



Cisco IOS XE Installation Methods

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Bundle Mode versus Install Mode

Cisco IOS XE running on IoT routers has typically made use of the Bundle boot mode. Bundle boot mode is also known as Consolidated boot, and uses a single compressed image. The typical naming convention is <product>-universalk9.<release>.SPA.bin.

This mode provides a consolidated boot process, using local (hard disk, flash) or remote (TFTP) .bin image. Booting via a .bin image means that the router would first have to uncompress the image before booting from it. This led to a longer period of time for the router to boot.

To upgrade the router to a new version of IOS XE, you would point the "boot system" to a new software image. This method is well known and details are available in your products configuration guide.

Starting with IOS XE release 17.9.1, a new boot mode called Install mode has been added to the IoT routers. Install mode uses packages loaded into bootflash, which are read by a packages.conf file. This method provides more control over the software installation process.

Install mode requires more room in bootflash: for the files. The packages are slightly larger than the .bin images, and they vary per product in size.

Installing the Software using install Commands

From Cisco IOS XE 17.9.1, Cisco IoT routers are shipped in install mode by default. Users can boot the platform, and upgrade or downgrade to Cisco IOS XE software versions using a set of **install** commands.

Restrictions for Installing the Software Using install Commands

- Install mode requires a reboot of the system.
- SMU installation was supported in both bundle boot and install mode. From Cisco IOS XE Release 17.9.x, SMU installation will be stopped if the router is booted up in bundle mode. If the router is booted up in install mode, SMU installation will keep working as it is in previous releases.

Information About Installing the Software Using install Commands

From the Cisco IOS XE 17.9.1 release, IoT routers will be shipped in install mode instead of bundle mode. So any new router from the factory will boot up in install mode.

Existing installations using previous releases of IOS XE have the option to continue to use their device in Bundle mode if they wish to. Or they can convert their device to Install mode.

Install mode is applicable to both autonomous mode and controller mode.

A new release can be installed in Install mode using vManage.

The following table describes the differences between Bundle mode and Install mode:

Table 1: Bundle Mode vs Install Mode

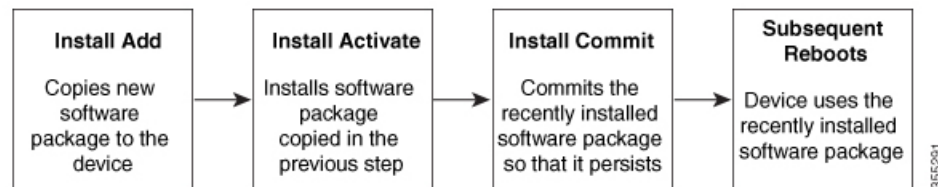
Bundle Mode	Install Mode
This mode provides a consolidated boot process, using local (hard disk, flash) or remote (TFTP) .bin image.	This mode uses the local (bootflash) packages.conf file for the boot process.
This mode uses a single .bin file.	.bin file is replaced with expanded .pkg files in this mode.
CLI: Router(config)# boot system bootflash: <filename>	CLI: #install add file bootflash: [activate commit]
To upgrade in this mode, point the boot system to the new image.	To upgrade in this mode, use the install commands.
Image Auto-Upgrade: When a new Field-Replaceable Unit (FRU) is inserted in a modular chassis, manual intervention is required to get the new FRU running with the same version as the active FRUs.	Image Auto-Upgrade: When a new FRU is inserted in a modular chassis, the joining FRU is auto-upgraded to the image version in sync with the active FRUs.
Rollback: Rollback to the previous image with multiple Software Maintenance Updates (SMUs) may require multiple reloads.	Rollback: Enables rollback to an earlier version of Cisco IOS XE software, including multiple patches in single reload.

Install Mode Process Flow

The install mode process flow comprises three commands to perform installation and upgrade of software on platforms— **install add**, **install activate**, and **install commit**.

The following flow chart explains the install process with **install** commands:

Process with Install Commit



The **install add** command copies the software package from a local or remote location to the platform. The command extracts individual components of the .package file into subpackages and packages.conf files. It also validates the file to ensure that the image file is specific to the platform on which it is being installed.

