4	Linecard	Cisco NX-OS arm based line cards in Cisco Nexus 9000 platform switches and x86_64 line cards in Cisco Nexus 9508 platform switches with -R series line cards.
5	Linecard 2	Cisco NX-OS x85_64 line card in Cisco Nexus 9000 Series switches.
6	TOR	Cisco NX-OS Top of Rack switches.

## Using Install CLIs for Feature RPM Operation

See the following reference table for using install CLIs for the feature RPM operations:

Table 4: Reference for Install CLIs for the Feature RPM Operations

CLI	Description
<b>install reset</b>	<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 <b>install reset</b> command also performs write erase operation. The following message is displayed at the prompt:</p> <pre>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>
<b>install reset nxos base</b>	This operation installs NXOS 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.
<b>install reset nxos full</b>	This operation installs NXOS 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).
<b>install add &lt;&gt;</b>	Adds an RPM file to respective repository and updates the repository ( <b>patch/feature/third-party</b> ).
<b>install activate &lt;rpm name&gt;</b>	Installs an RPM that is present in the repository.
<b>install commit &lt;rpm name&gt;</b>	Used for the patch RPMs. Makes the patch persist during reload.
<b>install deactivate &lt;rpm name&gt;</b>	Un-installs an RPM.
<b>install remove &lt;rpm name&gt;</b>	Removes an RPM file from the repository and updates the repository.
<b>sh install active</b>	Displays the list of the installed RPMs in the system apart from base rootfs RPMs. (features/patch/third-party).

CLI	Description
<b>sh install inactive</b>	Displays the list of the RPMs that are present in the repository but they are not installed.
<b>sh install packages</b>	Lists all the RPMs that are installed including rootfs RPMs.

## Using Install CLIs for Digital Signature Support

See the following section for more information on using the install CLIs for digital signature support.

### Procedure

**Step 1** switch# **install add bootflash:<keyfile> gpg-key**

#### Example:

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

Cisco release RPMs are signed with Cisco 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** switch#**install verify package <package-name>** OR switch#**install verify bootflash:<RPM file>**

#### Example:

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

```
RSA signed
switch#
```

Displays the CLI to verify whether the RPM file is a signed or non-signed file.

**Step 3** **show install packages**

Displays all packages with the signed or unsigned information.

#### Example:

```
switch# sh 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-udhcp.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
cgrouplite.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+gitaa8187dbd3b7ad67d8e5e3a15115d3eef43a7ed1-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#

```

## Querying All Installed RPMs

Complete the following step to query all the installed RPMs:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p><b>show install packages</b></p> <p><b>Example:</b></p> <pre> switch# <b>show install packages</b>  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 </pre>	Queries all the installed RPMs.

	Command or Action	Purpose
	<pre> 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 cgrouper-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-gitaad8187dbd3b7ad67d8e5e3a15115d3eef43a7ed1-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# </pre>	

## Querying Only Installed Featured NX-OS RPMs

Complete the following step to query only the installed featured NX-OS RPMs:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<pre> show install packages   grep &lt;lib32_n9000&gt; </pre> <p><b>Example:</b></p>	Queries only the installed featured NX-OS RPMs.

	Command or Action	Purpose
	<pre> switch# show install packages   grep lib32_n9000 core.lib32_n9000 2.0.0.0-9.2.1          installed Signed eth.lib32_n9000 2.0.0.0-9.2.1          installed Signed lACP.lib32_n9000 2.0.0.0-9.2.1          installed Signed linecard2.lib32_n9000 2.0.0.0-9.2.1          installed Signed lldp.lib32_n9000 2.0.0.0-9.2.1          installed Signed mtx-device.lib32_n9000 2.0.0.0-9.2.1          installed Signed mtx-grpc-agent.lib32_n9000 2.0.0.0-9.2.1          installed Signed mtx-infra.lib32_n9000 2.0.0.0-9.2.1          installed Signed mtx-netconf-agent.lib32_n9000 2.0.0.0-9.2.1          installed Signed mtx-restconf-agent.lib32_n9000 2.0.0.0-9.2.1          installed Signed mtx-telemetry.lib32_n9000 2.0.0.0-9.2.1          installed Signed ntp.lib32_n9000 2.0.0.0-9.2.1          installed Signed nxos-ssh.lib32_n9000 2.0.0.0-9.2.1          installed Signed platform.lib32_n9000 2.0.0.0-9.2.1          installed Signed snmp.lib32_n9000 2.0.0.0-9.2.1          installed Signed svi.lib32_n9000 2.0.0.0-9.2.1          installed Signed tacacs.lib32_n9000 2.0.0.0-9.2.1          installed Signed tor.lib32_n9000 2.0.0.0-9.2.1          installed Signed vtp.lib32_n9000 2.0.0.0-9.2.1          installed Signed </pre>	

