

Software Maintenance Upgrade

The Software Maintenance Upgrade (SMU) is a feature used to deliver critical software fixes without requiring a full image upgrade.

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Software Maintenance Upgrade package

The Software Maintenance Upgrade (SMU) is a package that can be installed on a system to provide a patch fix or security resolution to a released image for a specific defect in order to respond to immediate issues. It does not contain new features.

- SMUs are provided on a per release, per component basis and are specific to the platform. SMU versions are synchronized to the package major, minor, and maintenance versions they upgrade.
- SMUs are not an alternative to maintenance releases; all defects fixed by SMUs are automatically integrated into upcoming maintenance releases.
- The Cisco IOS XE platform internally validates SMU compatibility and does not allow installation of non-compatible SMUs, based on rules and limitations for a SMU change-set.
- An SMU allows you to address network issues quickly while reducing the time and scope of required testing compared to classic IOS software.
- SMU is a method to fix bugs in an existing release and allows the application of a PSIRT fix in an existing release.
- SMU is NOT an upgrade path from release X to release Y.

Hot Patching in SMU

The device only supports:

- The running image is modified in-place or in-service.
- This avoids downtime and interruption of service.
- The updated code to fix the defect is written in a different location, and the patch redirects the program run.

SMU workflow requirements

The workflow for the patch requires that you complete these sequence of operations in exec mode:

1. Addition of the SMU to the file system.
2. Activation of the SMU onto the system.
3. Committing the SMU change.
4. Removal and uninstallation of the SMU.

The basic requirements for SMU are:

- The image where the defect was discovered.
- The patch file that contains the fix for the defect must be formatted as ir8100-image_name.release_version.CSCxxyyyyy.SPA.smu.bin.

Install a patch image

Before you begin

Note Use this task as an example of a patch created as a test. Your patch will have a name associated with a CDET to be installed as a fix.

Use these steps to install the patch image:

Procedure

Step 1 Use the **enable** command to enable the router and enter the privileged EXEC mode.

Example:

```
Router> enable
```

Step 2 Use the **show power** command to verify the overall power consumption.

```
Router# show power
Main PSU :
Total Power Consumed: 11.37 Watts
Configured Mode : N/A
Current runtime state same : N/A
PowerSupplySource : External PS
POE Module :
Configured Mode : N/A
Current runtime state same : N/A
Total power available : 30 WattsRouter#
```

Step 3 Use the **install add file bootflash:***image-file* command to add the image.

```
Router# install add file
bootflash:/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V 17_5_0_148.SSA.bin
 CSCxx12345.SSA.smu.bin
```

```
install_add: START Thu Aug  6 11:52:52 PDT 2020
cat: /tmp/patch/patch.sta: No such file or directory
install_add: Adding SMU
install_add: Checking whether new add is allowed ....
--- Starting SMU Add operation ---
Performing SMU_ADD on Active/Standby
[1] SMU_ADD package(s) on R0
[1] Finished SMU_ADD on R0
Checking status of SMU_ADD on [R0]
SMU_ADD: Passed on [R0]
Finished SMU Add operation
SUCCESS: install_add  Thu Aug  6 11:53:31 PDT 2020
Router#
```

Step 4 Use the **install activate file bootflash:***image-file* command to activate the patch image.

```
Router# install activate file
bootflash:/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V 17_5_0_148.SSA.bin
 CSCxx12345.SSA.smu.bin

install_activate: START Thu Aug  6 11:53:59 PDT 2020
System configuration has been modified.
Press Yes(y) to save the configuration and proceed.
Press No(n) for proceeding without saving the configuration.
Press Quit(q) to exit, you may save configuration and re-enter the command. [y/n/q]
y
Building configuration...
[OK]Modified configuration has been saved
install_activate: Activating SMU
Executing pre scripts....
Executing pre sripts done.
--- Starting SMU Activate operation ---
Performing SMU_ACTIVATE on Active/Standby
/usr/sbin/kgv_update: kgv_update [
/flash1/ir8100-universalk9.2020-08-06_10.38_shchang2.0.CSCxx12345.SSA.smu.bin, NOT slot
local is ics ] continuing ....
/usr/sbin/kgv_update: Signature validated for
/flash1/ir8100-universalk9.2020-08-06_10.38_shchang2.0.CSCxx12345.SSA.smu.bin
/usr/sbin/kgv_update: TAM hash len:32
val:4407CBB447F0EEE3B12120D902F48FBA1C0D4900EED1FB614441198BE2302934
/usr/sbin/kgv_update: PCR8 before extend ctr:2
0817449B454BF036AF9D593D726D94D8942C50A9FFE93278FDA78EA62F2989F2
/usr/sbin/kgv_update: PCR8 after extend ctr:3
EF5F579FCDFA989D044296F0584B99F719F2B6215895524B5E8AD55DF5671560
/usr/sbin/kgv_update: PCR extend successful
/usr/sbin/kgv_update: Chasfs updated for
name:bootflash:/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V
17_5_0_148.SSA.bin CSCxx12345.SSA.smu.bin
hash:975352C1562A492D582D09D5EB91230863F6CC18E6F9C0EB512AF27CC0C77E2C05F29596AD34AD7808C9B39EC23D4412F0D3AFA707BC906FE03D554A845E42D4
/usr/sbin/kgv_update: Update successful for
bootflash:/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V 17_5_0_148.SSA.bin
 CSCxx12345.SSA.smu.bin
[1] SMU_ACTIVATE package(s) on R0
[1] Finished SMU_ACTIVATE on R0
Checking status of SMU_ACTIVATE on [R0]
SMU_ACTIVATE: Passed on [R0]
Finished SMU Activate operation
SUCCESS: install_activate flash1/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V
 17_5_0_148.SSA.bin CSCxx12345.SSA.smu.bin
Thu Aug  6 11:55:14 PDT 2020
Router#
```