The location of the software package can be in several places, as shown in the output of the following command:

```

IR1831#install add file ?
bootflash: Package name
crashinfo: Package name
flash: Package name
ftp: Package name
http: Package name
https: Package name
pram: Package name
rcp: Package name
scp: Package name
sftp: Package name
tftp: Package name
webui: Package name
  
```

The **install activate** command performs the required validations and provisions the packages previously added using the **install add** command. It also triggers a system reload.

The **install commit** command confirms the packages previously activated using the **install activate** command, and makes the updates persistent over reloads.



Note Installing an update replaces any previously installed software image. At any time, only one image can be installed in a device.

The following set of install commands is available:

Table 2: List of install Commands

Command	Syntax	Purpose
install add	install add file <i>location:filename.bin</i>	<p>Copies the contents of the image, package, and SMUs to the software repository. File location may be local or remote. This command does the following:</p> <ul style="list-style-type: none"> Validates the file-checksum, platform compatibility checks, and so on. Extracts individual components of the package into subpackages and packages.conf Copies the image into the local inventory and makes it available for the next steps.
install activate	install activate	<p>Activates the package added using the install add command.</p> <ul style="list-style-type: none"> Use the show install summary command to see which image is inactive. This image will get activated. System reloads on executing this command. Confirm if you want to proceed with the activation. Use this command with the prompt-level none keyword to automatically ignore any confirmation prompts.

Command	Syntax	Purpose
(install activate) auto abort-timer	install activate auto-abort timer <30-1200>	<p>The auto-abort timer starts automatically, with a default value of 120 minutes. If the install commit command is not executed within the time provided, the activation process is terminated, and the system returns to the last-committed state.</p> <ul style="list-style-type: none"> • You can change the time value while executing the install activate command. • The install commit command stops the timer, and continues the installation process. • The install activate auto-abort timer stop command stops the timer without committing the package. • Use this command with the prompt-level none keyword to automatically ignore any confirmation prompts. • This command is valid only in the three-step install variant.
install commit	install commit	<p>Commits the package activated using the install activate command, and makes it persistent over reloads.</p> <ul style="list-style-type: none"> • Use the show install summary command to see which image is uncommitted. This image will get committed.

Command	Syntax	Purpose
install abort	install abort	<p>Terminates the installation and returns the system to the last-committed state.</p> <ul style="list-style-type: none"> • This command is applicable only when the package is in activated status (uncommitted state). • If you have already committed the image using the install commit command, use the install rollback to command to return to the preferred version.
install remove	install remove {file <filename> inactive}	<p>Deletes inactive packages from the platform repository. Use this command to free up space.</p> <ul style="list-style-type: none"> • file: Removes specified files. • inactive: Removes all the inactive files.
install rollback to	install rollback to {base label committed id}	<p>Rolls back the software set to a saved installation point or to the last-committed installation point. The following are the characteristics of this command:</p> <ul style="list-style-type: none"> • Requires reload. • Is applicable only when the package is in committed state. • Use this command with the prompt-level none keyword to automatically ignore any confirmation prompts. <p>Note If you are performing install rollback to a previous image, the previous image must be installed in install mode. Only SMU rollback is possible in bundle mode.</p>

Command	Syntax	Purpose
install deactivate	install deactivate file <filename>	Removes a package from the platform repository. This command is supported only for SMUs. <ul style="list-style-type: none"> Use this command with the prompt-level none keyword to automatically ignore any confirmation prompts.

The following show commands are also available:

Table 3: List of show Commands

Command	Syntax	Purpose
show install log	show install log	Provides the history and details of all install operations that have been performed since the platform was booted.
show install package	show install package <filename>	Provides details about the .pkg/.bin file that is specified.
show install summary	show install summary	Provides an overview of the image versions and their corresponding install states.
show install active	show install active	Provides information about the active packages.
show install inactive	show install inactive	Provides information about the inactive packages.
show install committed	show install committed	Provides information about the committed packages.
show install uncommitted	show install uncommitted	Provides information about uncommitted packages.
show install rollback	show install rollback {point-id label}	Displays the package associated with a saved installation point.
show version	show version [rp-slot] [installed [user-interface] provisioned running]	Displays information about the current package, along with hardware and platform information.