## Querying Only Installed Third Party RPMs

Complete the following step to query only the installed third party RPMs:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>show install packages   grep &lt;x86_64&gt;</b>  <b>Example:</b>  <pre>switch# show install packages   grep x86_64 attr.x86_64 2.4.47-r0.0                installed         Unsigned aufs-util.x86_64 3.14+git0+b59a2167a1-r0.0  installed         Unsigned base-passwd.x86_64 3.5.29-r0.1.0            installed         Unsigned 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 cgroup-lite.x86_64 1.1-r0.0                 installed         Unsigned</pre>	Queries the installed third-party RPMs.  Queries all the installed RPMs.

## Installing the RPMs Using One Step Procedure

The CLIs for both install and upgrade RPMs are the same. See the following step to install the RPMs using one step procedure:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>install add &lt;rpm&gt; activate</b>  <b>Example:</b>  <pre>switch# install add bootflash:chef.rpm activate</pre>	Installs and activates the RPM.

	Command or Action	Purpose
	<pre>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</pre>	

### 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
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)#
```

## Installing the RPMs Using Two Steps Procedure

The CLIs for both install and upgrade RPMs are the same. See the following steps to install the RPMs using two steps procedure:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<pre>install add &lt;rpm&gt;  Example:  switch# install add</pre>	Installs the RPM.



	Command or Action	Purpose
	<pre>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  switch(config)# sh install inactive   grep vxlan  vxlan-2.0.1.0-9.2.1.lib32_n9000</pre>	
<b>Step 2</b>	<p><b>install activate &lt;rpm&gt;</b></p> <p><b>Example:</b></p>	Activates the RPM.

### Example

```
switch#install activate vxlan

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

switch# show install active | grep vxlan

vxlan-2.0.0.0-9.2.1.lib32_n9000

switch# sh install inactive | grep vxlan

switch#
```

## Upgrading the RPMs Using One Step

The CLIs for both install and upgrade RPMs are the same. See the following steps to upgrade the RPMs:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p><b>install add &lt;rpm&gt;activate upgrade</b></p> <p><b>Example:</b></p> <pre>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%</pre>	Installs the RPM.

	Command or Action	Purpose
	<pre>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</pre>	

### 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-12.0.0.alpha.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
```

## Downgrading the RPMs

The downgrade procedure needs a special CLI attribute. See the following step to downgrade the RPMs using the one step procedure:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<pre><b>install add &lt;rpm&gt;activate downgrade</b></pre> <p><b>Example:</b></p> <pre>switch(config)# <b>install add</b> <b>bootflash:bgp-2.0.1.0-9.2.1.lib32_n9000.rpm</b> <b>activate downgrade</b></pre>	Downgrades the RPM.

	Command or Action	Purpose
	<pre>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</pre>	