Step 5 Use the **install commit** command to commit the installation.

```
Router# install commit
install_commit: START Thu Aug  6 11:55:29 PDT 2020
install_commit: Committing SMU
Executing pre scripts....
Executing pre sripts done.
--- Starting SMU Commit operation ---
Performing SMU_COMMIT on Active/Standby
[1] SMU_COMMIT package(s) on R0
[1] Finished SMU_COMMIT on R0
Checking status of SMU_COMMIT on [R0]
SMU_COMMIT: Passed on [R0]
Finished SMU Commit operation
SUCCESS: install_commit flash1/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V
 17_5_0_148.SSA.bin CSCxx12345.SSA.smu.bin Thu Aug  6 11:56:08 PDT 2020
Router#
```

Step 6 Use the **show install summary** command to display the status summary of the installation.

```
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    17.04.01.0.118999
SMU   C    bootflash:/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V
17_5_0_148.SSA.bin CSCxx12345.SSA.smu.bin
--------------------------------------------------------------------------------
Auto abort timer: inactive
--------------------------------------------------------------------------------
Router#
```

Step 7 Use the **show power** command to verify the result of the patch by showing the same command.

```
Router# show power
Main PSU :
Total Power Consumed: 11.04 Watts
Device HOT SMU works!
Configured Mode : N/A
Current runtime state same : N/A
PowerSupplySource : External PS
POE Module :
Configured Mode : N/A
Current runtime state same : N/A
Total power available : 0 Watts
Router#
```

Uninstall patch image using rollback

Procedure

Step 1 Use the **enable** command to enable the router and enter the privileged EXEC mode.

Example:

```
Router> enable
```

Step 2 Use the **show install summary** command to display the install summary.

Example:

```
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    17.04.01.0.118999
SMU   C    bootflash:/ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210124_063209_V
17_5_0_148.SSA.bin CSCxx12345.SSA.smu.bin
--------------------------------------------------------------------------------
Auto abort timer: inactive
--------------------------------------------------------------------------------
Router#
```

Step 3 Use the **install ?** command to view all the available commands.

Example:

```
Router# install ?
abort             Abort the current install operation
activate          Activate an installed package
add               Install a package file to the system
auto-abort-timer  Install auto-abort-timer
commit            Commit the changes to the loadpath
deactivate        Deactivate an install package
label             Add a label name to any installation point
prepare           Prepare package for operation
remove            Remove installed packages
rollback          Rollback to a previous installation point
Router# install rollback to ?
base       Rollback to the base image
committed  Rollback to the last committed installation point
id         Rollback to a specific install point id
label      Rollback to a specific install point label
```

Step 4 Use the **install rollback to base** command to restore the image to its original version.

Example:

```
Router# install rollback to base
install_rollback: START Thu Aug  6 12:04:04 PDT 2020
install_rollback: Rolling back SMU
Executing pre scripts....
Executing pre sripts done.
--- Starting SMU Rollback operation ---
Performing SMU_ROLLBACK on Active/Standby
[1] SMU_ROLLBACK package(s) on R0
[1] Finished SMU_ROLLBACK on R0
Checking status of SMU_ROLLBACK on [R0]
SMU_ROLLBACK: Passed on [R0]
Finished SMU Rollback operation
CSCxx12345:SUCCESS
SUCCESS: install_rollback
/flash1/ir8100-universalk9.2020-08-06_10.38_shchang2.0.CSCxx12345.SSA.smu.bin Thu Aug  6
12:04:57 PDT 2020
Router#
```

Step 5 Use the **show install summary** command to display the installed patches.

