

在 Catalyst 3850 和 Catalyst 9000 系列交換器上執行 ISSU

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簡介

本文件說明在 Catalyst 3850 和 Catalyst 9000 系列交換器上執行服務中軟體升級 (ISSU) 所需的步驟。

什麼是 ISSU

服務中軟體升級這項程序，是當網路持續轉送封包時，在裝置上將映像檔升級至另一個映像檔的過程。ISSU 可協助網路管理員在執行軟體升級時避免網路中斷。映像檔會以安裝模式進行升級，也就是說每個套件都是個別升級的。

支援 StackWise-Virtual 的 Catalyst 3850 與 Catalyst 9000 全系列產品，以及配備雙監督器的 Catalyst 9400/9600 獨立式機箱都支援 ISSU。


StackWise Virtual (SVL) 包含了兩個彼此連結的交換器以構成一個虛擬交換器。SVL 支援服務中軟體升級。

支援的平台與版本支援一覽表

請先查看平台是否確實支援 ISSU，再繼續執行 ISSU。另外，請確認目前的程式碼與目標程式碼是否支援 ISSU。有關支援平台與 ISSU 相容性一覽表的更多詳細資料，請參閱這裡：

[不同版本間的 ISSU 支援](#)

執行 ISSU 之前的必備條件

 附註：本檔案中的範例基於設定為 Stackwise-Virtual 的 Cisco Catalyst 9500 交換器。這些步驟適用於具有雙管理引擎的 Cat9400 / Cat9600 獨立機箱，也適用於配置為 Stackwise-Virtual 的 Catalyst 3850 / Catalyst 9000 裝置。
為了避免在此過程中丟失任何資料包，ISSU 需要在節點中同時向主用和備用裝置提供冗餘。由於發生重新載入，因此需要在它們之間進行切換，以確保您的網路具有高可用性。

1. 查看目前程式碼版本

```
<#root>
```

```
C9500#show version | in IOS XE
```

```
Cisco IOS XE Software, Version 16.09.02
```

2. 查看啟動模式

只有 Stackwise Virtual 中的兩個交換器都在安裝模式中啟動時才支援 ISSU。

```
<#root>
```

```
C9500#show ver | in INSTALL
```

```
* 1 50 C9500-40X 16.9.2 CAT9K_IOSXE INSTALL
  2 50 C9500-40X 16.9.2 CAT9K_IOSXE INSTALL
```

On Catalyst 9400, the above output is not available. Check if the switch booted from packages.conf file

```
C9400#show version | in System image
System image file is "flash:packages.conf"
```

如果機箱以套件模式啟動，則不支援 ISSU。當交換器在套件模式下執行時，如果您嘗試執行 ISSU，就會看到此錯誤。

```
<#root>
```

```
*Nov 13 14:55:57.338: %INSTALL-5-INSTALL_START_INFO: Chassis 1 R1/0: install_engine: Started install on  
ERROR: install_add_activate_commit: One-Shot ISSU operation is
```

```
not supported in bundle boot mode
```

```
FAILED: install_add_activate_commit exit(1) Tue Nov 13 14:56:03 UTC 2018
```

3. 查看快閃記憶體是否有充足的可用記憶體

```
<#root>
```

```
C9500#dir flash: | in free
```

```
11353194496 bytes total (8565174272 bytes free)
```

```
C9500#dir stby-flash: | in free
```

```
11353980928 bytes total (8566865920 bytes free)
```

確認您的快閃記憶體具有至少 1 GB 的儲存空間，以擴充新的映像檔。如果空間不足，請清理舊的安裝檔案，並使用 `install remove inactive` 命令。