### 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-12.0.0alpha.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
  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)#
```

## Removing the RPMs

See the following steps to remove the RPMs:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<pre>install remove &lt;rpm&gt;  Example:  switch(config)# show install inactive   grep vxlan</pre>	Removes the RPM from the repository.

	Command or Action	Purpose
	<pre> vxlan-2.0.0.0-9.2.1.lib32_n9000 switch(config)# <b>install remove vxlan</b>  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 </pre>	

## Format of the RPM

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

- Name: package name, for example, BGP
- Version in <x.y.x.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

See the following table for more information on the naming convention, for example, fex-2.0.0.0-9.2.1.lib32\_n9000.rpm:

**Table 5: RPM Naming Convention**

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

RPM Naming Convention	Description
<b>Example: fex-2.0.0.0-9.2.1.lib32_n9000.rpm</b>	
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.

## Rules for Managing RPM Version During Installation

The **groups-repo** and **localdb** repositories hold the NX-OS feature RPMs that should be installed during the system boot or during activation. The **localdb** repository holds all the persisted RPMs from the old installation. All inactive RPMs that are present in **localdb** that are not required any more, should be removed to make space for the new RPMs.

YUM commands or **install** commands can be used for the installation or the removal of these RPMs.

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

- The RPM files with the release number that is same as the NXOS release are the compatible files to be activated.
- Users are not allowed to add a RPM to the **localdb** repository if the RPM is present in **groups-repo** repository. Any RPM version other than the **groups-repo** repository should be allowed.
- If a RPM is present in **groups-repo** and it is also present in **localdb** repository with the same version, the RPM from the **groups-repo** repository is considered for the installation during boot time and install time. (This step is needed because in old releases, adding the base RPM allowed the installation to the **localdb** repository. This step is needed for the backward compatibility.)
- When a non-base feature RPM is added, activated, deactivated, or removed, the respective entry should be present in **inactive\_feature\_rpms.inf**.
- When a base RPM is deactivated or activated, the entry should be present in **/bootflash/.rpmstore/nxos\_preinstall\_rpms\_removed** and **/bootflash/.rpmstore/nxos\_rpms\_persisted** respectively.
- If a base RPM entry is not present in the **/bootflash/.rpmstore/nxos\_rpms\_persisted** file, any RPM version present in the **groups-repo** or **localdb** repository should not be considered for the installation during boot time. In this case, the removed entry should be part of **/bootflash/.rpmstore/nxos\_preinstall\_rpms\_removed**.




---

**Note** Avoid manually copying the RPMs to the system repositories. Instead, use the **install** or YUM commands.

---

## Information About YUM Commands

See the following sections for more information about YUM commands.




---

**Note** YUM commands do not support ctrl+c. Install commands do support ctrl+c. If YUM commands are aborted using ctrl+c, manual cleanup must be performed using `"/isan/bin/patching_utils.py --unlock"`.

---

## Performing Package Operations Using the YUM Commands

See the following sections for performing package operations using the YUM commands:




---

**Note** YUM commands are accessed only from the BASH shell on the box and they are not allowed from the NXOS VSH terminal.

---




---

**Note** Make sure that as a sudo user, you have access to the super user privileges.

---

## Finding the Base Version RPM of the Image

Use the `ls /rpms` command to find the base version RPM of the image. The base RPM version is the pre-installed RPM that is archived in the system image.

```
#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                mtx-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           mtx-grpc-agent-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                 mtx-infra-2.0.0.0-9.2.1.lib32_n9000.rpm
            services-2.0.0.0-9.2.1.lib32_n9000.rpm
```

## Checking the List of the Installed RPMs

Use the **yum list installed** command to query the feature and third party RPMs and grep a specific RPM. See the following example for feature RPMs:

```
bash-4.2# yum 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
...
```

## Getting Details of the Installed RPMs

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

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

```

## Installing the RPMs

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

```

bash-4.3# yum 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
| 1.1 kB    00:00 ...
localdb
| 951 B    00:00 ...
localdb/primary
| 886 B    00:00 ...
localdb
| 1/1
patching
| 951 B    00:00 ...
thirdparty
| 951 B    00:00 ...

Setting up Install 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 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!

See the following example for installing the RPMs from local bootflash:

```
sudo yum install /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 ...

```

```

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

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!

See the following example for installing the RPM if it is available in a repository:

```
yum install eigrp
```

## Upgrading the RPMs

See the following example for upgrading the RPMs from a remote server (that is reachable in the network):

```

bash-4.3# yum 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	Repository	Arch	Version	Size
---------	------------	------	---------	------

```

Updating:
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
-----
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!

