In-Service Model Update

This module describes how to update the YANG data models on a device through an In-Service Model Update.

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Restrictions for In-Service Model Update

- High availability or In-Service Software Upgrade (ISSU) is not supported. After a switchover, users must install the Software Maintenance Update (SMU) on standby device.

Information About In-Service Model Update

Overview of In-Service Model Updates

In-Service Model Update adds new data models or extend functionality to existing data models. The In-Service Model Update provides YANG model enhancements outside of a release cycle. The update package is a superset of all existing models; it includes all existing models as well as updated YANG models.

The data model infrastructure implements the YANG model-defined management interfaces for Cisco IOS XE devices. The data model infrastructure exposes the NETCONF interface northbound from Cisco IOS XE devices. The supported data models include industry standard models such as IETF, and Cisco IOS XE device-specific models.

The functionality provided by the In-Service Model Update is integrated into the subsequent Cisco IOS XE software maintenance release. Data model update packages can be downloaded from the Cisco Download Software Center.

Compatibility of In-Service Model Update Packages

An update package is built on a per release basis and is specific to a platform. This means that an update package for Cisco ASR 1000 Series Aggregation Services Routers cannot be installed on Cisco CSR 1000V

Series Cloud Services Routers. Similarly, an update package built for Cisco IOS XE Fuji 16.7.1 cannot be applied on a device that runs the Cisco IOS XE Everest 16.5.2 version.

All contents of an update package will be part of future mainline or maintenance release images. The image and platform versions are checked by the In-Service Model Update commands during the package add and activate. If an image or platform mismatch occurs, the package install fails.

Update Package Naming Conventions

In-Service Model Updates are packaged as a .bin files. This file includes all updates for a specific release and platform and the Readme file. These files have a release date and are updated periodically with additional model updates.

The naming convention of the data model update package follows the format—platform type-license level.release version.DDTS ID-file. The following is an example of a data model update file:

- isr4300-universalk9.16.05.01.CSCxxxxxx.dmp.bin
- asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxx.SSA.dmp.bin

The readme file provides the following information:

- Console and error messages during data model activation or deactivation
- Data model installation impact
- Side effects and possible workarounds
- Package(s) that the In-Service Model Update impacts
- Restart type

Installing the Update Package

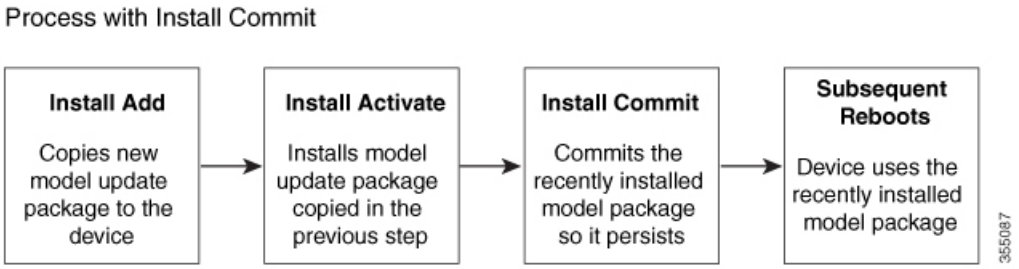
You can install the In-Service Model Update package on a device by using the **install add**, **install activate**, and **install commit** commands in privileged EXEC mode.

The **install add** command copies the update package from a remote location to the device. You can also use other methods to copy the package; however, you must still enable the **install add** command for the installation to work. For the **install activate** command to work, the package must be available in the device bootflash. Enable the **install commit** command to make updates persistent over reloads.

Installing an update replaces any previously installed data models. At any time, only one update is installed on the device. A data model package includes all updated YANG models and all existing YANG models previously installed on the device.

The following flow chart explains how the model update package works:

Figure 1: Committing a Model Update Package



If NETCONG-YANG is enabled during package activation, NETCONF processes are restarted. All active NETCONF sessions are killed during package activation. Failure during a package verification terminates the activation process.

Deactivating the Update Package

You can deactivate an update package by using the **install deactivate** command. Enable the **install commit** command to make changes persistent.

Table 1: Deactivating a Model Update Package

Action	Command to Use
To remove a package.	Use the **install remove** command. **Note** Deactivate a package before removing it.
To deactivate a package	Use the **install deactivate** command, followed by the **install commit** command. **Note** The **install commit** command must be used to ensure that the deactivation of the model package is persistent across reloads. Subsequent attempts at removal of the package will fail, if the deactivation is not committed.