Booting the Platform in Install Mode

You can install, activate, and commit a software package using a single command (one-step install) or multiple separate commands (three-step install).

If the platform is working in bundle mode, the one-step install procedure must be used to initially convert the platform from bundle mode to install mode. Subsequent installs and upgrades on the platform can be done with either one-step or three-step variants.

You can see how your device is set up to boot by using the **show romvar** and **show bootvar** commands.

```
Router#show romvar
ROMMON variables:
PS1 = rommon ! >
CM = IR1100
DEVICE_MANAGED_MODE = autonomous
LICENSE_SUITE =
RET_2_RTS =
THRPUT = 250
BOOT = flash:packages.conf,12;
LICENSE_BOOT_LEVEL = network-advantage,all:IR1101;
BSI = 0
RET_2_RCALTS =
RANDOM_NUM = 212626522
Router#

Router#show bootvar
BOOT variable = flash:packages.conf,12;
CONFIG_FILE variable does not exist
BOOTLDR variable does not exist
Configuration register is 0x2102

Standby not ready to show bootvar

Router#
```

One-Step Installation OR Converting from Bundle Mode to Install Mode



Note

- All the CLI actions (for example, add, activate, and so on) are executed.
- The configuration save prompt will appear if an unsaved configuration is detected.
- The reload prompt will appear after the second step in this workflow. Use the **prompt-level none** keyword to automatically ignore the confirmation prompts.
- If the prompt-level is set to None, and there is an unsaved configuration, the install fails. You must save the configuration before reissuing the command.

Use the one-step install procedure described below to convert a platform running in bundle boot mode to install mode. After the command is executed, the platform reboots in install boot mode.

Later, the one-step install procedure can also be used to upgrade the platform.

This procedure uses the **install add file activate commit** command in privileged EXEC mode to install a software package, and to upgrade the platform to a new version.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	install add file location: <i>filename</i> [activate commit] Example: Device# install add file bootflash:<router_image>.SSA.bin activate commit	Copies the software install package from a local or remote location (through FTP, HTTP, HTTPS, or TFTP) to the platform and extracts the individual components of the .package file into subpackages and packages.conf files. It also performs a validation and compatibility check for the platform and image versions, activates the package, and commits the package to make it persistent across reloads. The platform reloads after this command is run.
Step 3	exit Example: Device# exit	Exits privileged EXEC mode and returns to user EXEC mode.

Three-Step Installation

**Note**

- All the CLI actions (for example, add, activate, and so on) are executed.
- The configuration save prompt will appear if an unsaved configuration is detected.
- The reload prompt will appear after the install activate step in this workflow. Use the **prompt-level none** keyword to automatically ignore the confirmation prompts.

The three-step installation procedure can be used only after the platform is in install mode. This option provides more flexibility and control to the customer during installation.

This procedure uses individual **install add**, **install activate**, and **install commit** commands for installing a software package, and to upgrade the platform to a new version.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password, if prompted.

	Command or Action	Purpose
Step 2	install add file location: <i>filename</i> Example: <pre>Device#install add file bootflash:<router_image>.SSA.bin</pre>	Copies the software install package from a remote location (through FTP, HTTP, HTTPS, or TFTP) to the platform, and extracts the individual components of the .package file into subpackages and packages.conf files.
Step 3	show install summary Example: <pre>Device#show install summary</pre>	(Optional) Provides an overview of the image versions and their corresponding install state.
Step 4	install activate auto-abort-timer <i><time></i> Example: <pre>Device# install activate auto-abort-timer 120</pre>	Activates the previously added package and reloads the platform. <ul style="list-style-type: none"> • When doing a full software install, do not provide a package filename. • In the three-step variant, auto-abort-timer starts automatically with the install activate command; the default for the timer is 120 minutes. If the install commit command is not run before the timer expires, the install process is automatically terminated. The platform reloads and boots up with the last committed version.
Step 5	install abort Example: <pre>Device#install abort</pre>	(Optional) Terminates the software install activation and returns the platform to the last committed version. <ul style="list-style-type: none"> • Use this command only when the image is in activated state, and not when the image is in committed state.
Step 6	install commit Example: <pre>Device#install commit</pre>	Commits the new package installation and makes the changes persistent over reloads.
Step 7	install rollback to committed Example: <pre>Device#install rollback to committed</pre>	(Optional) Rolls back the platform to the last committed state.
Step 8	install remove { <i>file filesystem: filename</i> <i>inactive</i> } Example: <pre>Device#install remove inactive</pre>	(Optional) Deletes software installation files. <ul style="list-style-type: none"> • file: Deletes a specific file • inactive: Deletes all the unused and inactive installation files.