Example:

```
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    17.04.01.0.118999
--------------------------------------------------------------------------------
Auto abort timer: inactive
--------------------------------------------------------------------------------
Router#
```

Note In the above command output, the patch has been removed and the device returns to the base image version prior to the upgrade.

Step 6 Use the **show power** command to verify the result of the patch.

Example:

```
Router# show power
Main PSU :
Total Power Consumed: 11.98 Watts
Configured Mode : N/A
Current runtime state same : N/A
PowerSupplySource : External PS
POE Module :
Configured Mode : N/A
Current runtime state same : N/A
Total power available : 30 Watts
Router#
```

Uninstall the patch image using deactivate, commit, and remove commands

Note In this task there are two patches installed on the devices: CSCvq11111 and CSCvt22222. but only CSCvt22222 will be removed.

Procedure

Step 1 Use the **show install summary** command to display the installation and patch details.

Example:

```
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
--------------------------------------------------------------------------------
SMU   C    /flash1/ir8100-universalk9.<release>.CSCvq11111.SPA.smu.bin
SMU   C    /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin
IMG   C    17.04.1
```

Step 2 Use the **install deactivate file bootflash:** *patch-file* command to deactivate the patch.

```
Router# install deactivate file bootflash:/ir8100-universalk9.release.CSCvt22222.SPA.smu.bin
install_deactivate: START Fri Apr 24 22:54:10 UTC 2020
install_deactivate: Deactivating SMU
Executing pre scripts....
Executing pre sripts done.
--- Starting SMU Deactivate operation ---
Performing SMU_DEACTIVATE on Active/Standby
[R0] SMU_DEACTIVATE package(s) on R0
[R0] Finished SMU_DEACTIVATE on R0
Checking status of SMU_DEACTIVATE on [R0]
SMU_DEACTIVATE: Passed on [R0]
Finished SMU Deactivate operation
SUCCESS: install_deactivate /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin Fri
 Apr 24 22:54:49 UTC 2020
```

Step 3 Use the **show install summary** command to display the installed patches.

Example:

```
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
  --------------------------------------------------------------------------------
SMU   C    /flash1/ir8100-universalk9.<release>.CSCvt11111.SPA.smu.bin
SMU   D    /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin
IMG   C    17.01.1
```

Step 4 Use the **install commit** command to save.

```
Router# install commit
install_commit: START Fri Apr 24 22:56:11 UTC 2020
install_commit: Committing SMU

*Apr 24 22:56:15.169: %INSTALL-5-INSTALL_START_INFO: R0/0: install_engine: Started install
 commitExecuting pre scripts....
Executing pre sripts done.
--- Starting SMU Commit operation ---
Performing SMU_COMMIT on Active/Standby
  [R0] SMU_COMMIT package(s) on R0
  [R0] Finished SMU_COMMIT on R0
Checking status of SMU_COMMIT on [R0]
SMU_COMMIT: Passed on [R0]
Finished SMU Commit operation

SUCCESS: install_commit /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin Fri Apr
 24 22:56:32 UTC 2020

*Apr 24 22:56:33.342: %INSTALL-5-INSTALL_COMPLETED_INFO: R0/0: install_engine: Completed
install commit SMU
```

Step 5 Use the **show install summary** command to display the installed patches.

Example:

```
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
--------------------------------------------------------------------------------
SMU   C    /flash1/ir8100-universalk9.<release>.CSCvt11111.SPA.smu.bin
SMU   I    /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin
IMG   C    <release>
```

Step 6 Use the **install remove file flash:** *patch-file* command to remove the patch.

Example:

```
Router# install remove file flash:ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin
install_remove: START Fri Apr 24 22:57:17 UTC 2020

*Apr 24 22:57:20.775: %INSTALL-5-INSTALL_START_INFO: R0/0: install_engine: Started install
 remove flash:ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bininstall_remove: Removing
SMU
Executing pre scripts....
Executing pre scripts done.

--- Starting SMU Remove operation ---
Performing SMU_REMOVE on Active/Standby
  [R0] SMU_REMOVE package(s) on R0
  [R0] Finished SMU_REMOVE on R0
Checking status of SMU_REMOVE on [R0]
SMU_REMOVE: Passed on [R0]
Finished SMU Remove operation

SUCCESS: install_remove /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin Fri Apr
 24 22:57:34 UTC 2020

*Apr 24 22:57:34.902: %INSTALL-5-INSTALL_COMPLETED_INFO: R0/0: install_engine: Completed
install remove flash:ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin
```

Show what patches are installed:

Step 7 Use the **show install summary** command to display the installed patches.

Example:

```
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
 --------------------------------------------------------------------------------
SMU   C    /flash1/ir8100-universalk9.<release>.CSCvt11111.SPA.smu.bin
SMU   I    /flash1/ir8100-universalk9.<release>.CSCvt22222.SPA.smu.bin
IMG   C    <release>
```