When you deactivate an update, if more than one model update package is installed, the most recently committed model update package becomes the model package used by the device. If there are no other previously committed model packages, then the base version of data models included with the standard image is used.

Rollback of the Update Package

Rollback provides a mechanism to move a device back to the state in which it was operating prior to an update. After a rollback, NETCONF-YANG processes are restarted before changes are visible.

You can roll back an update to the base version, the last committed version, or a known commit ID by using the **install rollback** command.

How to Manage In-Service Model Update

Managing the Update Package

SUMMARY STEPS

1. **enable**
2. **install add file tftp:** *filename*
3. **install activate file bootflash:** *filename*
4. **install commit**
5. **install deactivate file bootflash:** *filename*
6. **install commit**
7. **install rollback to** {**base** | **committed** | **id** *commit-ID*}
8. **install remove** {**file bootflash:** *filename* | **inactive**}
9. **show install summary**

DETAILED STEPS

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 tftp:** *filename*
	Example:
	`Device# install add file tftp://172.16.0.1//tftpboot/folder1/ isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin`
	`Device# install add file tftp://172.16.0.1//tftpboot/folder1/ asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin`
		Copies the model update package from a remote location (via FTP, TFTP) to the device, and performs a compatibility check for the platform and image versions.
		• You can use other methods to copy the update package from the remote location to the device, however; you still have to execute the **install add** command before the package is activated.

Step 3	**install activate file bootflash:** *filename*
	Example:
	`Device# install activate file bootflash: isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin`
	`Device# install activate file bootflash: asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin`
		Validates whether the update package is added through the **install add** command, and restarts the NETCONF processes.
		• Perform the **install add** operation prior to activating an update package.

Step 4	**install commit** **Example:** `Device# install commit`	Makes the changes persistent over reload. • NETCONF processes are not restarted.

	Command or Action	Purpose

Step 5	**install deactivate file bootflash:** *filename*
	Example:
	`Device# install deactivate file bootflash: isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin`
	`Device# install deactivate file bootflash: asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin`
		Deactivates the specified update package, and restarts the NETCONF processes.

Step 6	**install commit** **Example:** `Device# install commit`	Makes the changes persistent over reload. • NETCONF processes are not restarted.
Step 7	**install rollback to** {**base** | **committed** | **id** *commit-ID*} **Example:** `Device# install rollback to base`	Rollbacks the update to the base version, the last committed version, or a known commit ID, and restarts NETCONF processes. • Valid values for the *commit-id* argument are from 1 to 4294967295. • Older versions of data models updates are available for use.

Step 8	**install remove** {**file bootflash:** *filename* | **inactive**}
	Example:
	`Device# install remove file bootflash: isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin`
	`Device# install remove file bootflash: asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin`
		Removes the specified update package from the bootflash.
		• A package must be deactivated before it is removed.

Step 9	**show install summary** **Example:** `Device# show install summary`	Displays information about the active package. • The output of this command varies according to the **install** commands that are configured.

Configuration Examples for In-Service Model Updates

Example: Managing an Update Package

The sample image used in the following examples are a Cisco 4000 Series Integrated Services Router image.

The following example shows how to add a model update package file:

```
Device# install add file tftp://172.16.0.1//tftpboot/folder1/
isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin

install_add: START Sun Feb 26 05:57:04 UTC 2017
Downloading file
```

```
tftp://172.16.0.1//tftpboot/folder1/isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Finished downloading file
tftp://172.16.0.1//tftpboot/folder1/isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
to bootflash:isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
SUCCESS: install_add /bootflash/isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Sun Feb 26 05:57:22 UTC 2017
Device#
```

The sample image used in the following examples are a Cisco ASR1000 Series Aggregated Services Router image.

The following example shows how to add a model update package file:

```
Device# install add file tftp://172.16.0.1//tftpboot/folder1/
asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin

install_add: START Sun Feb 26 05:57:04 UTC 2017
Downloading file
tftp://172.16.0.1//tftpboot/folder1/asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin
Finished downloading file
tftp://172.16.0.1//tftpboot/folder1/asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin
to bootflash: asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin
SUCCESS: install_add /bootflash/asr1000-universalk9.2017-08-23_17.48.0.CSCxxxxxxx.SSA.dmp.bin
Sun Feb 26 05:57:22 UTC 2017
Device#
```

The following is sample output from the **show install summary** command after adding an update package file to the device:

```
Device# show install summary

Active Packages:
No packages
Inactive Packages:
bootflash: isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Committed Packages:
No packages
Uncommitted Packages:
No packages
Device#
```