4. 查看交換器是否處於 SSO 模式

```
<#root>
```

```
C9500#show redundancy
```

```
Redundant System Information :
```

```
-----  
    Available system uptime = 4 minutes  
Switchovers system experienced = 0  
    Standby failures = 0  
    Last switchover reason = none
```

```
    Hardware Mode = Duplex
```

```
Configured Redundancy Mode = sso
```

```
    Operating Redundancy Mode = sso
```

```
    Maintenance Mode = Disabled  
    Communications = Up
```

```
Current Processor Information :
```

```
-----
      Active Location = slot 1
      Current Software state = ACTIVE
      Uptime in current state = 30 minutes
      Image Version = Cisco IOS Software [Fuji], Catalyst L3 Switch Software (CAT9K_IOSXE), V
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2018 by Cisco Systems, Inc.
Compiled Mon 05-Nov-18 19:32 by mcpre
```

```
BOOT = flash:packages.conf;
```

```
      CONFIG_FILE =
      Configuration register = 0x102
```

```
Peer Processor Information :
```

```
-----
      Standby Location = slot 2
      Current Software state = STANDBY HOT
      Uptime in current state = 26 minutes
      Image Version = Cisco IOS Software [Fuji], Catalyst L3 Switch Software (CAT9K_IOSXE), V
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2018 by Cisco Systems, Inc.
Compiled Mon 05-Nov-18 19:32 by mcpre
```

```
BOOT = flash:packages.conf;
```

```
      CONFIG_FILE =
      Configuration register = 0x102
```

5. 查看自動啟動功能是否已經啟用

```
<#root>
```

```
C9500#show boot system
```

```
-----
```

```
Switch 1
```

```
-----
```

```
Current Boot Variables:
```

```
BOOT variable = flash:packages.conf;
```

```
Boot Variables on next reload:
```

```
BOOT variable = flash:packages.conf;
```

```
Manual Boot = no
```

```
<<<<< Manual Boot should be set to "no"
```

```
Enable Break = no
```

```
Boot Mode = DEVICE
```

```
iPXE Timeout = 0
```

```
-----
```

```
Switch 2
```

```
-----
```

```
Current Boot Variables:
```

```
BOOT variable = flash:packages.conf;
```

```
Boot Variables on next reload:
```

```
BOOT variable = flash:packages.conf;
```

```
Manual Boot = no
```

```
Enable Break = no
```

```
Boot Mode = DEVICE
```

```
iPXE Timeout = 0
```

如果未啟用「自動啟動」，可以按照以下方式變更設定：

```
<#root>
```

```
C9500(config)#no boot manual
```

6. 查看目前的 ISSU 與安裝狀態



附註：此步驟非常重要！

```
<#root>
```

```
C9500#show issu state detail
```

```
--- Starting local lock acquisition on switch 1 ---  
Finished local lock acquisition on switch 1
```

```
No ISSU operation is in progress      <<<<<<<< If see anything else, abort ISSU before proceeding.
```

```
Check on how to manually abort ISSU.
```

```
C9500#show install summary
```

[Switch 1 2] Installed Package(s) Information:
State (St): I - Inactive, U - Activated & Uncommitted,
 C - Activated & Committed, D - Deactivated & Uncommitted

Type St Filename/Version

IMG C 16.9.2.0.2433 <<<<<<<< State should be Activated & Committed for current version alone.

If not clear install state before proceeding. Check on how to clear install state.

Auto abort timer: inactive

7. 複製即將升級/降級的新映像檔

只需要將映像檔複製到作用中機箱 (若為 Stackwise) , 或作用中監督器 (若為 Cat9400 雙 SUP) 即可。

<#root>

C9500#copy tftp: bootflash:

Address or name of remote host []? X.X.X.X
Source filename []? cat9k_iosxe.16.09.02.SPA.bin
Destination filename [cat9k_iosxe.16.09.02.SPA.bin]?

ISSU 工作流程 - 實際升級

一旦所有必備條件經確認後，您便可繼續進行實際升級並使用下列其中一個方法：

- 單一步驟工作流程 (僅一個步驟，且不支援復原)
- 三步驟工作流程 (包含 3 個步驟，並支援在失敗時復原)