	Command or Action	Purpose
Step 9	show install summary Example: Device# <code>show install summary</code>	(Optional) Displays information about the current state of the system. The output of this command varies according to the install commands run prior to this command.
Step 10	exit Example: Device# <code>exit</code>	Exits privileged EXEC mode and returns to user EXEC mode.

Upgrading in Install Mode

Use either the one-step installation or the three-step installation to upgrade the platform in install mode.

Downgrading in Install Mode

Use the **install rollback** command to downgrade the platform to a previous version by pointing it to the appropriate image, provided the image you are downgrading to was installed in install mode.

The **install rollback** command reloads the platform and boots it with the previous image.



Note The **install rollback** command succeeds only if you have not removed the previous file using the **install remove inactive** command.

Alternatively, you can downgrade by installing the older image using the **install** commands.

Terminating a Software Installation

You can terminate the activation of a software package in the following ways:

- When the platform reloads after activating a new image, the auto-abort-timer is triggered (in the three-step install variant). If the timer expires before issuing the **install commit** command, the installation process is terminated, and the platform reloads and boots with the last committed version of the software image.

Alternatively, use the **install auto-abort-timer stop** command to stop this timer, without using the **install commit** command. The new image remains uncommitted in this process.

- Using the **install abort** command returns the platform to the version that was running before installing the new software. Use this command before issuing the **install commit** command.

Configuration Examples

This section shows examples of using install commands.

One Step Installation

The following is an example of the one-step installation or converting from bundle mode to install mode:

```

Router# install add file flash:irl101-universalk9.SSA.bin activate commit
install_add_activate_commit: START Mon May 30 20:45:11 UTC 2022
install_add: Adding IMG
--- Starting initial file syncing ---
Copying flash:irl101-universalk9.SSA.bin from R0 to R0
Info: Finished copying to the selected
Finished initial file syncing

--- Starting Add ---
Performing Add on all members
 [1] Finished Add package(s) on R0
Checking status of Add on [R0]
Add: Passed on [R0]
Finished Add

Image added. Version: 17.09.01.0.157857

install_activate: Activating IMG
Following packages shall be activated:
/flash/irl101-mono-universalk9.SSA.pkg
/flash/irl101-rpboot.SSA.pkg

This operation may require a reload of the system. Do you want to proceed? [y/n]y

--- Starting Activate ---
Performing Activate on all members
Building configuration...
[OK] [1] Activate package(s) on R0
 [1] Finished Activate on R0
Checking status of Activate on [R0]
Activate: Passed on [R0]
Finished Activate

--- Starting Commit ---
Performing Commit on all members
 [1] Commit package(s) on R0
 [1] Finished Commit on R0
Checking status of Commit on [R0]
Commit: Passed on [R0]
Finished Commit operation

SUCCESS: install_add_activate_commit Mon May 30 20:48:01 UTC 2022
%PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: reload action requested
watchdog: watchdog0: watchdog did not stop!
reboot: Restarting system

System Bootstrap, Version 3.3(REL), RELEASE SOFTWARE
Copyright (c) 1994-2021 by cisco Systems, Inc.

IR1101-K9 platform with 4169728 Kbytes of main memory

MCU Version - Bootloader: 4, App: 6
MCU is in application mode.

.....