The following example shows how to activate an added update package file:

```
Device# install activate file bootflash:
isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin

install_activate: START Sun Feb 26 05:58:41 UTC 2017
DMP package.
Netconf processes stopped
SUCCESS: install_activate /bootflash/isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Sun Feb 26 05:58:58 UTC 2017*Feb 26 05:58:47.655: %DMI-4-CONTROL_SOCKET_CLOSED:
SIP0: nesd: Confd control socket closed Lost connection to ConfD (45): EOF on socket to
ConfD.
*Feb 26 05:58:47.661: %DMI-4-SUB_READ_FAIL: SIP0: vtyserverutild:
Confd subscription socket read failed Lost connection to ConfD (45):
EOF on socket to ConfD.
*Feb 26 05:58:47.667: %DMI-4-CONTROL_SOCKET_CLOSED: SIP0: syncfd:
Confd control socket closed Lost connection to ConfD (45): EOF on socket to ConfD.
*Feb 26 05:59:43.269: %DMI-5-SYNC_START: SIP0: syncfd:
External change to running configuration detected.
The running configuration will be synchronized to the NETCONF running data store.
*Feb 26 05:59:44.624: %DMI-5-SYNC_COMPLETE: SIP0: syncfd:
The running configuration has been synchronized to the NETCONF running data store.
```

```
Device#
```

The following sample output from the **show install summary** command displays the status of the model package as active and uncommitted:

```
Device# show install summary

Active Packages:
bootflash:isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Inactive Packages:
No packages
Committed Packages:
No packages
Uncommitted Packages:
bootflash:isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Device#
```

The following example shows how to execute the **install commit** command:

```
Device# install commit

install_commit: START Sun Feb 26 06:46:48 UTC 2017
SUCCESS: install_commit Sun Feb 26 06:46:52 UTC 2017
Device#
```

The following sample output from the **show install summary** command displays that the update package is now committed, and that it will be persistent across reloads:

```
Device# show install summary

Active Packages:
bootflash:isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Inactive Packages:
No packages
Committed Packages:
bootflash:isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Uncommitted Packages:
No packages
Device#
```

The following example shows how to rollback an update package to the base package:

```
Device# install rollback to base

install_rollback: START Sun Feb 26 06:50:29 UTC 2017
7 install_rollback: Restarting impacted processes to take effect
7 install_rollback: restarting confd
*Feb 26 06:50:34.957: %DMI-4-CONTROL_SOCKET_CLOSED: SIP0: syncfd:
Confd control socket closed Lost connection to ConfD (45): EOF on socket to ConfD.
*Feb 26 06:50:34.962: %DMI-4-CONTROL_SOCKET_CLOSED: SIP0: nesd:
Confd control socket closed Lost connection to ConfD (45): EOF on socket to ConfD.
*Feb 26 06:50:34.963: %DMI-4-SUB_READ_FAIL: SIP0: vtyserverutild:
Confd subscription socket read failed Lost connection to ConfD (45):
EOF on socket to ConfD.Netconf processes stopped
7 install_rollback: DMP activate complete
SUCCESS: install_rollback Sun Feb 26 06:50:41 UTC 2017
*Feb 26 06:51:28.901: %DMI-5-SYNC_START: SIP0: syncfd:
External change to running configuration detected.
The running configuration will be synchronized to the NETCONF running data store.
*Feb 26 06:51:30.339: %DMI-5-SYNC_COMPLETE: SIP0: syncfd:
The running configuration has been synchronized to the NETCONF running data store.
```

```
Device#
```

The following is sample output from the **show install package** command:

```
Device# show install package bootflash:
isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin

Name: isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Version: 16.5.1.0.199.1484082952..Everest
Platform: ISR4300
Package Type: dmp
Defect ID: CSCxxxxxxx
Package State: Added
Supersedes List: {}
Smu ID: 1
Device#
```