單一步驟工作流程

此工作流程僅含有一個步驟，並且有助於最佳化。

附註：無法回滾，因為升級已自動提交。如果您想要復原，請繼續進行 3 步驟工作流程。

<#root>

```
// This example has SW-2 as Active and Sw-1 as Standby before starting ISSU
```

```
C9500#install add file flash:cat9k_iosxe.16.09.02.SPA.bin activate issu commit
```

```
install_add_activate_commit: START Fri Feb 8 10:07:51 jst 2019
```

```
*Feb 8 10:07:52.456 jst: %INSTALL-5-INSTALL_START_INFO: Switch 2 R0/0: install_engine: Started install
```

```
--- Starting initial file syncing ---
```

```
[2]: Copying flash:cat9k_iosxe.16.09.02.SPA.bin from switch 2 to switch 1
```

```
[1]: Finished copying to switch 1
```

```
Info: Finished copying flash:cat9k_iosxe.16.09.02.SPA.bin to the selected switch(es)
```

```
Finished initial file syncing
```

```
--- Starting Add ---
```


Performing Add on all members
[1] Add package(s) on switch 1
[1] Finished Add on switch 1
[2] Add package(s) on switch 2
[2] Finished Add on switch 2
Checking status of Add on [1 2]
Add: Passed on [1 2]
Finished Add

install_add_activate_commit: Activating ISSU

Going to start Oneshot ISSU install process

STAGE 0: Initial System Level Sanity Check before starting ISSU

=====
--- Verifying install_issu supported ---
--- Verifying standby is in Standby Hot state ---
--- Verifying booted from the valid media ---
--- Verifying AutoBoot mode is enabled ---
Finished Initial System Level Sanity Check

STAGE 1: Installing software on Standby

=====
--- Starting install_remote ---
Performing install_remote on Chassis remote
[1] install_remote package(s) on switch 1
[1] Finished install_remote on switch 1
install_remote: Passed on [1]
Finished install_remote

STAGE 2: Restarting Standby

=====
--- Starting standby reload ---
Finished standby reload

--- Starting wait for Standby to reach terminal redundancy state ---

<<<<< Standby (Sw-1) reloads here!!!

<<<<<<< After Standby (Sw-1) comes up >>>>>>>>>>

*Feb 8 10:19:10.223 jst: %REDUNDANCY-3-IPC: IOS versions do not match.
*Feb 8 10:19:48.421 jst: %HA_CONFIG_SYNC-6-BULK_CFGSYNC_SUCCEED: Bulk Sync succeeded
*Feb 8 10:19:49.422 jst: %RF-5-RF_TERMINAL_STATE: Terminal state reached for (SSO) <<<<< Standby (Sw-1) reloads here!!!
*Feb 8 10:21:02.975 jst: %PLATFORM-6-HASTATUS_DETAIL: RP switchover, received chassis event became act

```
<<<<<<< After new Standby (Sw-2) comes up >>>>>>>
```

```
*Feb 8 10:27:09.715 jst: %HA_CONFIG_SYNC-6-BULK_CFGSYNC_SUCCEEDED: Bulk Sync succeeded
```

```
*Feb 8 10:27:10.717 jst: %RF-5-RF_TERMINAL_STATE: Terminal state reached for (SS0).
```

```
<<<< ISSU commit starts after this automatically..
```

```
*Feb 8 10:28:27.302 jst: %INSTALL-5-INSTALL_START_INFO: Switch 2 R0/0: install_engine: Started install
```

```
%IOSXEBOOT-4-ISSU_ONE_SHOT: (rp/0): ISSU finished successfully
```

```
*Feb 8 10:29:32.127 jst: %INSTALL-5-INSTALL_COMPLETED_INFO: Switch 2 R0/0: install_engine: Completed i
```

在 ISSU 完成後繼續進行。

三步驟工作流程

- 此工作流程包括三個步驟：新增、啟用和提交。在啟用後，所有交換器都會升級至新的軟體版本（未自動認可的軟體除外），不過必須透過 install commit 命令手動執行。
- 此方法的優點在於，系統可以復原至先前的軟體版本。
- 如果復原計時器並未停止，則系統會自動復原，並使用 install auto-abort-timer stop 或 install commit 命令如果復原計時器停止，則新的軟體版本可以在裝置上持續執行任意時間，然後復原至先前的版本。