See the following example for upgrading the RPMs from local bootflash:

```
sudo yum 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	

## 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!

See the following example for upgrading the RPMs if it is available in any repository:

```
yum upgrade eigrp
```

## Downgrading the RPMs

See the following example for downgrading the RPMs from a remote server (that is reachable in the network):

```
sudo yum 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/primary  | 951 B    00:00 ...
```

```

localdb          | 1.3 kB    00:00 ...
                2/2
patching
thirdparty      | 951 B     00:00 ...
                | 951 B     00:00 ...

```

```

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	Size	Arch	Repository
Downgrading:				
vxlan	2.0.0.0-9.2.1	1.6 M	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!

See the following example for downgrading the RPMs from local bootflash:

```
yum downgrade /bootflash/eigrp-2.0.0-9.2.1.lib32_n9000.rpm
```

See the following example for downgrading the RPMs if it is available in any repository:

```
yum downgrade eigrp
```

## Deleting the RPMs

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

```
bash-4.2# sudo yum 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	Repository	Version	Size
Removing:				
vxlan	lib32_n9000	@/vxlan-2.0.1.0-9.2.1.lib32_n9000	2.0.1.0-9.2.1	6.4 M
Transaction Summary				

```
Remove      1 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 YUM Groups

The support for YUM groups is part of the package management. It simplifies the management of the packages for the administrators and it provides greater flexibility.

The administrators can group a list of packages (RPMs) into a logical group and they can perform various operations. YUM supports the following group commands:

- grouplist
- groupinfo
- groupinstall
- groupremove
- groupupdate

YUM groups can be broadly classified as L2, L3, routing, and management.

### Using the grouplist Command

In Linux, number of packages are bundled to particular group. Instead of installing individual packages with yum, 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 **yum grouplist** command:

```
bash-4.2# sudo yum grouplist

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

localdb                | 1.1 kB    00:00 ...
patching               | 951 B     00:00 ...
thirdparty            | 951 B     00:00 ...
groups-repo/group     | 951 B     00:00 ...
Installed Groups:
  L2
  L3
  management
Available Groups:
  routing
Done

bash-4.3$
```

## Using the groupmembers Command

Use **yum groupinfo** command to display the description and the contents of a package group. The command lists out the feature members of the group.

```
bash-4.2# sudo yum groupinfo l2

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

localdb                | 1.1 kB    00:00 ...
patching               | 951 B     00:00 ...
thirdparty             | 951 B     00:00 ...
                       | 951 B     00:00 ...

Group: L2
Mandatory Packages:
  lacp
  lldp
  svi
  vtp
```

## Using the groupinstall Command

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

```
bash-4.2# sudo yum groupinstall routing

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 Group Process
Package ospf-2.0.0.0-9.2.1.lib32_n9000 already installed and latest version
Resolving Dependencies
--> Running transaction check
---> Package bgp.lib32_n9000 0:2.0.0.0-9.2.1 will be installed
```



```

---> Package eigrp.lib32_n9000 0:2.0.0.0-9.2.1 will be installed
---> Package isis.lib32_n9000 0:2.0.0.0-9.2.1 will be installed
---> Package rip.lib32_n9000 0:2.0.0.0-9.2.1 will be installed
--> Finished Dependency Resolution

```

Dependencies Resolved

Package	Arch	Repository	Version Size
Installing:			
bgp	lib32_n9000	groups-repo	2.0.0.0-9.2.1 2.4 M
eigrp	lib32_n9000	groups-repo	2.0.0.0-9.2.1 428 k
isis	lib32_n9000	groups-repo	2.0.0.0-9.2.1 1.2 M
rip	lib32_n9000	groups-repo	2.0.0.0-9.2.1 214 k
Transaction Summary			

Install 4 Packages

Total download size: 4.2 M

Installed size: 19 M

Is this ok [y/N]: y

Downloading Packages:

Total

132 MB/s | 4.2 MB 00:00

Running Transaction Check

Running Transaction Test

Transaction Test Succeeded

Running Transaction

Installing : rip-2.0.0.0-9.2.1.lib32\_n9000

1/4

starting pre-install package version mgmt for rip

pre-install for rip complete

starting post-install package version mgmt for rip

post-install for rip complete

Installing : isis-2.0.0.0-9.2.1.lib32\_n9000

2/4

starting pre-install package version mgmt for isis

pre-install for isis complete

starting post-install package version mgmt for isis

post-install for isis complete

Installing : eigrp-2.0.0.0-9.2.1.lib32\_n9000

3/4

starting pre-install package version mgmt for eigrp

pre-install for eigrp complete

starting post-install package version mgmt for eigrp

post-install for eigrp complete

Installing : bgp-2.0.0.0-9.2.1.lib32\_n9000

4/4

starting pre-install package version mgmt for bgp

pre-install for bgp complete

starting post-install package version mgmt for bgp

```

post-install for bgp complete

Installed:
  bgp.lib32_n9000 0:2.0.0.0-9.2.1          eigrp.lib32_n9000 0:2.0.0.0-9.2.1
  isis.lib32_n9000 0:2.0.0.0-9.2.1      rip.lib32_n9000
0:2.0.0.0-9.2.1

Complete!

```

## Using the groupupdate Command

Use the **yum groupupdate** command to update any existing installed group packages.

```

bash-4.3# yum groupupdate routing

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

localdb | 1.1 kB 00:00 ...
localdb/primary | 951 B 00:00 ...
localdb | 1.9 kB 00:00 ...
patching 6/6
thirdparty | 951 B 00:00 ...

Setting up Group Process
Resolving Dependencies
--> Running transaction check
---> Package bgp.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
---> Package bgp.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
---> Package eigrp.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
---> Package eigrp.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
---> Package isis.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
---> Package isis.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
---> Package ospf.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
---> Package ospf.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
---> Package rip.lib32_n9000 0:2.0.0.0-9.2.1 will be updated
---> Package rip.lib32_n9000 0:2.0.1.0-9.2.1 will be an update
--> Finished Dependency Resolution

Dependencies Resolved


```

Package	Arch	Repository	Size	Version
Updating:				
bgp	lib32_n9000	localdb	2.4 M	2.0.1.0-9.2.1

eigrp	lib32_n9000			2.0.1.0-9.2.1
		locald	428 k	
isis	lib32_n9000			2.0.1.0-9.2.1
		local	1.2 M	
ospf	lib32_n9000			2.0.1.0-9.2.1
		localdb	2.8 M	
rip	lib32_n9000			2.0.1.0-9.2.1
		localdb	214 k	

## Transaction Summary

Upgrade 5 Packages

Total download size: 7.0 M

Is this ok [y/N]: y

Downloading Packages:

Total

269 MB/s | 7.0 MB 00:00

Running Transaction Check

Running Transaction Test

Transaction Test Succeeded

Running Transaction

Updating : eigrp-2.0.1.0-9.2.1.lib32\_n9000

1/10

starting pre-install package version mgmt for eigrp

pre-install for eigrp complete

starting post-install package version mgmt for eigrp

post-install for eigrp complete

Updating : ospf-2.0.1.0-9.2.1.lib32\_n9000

2/10

starting pre-install package version mgmt for ospf

pre-install for ospf complete

starting post-install package version mgmt for ospf

post-install for ospf complete

Updating : rip-2.0.1.0-9.2.1.lib32\_n9000

3/10

starting pre-install package version mgmt for rip

pre-install for rip complete

starting post-install package version mgmt for rip

post-install for rip complete

Updating : isis-2.0.1.0-9.2.1.lib32\_n9000

4/10

starting pre-install package version mgmt for isis

pre-install for isis complete

starting post-install package version mgmt for isis

post-install for isis complete

Updating : bgp-2.0.1.0-9.2.1.lib32\_n9000

5/10

starting pre-install package version mgmt for bgp

pre-install for bgp complete

starting post-install package version mgmt for bgp

post-install for bgp complete

Cleanup : bgp-2.0.0.0-9.2.1.lib32\_n9000

6/10

Cleanup : isis-2.0.0.0-9.2.1.lib32\_n9000

7/10

```

Cleanup      : rip-2.0.0.0-9.2.1.lib32_n9000
              8/10
Cleanup      : ospf-2.0.0.0-9.2.1.lib32_n9000
              9/10
Cleanup      : eigrp-2.0.0.0-9.2.1.lib32_n9000
              10/10

Updated:
  bgp.lib32_n9000 0:2.0.1.0-9.2.1      eigrp.lib32_n9000 0:2.0.1.0-9.2.1
  isis.lib32_n9000 0:2.0.1.0-9.2.1    ospf.lib32_n9000 0:2.0.1.0-9.2.1      rip.lib32_n9000
  0:2.0.1.0-9.2.1

Complete!