```

```

Loading: bootflash:packages.conf
#

#####
#####
#####

%BOOT-5-OPMODE_LOG: R0/0: binos: System booted in AUTONOMOUS mode
Press RETURN to get started!

Router# show install summary
[ R0 ] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type  St   Filename/Version
-----
IMG   C    17.09.01.0.157857
-----

Auto abort timer: inactive
-----

```

Three Step Installation

The following is an example of the three-step installation.

Install Add

```

Router# install add file flash:irl101-universalk9.17.09.01.SPA.bin
install_add: START Tue May 31 01:35:40 UTC 2022
install_add: Adding IMG
--- Starting initial file syncing ---
Copying flash:irl101-universalk9.17.09.01.SPA.bin from R0 to R0
Info: Finished copying to the selected
Finished initial file syncing

--- Starting Add ---
Performing Add on all members
[1] Finished Add package(s) on R0
Checking status of Add on [R0]
Add: Passed on [R0]
Finished Add

Image added. Version: 17.09.01.0.1

SUCCESS: install_add /flash1/irl101-universalk9.17.09.01.SPA.bin Tue May 31 01:37:10 UTC
2022
Router#

Router# show install summary
[ R0 ] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type  St   Filename/Version
-----
IMG   I    17.09.01.0.1
-----

```

```
Auto abort timer: inactive
-----
```

Install Activate

```
Router#install activate
install_activate: START Tue May 31 01:37:14 UTC 2022
install_activate: Activating IMG
Following packages shall be activated:
/flash/irl101-mono-universalk9_iot.17.09.01.SPA.pkg
/flash/irl101-rpboot.17.09.01.SPA.pkg

This operation may require a reload of the system. Do you want to proceed? [y/n]y
```

```
--- Starting Activate ---
Performing Activate on all members
 [1] Activate package(s) on R0
 [1] Finished Activate on R0
Checking status of Activate on [R0]
Activate: Passed on [R0]
Finished Activate
```

```
SUCCESS: install_activate Tue May 31 01:41:03 UTC 2022
Router#
May 31 01:41:08.684: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting:
 reload action requested
```

```
watchdog: watchdog0: watchdog did not stop!
reboot: Restarting system
```

```
System Bootstrap, Version 3.3(REL), RELEASE SOFTWARE
Copyright (c) 1994-2021 by cisco Systems, Inc.
```

```
IR1101-K9 platform with 4169728 Kbytes of main memory
```

```
MCU Version - Bootloader: 4, App: 6
MCU is in application mode.
```

```
.....
```

```
Loading: bootflash:packages.conf
#
```

```
#####
#####
#####
```

```
Press RETURN to get started!
```

```
Router# show install summary
[ R0 ] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
```

```
Type  St  Filename/Version
-----
IMG   U    17.09.01.0.1
-----
```

```
Auto abort timer: inactive
-----
```

Install Commit

```
Router#install commit
install_commit: START Tue May 31 01:47:56 UTC 2022
--- Starting Commit ---
Performing Commit on all members
 [1] Commit packages(s) on R0
 [1] Finished Commit packages(s) on R0
Checking status of Commit on [R0]
Commit: Passed on [R0]
Finished Commit operation

SUCCESS: install_commit Tue May 31 01:48:04 UTC 2022
```

```
Router# show install summary
[ R0 ] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type  St   Filename/Version
-----
IMG   C    17.09.01.0.1
-----
Auto abort timer: inactive
-----
```

Showing the Installed Packages

```
Router# show install package flash:ir1101-universalk9.17.09.01.SPA.bin
Package: ir1101-universalk9.17.09.01.SPA.bin
Size: 674114352
Timestamp:
Canonical path: /flash1/ir1101-universalk9.17.09.01.SPA.bin

Raw disk-file SHA1sum:
  e54ba5a59824156af7515eaf4367ebe51b920316
Header size:      1148 bytes
Package type:     30000
Package flags:    0
Header version:   3

Internal package information:
Name: rp_super
BuildTime: 2022-04-27_00.47
ReleaseDate: 2022-04-27_07.05
BootArchitecture: arm64
RouteProcessor: IR1101
Platform: IR1101
User: mcpre
PackageName: universalk9
Build: 17.09.01
CardTypes:

Package is bootable from media and tftp.
Package contents:

Package: ir1101-mono-universalk9_iot.17.09.01.SPA.pkg
Size: 673776700
Timestamp:

Raw disk-file SHA1sum:
```