步驟1.安裝add。

此命令會將映像檔下載至啟動快閃記憶體，並且在兩個交換器上加以擴充。

```
<#root>
```

```
// This example has SW-1 as Active and Sw-2 as Standby before starting ISSU
```

```
C9500#install add file flash:cat9k-universalk9.SPA.16.09.03.BETA.E1.SSA.bin.bin  
install_add: START Fri Feb 8 09:22:00 jst 2019
```

```
*Feb 8 09:22:02.055 jst: %INSTALL-5-INSTALL_START_INFO: Switch 1 R0/0: install_engine: Started install
```

```
--- Starting initial file syncing ---
```

```
[1]: Copying flash:cat9k-universalk9.SPA.16.09.03.BETA.E1.SSA.bin.bin from switch 1 to switch 2
```

```
[2]: Finished copying to switch 2
```

```
Info: Finished copying flash:cat9k-universalk9.SPA.16.09.03.BETA.E1.SSA.bin.bin to the selected switch(
```

```
Finished initial file syncing
```

```
--- Starting Add ---
```

```
Performing Add on all members
[1] Add package(s) on switch 1
[1] Finished Add on switch 1
[2] Add package(s) on switch 2
[2] Finished Add on switch 2
Checking status of Add on [1 2]
Add: Passed on [1 2]
Finished Add
```

SUCCESS: install_add Fri Feb 8 09:26:26 jst 2019 <<<< Wait until install_add says SUCCESS. If fails,

步驟2.安裝啟用。

- 當您執行此命令時，此事件的順序就會發生：

(i) 復原計時器會啟動。如果復原計時器過期，系統會復原至 ISSU 開始之前的相同狀態。當您使用 `install auto-abort-timer stop` 命令時，復原計時器會停止運作。當您使用 `install abort issu` 命令時，便可復原 ISSU。

(ii) 待命交換器會以新的軟體佈建，而且會使用新的軟體版本重新載入。接著，作用中的交換器會以新的軟體佈建並重新載入。使用新映像檔的待命交換器現在會成為作用中交換器，而舊的作用中交換器則成為待命交換器。

當此程序結束時，兩個交換器都會以新的軟體映像檔執行。

<#root>

```
C9500#install activate issu
```

```
install_activate: START Fri Feb 8 09:28:27 jst 2019
install_activate: Activating ISSU
```

```
*Feb 8 09:28:28.905 jst: %INSTALL-5-INSTALL_START_INFO: Switch 1 R0/0: install_engine: Started install
Going to start Activate ISSU install process
```

```
STAGE 0: Initial System Level Sanity Check before starting ISSU=====
--- Verifying install_issu supported ---
--- Verifying standby is in Standby Hot state ---
--- Verifying booted from the valid media ---
--- Verifying AutoBoot mode is enabled ---
Finished Initial System Level Sanity Check
```

```
STAGE 1: Installing software on Standby
```

```
=====
--- Starting install_remote ---
Performing install_remote on Chassis remote
```

```
*Feb 8 09:28:31.880 jst: %INSTALL-5-INSTALL_AUTO_ABORT_TIMER_PROGRESS: Switch 1 R0/0: rollback_timer:
```

```
[2] install_remote package(s) on switch 2
[2] Finished install_remote on switch 2
install_remote: Passed on [2]
Finished install_remote
```

STAGE 2: Restarting Standby

```
=====
--- Starting standby reload ---
Finished standby reload--- Starting wait for Standby to reach terminal redundancy state ---
<<<<<<< Standby (Sw-2) reloads here!!!*Feb  8 09:35:16.489 jst: %REDUNDANCY-3-IPC: IOS versions do not

*Feb  8 09:36:00.238 jst: %HA_CONFIG_SYNC-6-BULK_CFGSYNC_SUCCEED: Bulk Sync succeeded
*Feb  8 09:36:01.240 jst: %RF-5-RF_TERMINAL_STATE: Terminal state reached for (SSO)

<<<< At this point, Standby (Sw-2) comes up with new code and joins as Hot Standby
Finished wait for Standby to reach terminal redundancy state
```

STAGE 3: Installing software on Active

```
=====
--- Starting install_active ---

Performing install_active on Chassis 1] install_active package(s) on switch 1
[1] Finished install_active on switch 1
install_active: Passed on [1]
Finished install_active
Chassis 1 reloading, reason - Non participant detected
```