```

## Using the grouperase Command

Use the `yum grouperase` command to delete the groups or all the RPM members of the group.

```

bash-4.3$ sudo yum grouperase routing

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

localdb          | 1.1 kB      00:00 ...
patching         | 951 B       00:00 ...
thirdparty      | 951 B       00:00 ...
                 | 951 B       00:00 ...

Resolving Dependencies
--> Running transaction check
---> Package bgp.lib32_n9000 0:2.0.0.0-9.2.1 will be erased
---> Package eigrp.lib32_n9000 0:2.0.0.0-9.2.1 will be erased
---> Package isis.lib32_n9000 0:2.0.0.0-9.2.1 will be erased
---> Package ospf.lib32_n9000 0:2.0.0.0-9.2.1 will be erased
---> Package rip.lib32_n9000 0:2.0.0.0-9.2.1 will be erased
--> Finished Dependency Resolution

Dependencies Resolved

```

Package	Arch	Repository	Size	Version
Removing:				
bgp	lib32_n9000	@groups-repo	11 M	2.0.0.0-9.2.1
eigrp	lib32_n9000	@groups-repo	2.0 M	2.0.0.0-9.2.1
isis	lib32_n9000	@groups-repo	5.7 M	2.0.0.0-9.2.1
ospf	lib32_n9000	@groups-repo	15 M	2.0.0.0-9.2.1

```

rip                               lib32_n9000                               2.0.0.0-9.2.1
                                     @groups-repo                               1.0 M

```

---



---

Transaction Summary

Remove 5 Packages

Installed size: 34 M

Is this ok [y/N]: y

Downloading Packages:

Running Transaction Check

Running Transaction Test

Transaction Test Succeeded

Running Transaction

Erasing : isis-2.0.0.0-9.2.1.lib32\_n9000

1/5

starting pre-remove package version mgmt for isis

pre-remove for isis complete

Erasing : ospf-2.0.0.0-9.2.1.lib32\_n9000

2/5

starting post-remove package version mgmt for isis

post-remove for isis complete

starting pre-remove package version mgmt for ospf

pre-remove for ospf complete

Erasing : eigrp-2.0.0.0-9.2.1.lib32\_n9000

3/5

starting post-remove package version mgmt for ospf

post-remove for ospf complete

starting pre-remove package version mgmt for eigrp

pre-remove for eigrp complete

Erasing : rip-2.0.0.0-9.2.1.lib32\_n9000

4/5

starting post-remove package version mgmt for eigrp

post-remove for eigrp complete

starting pre-remove package version mgmt for rip

pre-remove for rip complete

Erasing : bgp-2.0.0.0-9.2.1.lib32\_n9000

5/5

starting post-remove package version mgmt for rip

post-remove for rip complete

starting pre-remove package version mgmt for bgp

pre-remove for bgp complete

Removed:

```

  bgp.lib32_n9000 0:2.0.0.0-9.2.1      eigrp.lib32_n9000 0:2.0.0.0-9.2.1
  isis.lib32_n9000 0:2.0.0.0-9.2.1    ospf.lib32_n9000 0:2.0.0.0-9.2.1      rip.lib32_n9000
  0:2.0.0.0-9.2.1

```

Complete!

## Finding Repositories

This command lists the repositories that the switch has along with the number of RPMs it has to those repositories.

```
bash-4.3# yum 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
repo id          | 951 B    00:00 ...
repo name
status
groups-repo     Groups-RPM Database
localdb         Local RPM Database
patching        Patch-RPM Database
thirdparty      Thirdparty RPM Database
open-nxos       open-nxos
repolist: 43

```

## Finding the Installed YUM Version

See the following example for listing the installed YUM version:

```
yum --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 the NX-OS CLI to the YUM Commands

See the following table for mapping the NX-OS CLI to the YUM commands:

**Table 6: Patching Command Reference**

NX-OS CLI Commands	YUM Commands
show install inactive	yum list --patch-only available

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

## Creating 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. See RBAC configuration guidelines for the same.