Showing Committed and Uncommitted Packages

```

Header size:      1084 bytes
Package type:    30000
Package flags:   0
Header version:  3

Internal package information:
  Name: mono
  BuildTime: 2022-04-27_00.47
  ReleaseDate: 2022-04-27_07.05
  BootArchitecture: arm64
  RouteProcessor: IR1101
  Platform: IR1101
  User: mcpre
  PackageName: mono-universalk9_iot
  Build: 17.09.01
  CardTypes:

Package is bootable from media and tftp.
Package contents:

```

You can determine which package is active using the **show install active** command.

```

Router#show install active
[ R0 ] Active Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type St Filename/Version
-----
IMG C 17.09.01.0.1193
-----
Auto abort timer: inactive
-----

```

Showing Committed and Uncommitted Packages

These two show commands provide information on which packages are committed and uncommitted.

```

Router# show install committed
[ R0 ] Committed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type  St  Filename/Version
-----
IMG   C   17.09.01.0.1
-----
Auto abort timer: inactive
-----

Router#show install uncommitted
[ R0 ] Uncommitted Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type  St  Filename/Version
-----
No Uncommitted Packages

```


Removing Inactive Packages

This command will remove unused installation files (.conf/.pkg/.bin) from installation media.



Note This command is used to clean up the boot directory of unused installation files. This will not remove the bootable image.

```
Router#install remove inactive
install_remove: START Tue May 31 01:49:10 UTC 2022
install_remove: Removing IMG
Cleaning up unnecessary package files
No path specified, will use booted path /bootflash/packages.conf

Cleaning /flash
Scanning boot directory for packages ... done.
Preparing packages list to delete ...
[R0]: /flash/packages.conf File is in use, will not delete.
[R0]: /flash/ir1101-mono-universalk9_iot.17.09.01.SPA.pkg File is in use, will not
delete.
[R0]: /flash/ir1101-universalk9.17.09.01.SPA.conf File is in use, will not delete.
[R0]: /flash/ir1101-rpboot.17.09.01.SPA.pkg File is in use, will not delete.

The following files will be deleted:
[R0]: /flash/ir1101-universalk9.17.09.01.SPA.bin
[R0]: /flash/ir1101-mono-universalk9_iot.SSA.pkg
[R0]: /flash/ir1101-universalk9.SSA.conf
[R0]: /flash/ir1101-rpboot.SSA.pkg

Do you want to remove the above files? [y/n]y

Deleting file /flash/ir1101-universalk9.17.09.01.SPA.bin ... done.
Deleting file /flash/ir1101-mono-universalk9_iot.SSA.pkg ... done.
Deleting file /flash/ir1101-universalk9.SSA.conf ... done.
Deleting file /flash/ir1101-rpboot.SSA.pkg ... done.
Deleting /bootflash/.images/17.09.01.0.1.1651045630 ... done.
SUCCESS: Files deleted.

--- Starting Post_Remove_Cleanup ---
Performing REMOVE_POSTCHECK on all members
Finished Post_Remove_Cleanup
SUCCESS: install_remove Tue May 31 01:49:14 UTC 2022

Router#show install inactive
[ R0 ] Inactive Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
           C - Activated & Committed, D - Deactivated & Uncommitted
-----
Type  St  Filename/Version
-----
No Inactive Packages
```

Troubleshooting Software Installation Using install Commands

Problem Troubleshooting the software installation

Solution Use the following show commands to view installation summary, logs, and software versions.

- **show install summary**
- **show install log**
- **show version**
- **show version running**

Problem Other installation issues

Solution Use the following commands to resolve installation issue:

- **dir** *<install directory>*
- **more location:***packages.conf*
- **show tech-support install:** this command automatically runs the **show** commands that display information specific to installation.
- **request platform software trace archive target bootflash** *<location>*: this command archives all the trace logs relevant to all the processes running on the system since the last reload, and saves this information in the specified location.