The following sample NETCONF hello message verifies the new data model package version:

```
Getting Capabilities: (admin @ 172.16.0.1:830)
PROTOCOL netconf
<?xml version="1.0" encoding="UTF-8"?>
<hello xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
<capabilities>
<capability>urn:ietf:params:netconf:base:1.0</capability>
<capability>urn:ietf:params:netconf:base:1.1</capability>
<capability>urn:ietf:params:netconf:capability:writable-running:1.0</capability>
<capability>urn:ietf:params:netconf:capability:xpath:1.0</capability>
<capability>urn:ietf:params:netconf:capability:validate:1.0</capability>
<capability>urn:ietf:params:netconf:capability:validate:1.1</capability>
<capability>urn:ietf:params:netconf:capability:rollback-on-error:1.0</capability>
<capability>urn:ietf:params:netconf:capability:notification:1.0</capability>
<capability>urn:ietf:params:netconf:capability:interleave:1.0</capability>
<capability>http://tail-f.com/ns/netconf/actions/1.0</capability>
<capability>http://tail-f.com/ns/netconf/extensions</capability>
<capability>urn:ietf:params:netconf:capability:with-defaults:1.0?basic-mode=
explicit&amp;also-supported=report-all-tagged</capability>
<capability>urn:ietf:params:xml:ns:yang:ietf-netconf-with-defaults?
revision=2011-06-01&amp;module=ietf-netconf-with-defaults</capability>
<capability>http://cisco.com/ns/yang/Cisco-IOS-XE-aaa?module=
Cisco-IOS-XE-aaa&amp;revision=2017-02-07</capability>
<<capability>http://cisco.com/ns/yang/Cisco-IOS-XE-native?module=
Cisco-IOS-XE-native&amp;revision=2017-01-07&amp;features=virtual-
template,punt-num,multilink,eth-evc,esmc,efp,dot1x</capability>
Device#
```

The following is sample output from the **show install log** command:

```
Device# show install log

[0|install_op_boot]: START Fri Feb 24 19:20:19 Universal 2017
[0|install_op_boot]: END SUCCESS Fri Feb 24 19:20:23 Universal 2017
[3|install_add]: START Sun Feb 26 05:55:31 UTC 2017
[3|install_add( FATAL)]: File path (scp) is not yet supported for this command
[4|install_add]: START Sun Feb 26 05:57:04 UTC 2017
[4|install_add]: END SUCCESS /bootflash/isr4300-universalk9.16.05.01.CSCxxxxxxx.dmp.bin
Sun Feb 26 05:57:22 UTC 2017
[5|install_activate]: START Sun Feb 26 05:58:41 UTC 2017
Device#
```

The sample image used in the following examples are a Cisco Catalyst 3000 Series Switch image.

The following example shows how to add a model update package file:

```
Device# install add file tftp://172.16.0.1//tftpboot/folder1/
cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.dmp.bin

install_add: START Sat Jul 29 05:57:04 UTC 2017
Downloading file tftp://172.16.0.1//tftpboot/folder1/
cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.dmp.bin
Finished downloading file tftp://172.16.0.1//tftpboot/folder1/
cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.SPA.smu.bin
to bootflash:cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.dmp.bin
SUCCESS: install_add /bootflash/cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.dmp.bin
Sat Jul 29 05:57:22 UTC 2017
Device#
```

The following sample output from the **show install summary** command displays that the update package is now committed, and that it will be persistent across reloads:

```
Device# show install summary

Active Packages:
bootflash:cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.dmp.bin
Inactive Packages:
No packages
Committed Packages:
bootflash:cat3k_caa-universalk9.16.06.01.CSCxxxxxxx.dmp.bin
Uncommitted Packages:
No packages
Device#
```

Feature Information for In-Service Model Update

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 2: Feature Information for In-Service Model Update

Feature Name	Release	Feature Information
In-Service Model Update	Cisco IOS XE Everest 16.5.1a Cisco IOS XE Everest 16.5.1b	This module describes how to update YANG data models through In-Service Model Update. In Cisco IOS XE Everest 16.5.1a, this feature was implemented on the following platforms: • Cisco Catalyst 9300 Series Switches • Cisco Catalyst 9500 Series Switches In Cisco IOS XE Everest 16.5.1b, this feature was implemented on the following platforms: • Cisco 4000 Series Integrated Services Routers • Cisco Cloud Services Router 1000v • Cisco Integrated Services Virtual Routers (ISRv) The following commands were introduced or updated: **install (Programmability)**, **show install (Programmability)**.
	Cisco IOS XE Everest 16.6.1	In Cisco IOS XE Everest 16.5.1b, this feature was implemented on the following platforms: • Cisco Catalyst 3650 Series Switches • Cisco Catalyst 3850 Series Switches
	Cisco IOS XE Fuji 16.7.x	In Cisco IOS XE Fuji 16.7.x, this feature was implemented on the following platform: • Cisco 1000 Series Aggregated Services Routers
	Cisco IOS XE Fuji 16.8.1a	In Cisco IOS XE Fuji 16.8.1a, this feature was implemented on Cisco Catalyst 9500-High Performance Series Switches