STAGE 4: Restarting Active (switchover to standby) <<<<<<< At this point, there is a switchover ar

```
=====
--- Starting active reload ---
New software can load after reboot process is completed
SUCCESS: install_activate Fri Feb  8 09:37:14 jst 2019
```

啟用狀態結束時，請檢查 ISSU 狀態。

<#root>

C9500#show issu state detail

```
--- Starting local lock acquisition on switch 2 ---
Finished local lock acquisition on switch 2
```

Operation type: Step-by-step ISSU
Install type : Image installation using ISSU
Current state : Activated state
Last operation: Switchover

Completed operations:

Operation	Start time
-----	-----
Activate location standby Chassis 2	2019-02-08:09:28:32
Activate location active Chassis 1	2019-02-08:09:36:03
Switchover	2019-02-08:09:37:16

State transition: Added -> Standby activated -> Active switched-over

Auto abort timer: automatic, remaining time before rollback: 01:43:55
Running image: flash:packages.conf
Operating mode: sso, terminal state reached

<<<< Wait until SSO terminal state before proceeding to commit.

步驟 3. Install commit。

commit 命令會執行必要的清理，使新軟體成為永久版本（移除舊版軟體），並停止復原計時器。在認可後，任何重新啟動都可以使用新軟體啟動。

<#root>

C9500#install commit

install_commit: START Fri Feb 8 09:45:22 jst 2019
install_commit: Committing ISSU

*Feb 8 09:45:23.533 jst: %INSTALL-5-INSTALL_START_INFO: Switch 2 R0/0: install_engine: Started install

Going to start Commit ISSU install process

STAGE 0: Initial System Level Sanity Check before starting ISSU

=====

--- Verifying install_issu supported ---
--- Verifying standby is in Standby Hot state ---
--- Verifying booted from the valid media ---
--- Verifying AutoBoot mode is enabled ---

Finished Initial System Level Sanity Check

--- Starting install_commit_2 ---

Performing install_commit_2 on Chassis 2
[2] install_commit_2 package(s) on switch 2
[2] Finished install_commit_2 on switch 2
install_commit_2: Passed on [2]
Finished install_commit_2

STAGE 1: Dispatching the commit command to remote

=====

--- Starting install_commit_remote ---

Performing install_commit_remote on Chassis 1
Feb 8 09:48:33.364: %INSTALL-5-INSTALL_START_INFO: R0/0: install_engine: Started install commit

*Feb 8 09:48:33.352 jst: %INSTALL-5-INSTALL_START_INFO: Switch 1 R0/0: install_engine: Started install

Feb 8 09:51:27.505: %INSTALL-5-INSTALL_COMPLETED_INFO: R0/0: install_engine: Completed install commit
[1] install_commit_remote package(s) on switch 1
[1] Finished install_commit_remote on switch 1
install_commit_remote: Passed on [1]
Finished install_commit_remote

SUCCESS: install_commit Fri Feb 8 09:51:27 jst 2019

<<<<< ISSU is completed here!!!!!!

執行 ISSU 後的檢查清單

ISSU 順利完成後，

- 請檢查兩個交換器是否都以新軟體執行。
- 查看要清理的 show issu state detail 輸出，並且不要顯示任何進行中的 ISSU。
- 查看 show install issu history 輸出以確保 ISSU 作業成功（命令僅限 16.10.1 版與更新版本可用）。
- 在您啟用任何新功能之前，建議您給新軟體足夠的測試時間。

ISSU 失敗時採取的行動

- 如果 ISSU 失敗，預期自動中止功能可以將系統復原為初始狀態（舊版映像檔）。不過，如果這個作法也失敗，預期會執行機箱的手動復原。
- 在手動復原期間，請檢查作用中與待命機箱是否都執行舊版映像檔（如果不是，請復原個別機箱）。
- 在您確認兩個機箱都執行舊版映像檔後，請執行 install remove inactive 以移除任何未使用的映像檔套件。
- 兩個機箱都執行舊版軟體後，請手動清理 ISSU 作業的所有內部狀態。（請參閱此處瞭解如何清理內部 ISSU 狀態）。

中止 ISSU

- 在 3 步驟工作流程的啟用 ISSU 程序進行期間，如果中止計時器過期，系統會自動中止並回到舊版映像檔。



附註：如果備用裝置在中止期間未達到SSO，則需要手動中止。此外，如果出於任何原因，您想要在過程中中止 ISSU，則需手動中止。

<#root>

EXAMPLE : During install add, we notice these erro

rs:

```
C9400#install add file flash:cat9k_iosxe.16.09.02.SPA.bin
install_add: START Tue Nov 13 20:47:53 UTC 2018
```

```
*Nov 13 20:47:54.787: %INSTALL-5-INSTALL_START_INFO: Chassis 1 R1/0: install_engine: Started install ad
```

```
--- Starting initial file syncing ---
```

```
[1]: Copying flash:cat9k_iosxe.16.09.02.SPA.bin from chassis 1 to chassis 2
```

```
[2]: Finished copying to chassis 2
```

```
Info: Finished copying flash:cat9k_iosxe.16.09.02.SPA.bin to the selected chassis
```

```
Finished initial file syncing
```

```
--- Starting Add ---
Performing Add on all members
  [1] Add package(s) on chassis 1
  [1] Finished Add on chassis 1
  [2] Add package(s) on chassis 2
      cp: cannot stat '/tmp/packages.conf': No such file or directory
  [2] Finished Add on chassis 2
Checking status of Add on [1 2]
Add: Passed on [1]. Failed on [2]
Finished Add
```

FAILED: install_add exit(1) Tue Nov 13 20:51:58 UTC 2018 <<<<< install_add failed. If see any such e

C9400#install abort issu

```
install_abort: START Tue Nov 13 20:57:40 UTC 2018
install_abort: Abort type ISSU subtype NONE smutype NONE
```

*Nov 13 20:57:41.759: %INSTALL-5-INSTALL_START_INFO: Chassis 1 R1/0: install_engine: Started install ab

NOTE: Going to start Abort ISSU install process

STAGE 0: Initial System Level Sanity Check before starting ISSU

=====

```
--- Verifying install_issu supported ---
--- Verifying booted from the valid media ---
--- Verifying AutoBoot mode is enabled ---
Finished Initial System Level Sanity Check
```

FAILED: ABORT operation is not allowed in ADDED state
ERROR: install_abort exit(2) Tue Nov 13 20:57:49 UTC 2018

*Nov 13 20:57:49.756: %INSTALL-5-INSTALL_COMPLETED_INFO: Chassis 1 R1/0: install_engine:

Completed install abort ISSU

清理 ISSU 狀態

如果 ISSU 升級/降級/中止/自動中止失敗，則需要手動清理 ISSU 內部狀態。

<#root>

C9400#sh issu state detail

```
--- Starting local lock acquisition on chassis 1 ---
Finished local lock acquisition on chassis 1
```

Operation type: One-shot ISSU
Install type : Image installation using ISSU

Current state : Added state

Last operation: Activate location standby Chassis 2 <<<< Previous Add is still pending. This needs to

Completed operations:

```
Operation                               Start time
-----
```


Activate location standby Chassis 2 2018-11-13:16:26:34

State transition: Added

Auto abort timer: inactive

Running image: flash:packages.conf

Operating mode: sso, terminal state not reached

Enable Service Internal before you run this command

C9400#clear install state

clear_install_state: START Tue Nov 13 17:05:47 UTC 2018

--- Starting clear_install_state ---

Performing clear_install_state on all members

[1] clear_install_state package(s) on chassis 1

[1] Finished clear_install_state on chassis 1

Checking status of clear_install_state on [1]

clear_install_state: Passed on [1]

Finished clear_install_state

C9400#sh issu state detail

--- Starting local lock acquisition on chassis 1 ---

Finished local lock acquisition on chassis 1

No ISSU operation is in progress

關於此翻譯

思科已使用電腦和人工技術翻譯本文件，讓全世界的使用者能夠以自己的語言理解支援內容。請注意，即使是最佳機器翻譯，也不如專業譯者翻譯的內容準確。Cisco Systems, Inc. 對這些翻譯的準確度概不負責，並建議一律查看原始英文文件（提供連結）。