

How To | Use The In-Service Software Upgrade (ISSU) Feature

Introduction

In-Service Software Upgrade (ISSU) is a feature that allows you to upgrade the software version of the release on a chassis device with no network downtime.

ISSU works because it allows the chassis to run two different software versions at the same time. This is important, because the chassis must continue to correctly forward traffic while it performs the software version upgrade. This necessarily involves a period in which two different software versions are in operation simultaneously.

With ISSU, you can upgrade the chassis to a future maintenance release - which may contain new functionality, or resolve a software issue - without disrupting network operation.

Supported platforms

ISSU is only supported on the CFC960 Controller Fabric Card (CFC), for use with the SwitchBlade x8100 Series Switch.

Duplex configuration

When a SwitchBlade x8100 Series Switch is used with two CFCs, this is known as a **duplex** configuration, using an **Active/Master** CFC, and a **Standby/Slave** CFC.

ISSU is only supported with a duplex configuration. It is not supported on a **simplex** standalone chassis, which is a standalone chassis with only one CFC960. This is because if only one CFC is present in the chassis, there is no other CFC to take control of the chassis when the one CFC is rebooting.

Do note that, in addition to a duplex configuration being necessary for ISSU, a duplex CFC configuration is the preferred mode of operation for the Switchblade x8100. This is because it offers CFC redundancy, and also doubles the chassis bandwidth capacity. Both CFCs are **Active/Active**, and the switch synchronizes hardware tables and entries between CFCs.

VCStack Plus ISSU support

ISSU is also supported on VCStack Plus, which allows you to configure two SwitchBlade x8100 chassis as a single virtual switch. When the x8100 chassis are stacked using VCStack Plus, then ISSU is supported with both simplex or duplex configurations of the chassis within the stack.

Simplex VCStack Plus

With a simplex configuration, each chassis only has one CFC. Although this configuration is supported for ISSU, you can expect some traffic loss during the ISSU upgrade - depending on device configuration. This is because each chassis separately reboots during the ISSU process to upgrade the software.

An ISSU in this configuration is known as a **rolling-upgrade**.

Duplex VCStack Plus

With a duplex configuration, each chassis has two CFCs.

For more information, go to "[How does ISSU work with VCStack Plus?](#)" on page 5.

Supported releases

Please refer to the "ISSU compatibility matrix" to determine ISSU release compatibility. An up-to-date version of this can be found in the latest Release Note.

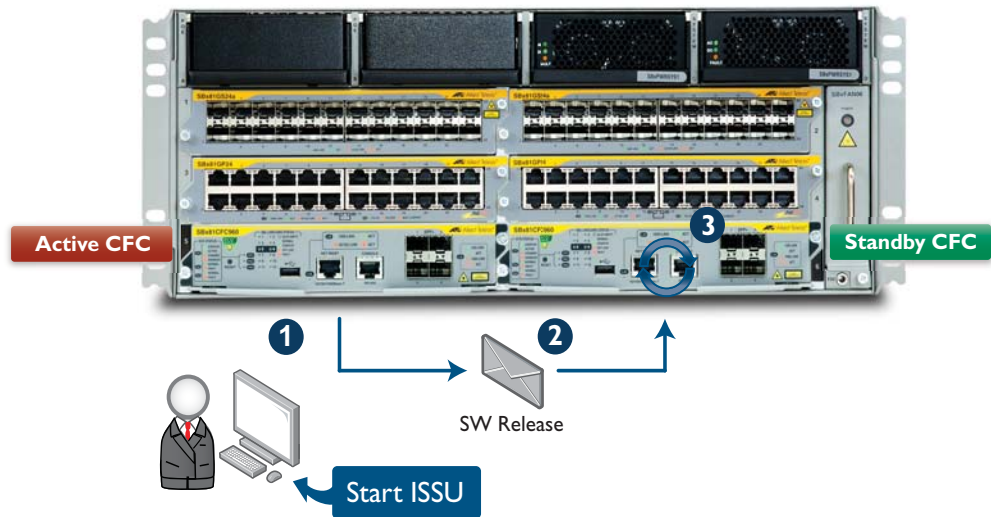
How does the Allied Telesis ISSU implementation work?

The Allied Telesis ISSU implementation has two phases - an automatic phase and a manual phase.

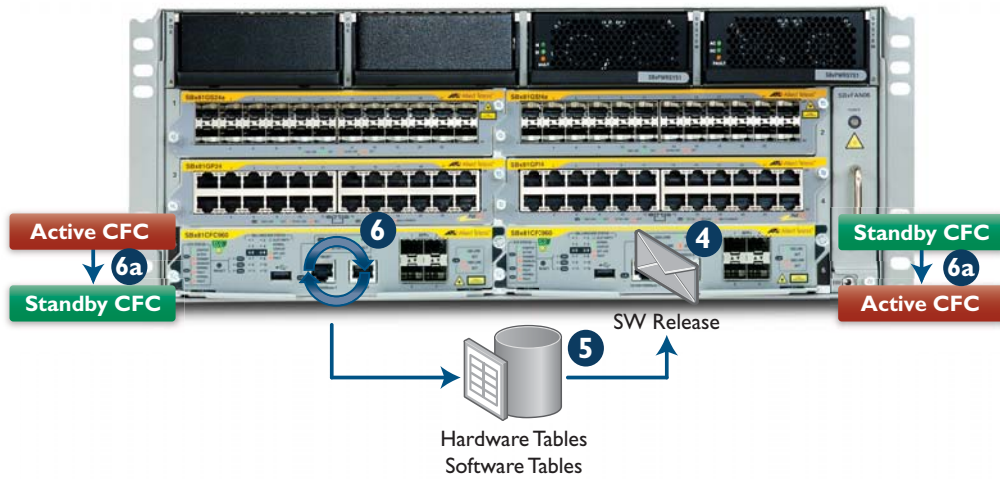
Automatic phase

When a user initiates ISSU:

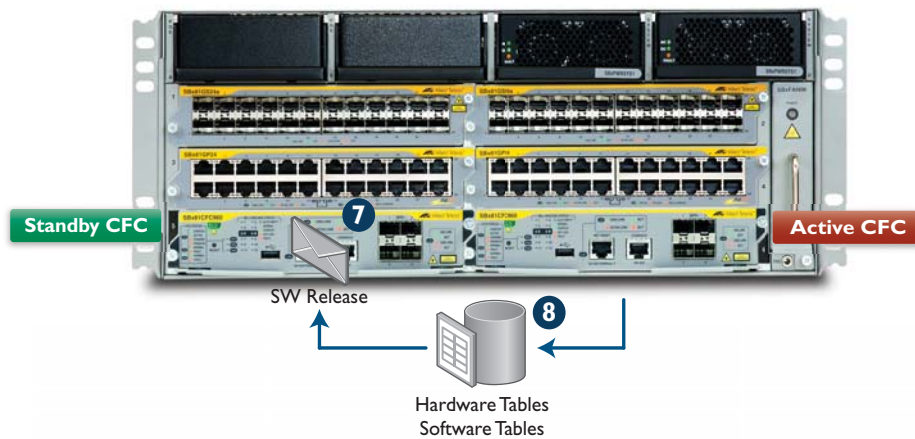
1. The user specifies the release to upgrade to. The system first checks several prerequisites, such as whether two CFCs are present in the chassis.
2. Next, the software release is synced to Flash from the Active to the Standby CFCs.
3. The chassis then reboots the Standby CFC, as shown below:



4. The Standby CFC then proceeds to boot the new software version release.
5. Once the Standby CFC has finished booting, it syncs information from the Active CFC, such as hardware and software tables.
6. When syncing is complete, ISSU automatically reboots the Active CFC. This causes a CFC failover; and the previously rebooted Standby CFC takes over as the new Active CFC, as shown below:



7. The old Active CFC now proceeds to boot the new release, and joins the chassis as a Standby CFC.
8. The new Standby CFC syncs hardware and software tables from the Active CFC.
9. Once Standby CFC syncing is complete, ISSU moves to the **CFCs Upgraded** state, as shown below:



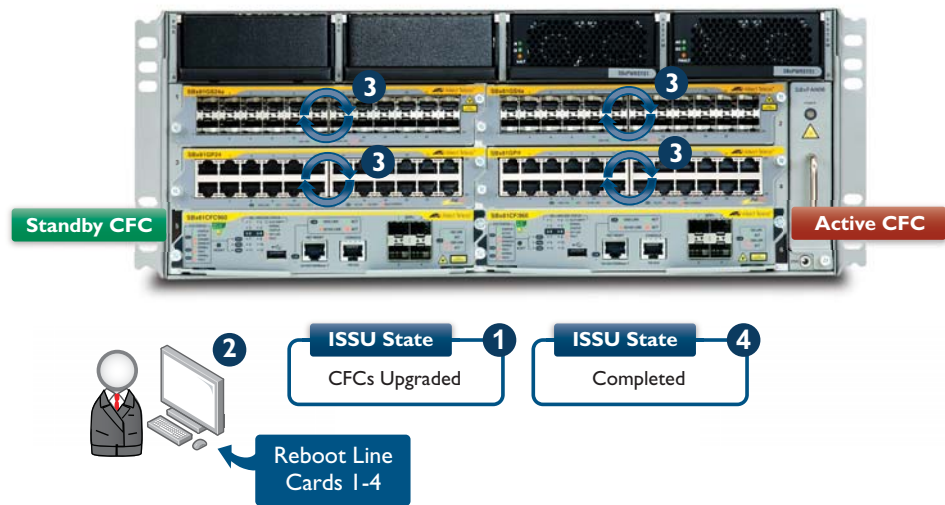
At this point, high availability has been achieved by successfully upgrading both CFCs to the new software version without any chassis downtime. Traffic has continued to flow uninterrupted. No Line Card ports have gone down, and by definition, the software upgrade has been “hitless”.

Manual Phase

Reboot the Line Interface Cards (LIFs)

Once the automatic phase is complete, it is advisable that you reboot each Line Interface Card (LIF) in the chassis.

This reboot can be done at a more convenient time, such as in a maintenance window. It results in roughly 1 minute of downtime per LIF, as each LIF reboots with the new software release and synchronizes hardware tables, as shown below:



Once all LIFs have been rebooted in the chassis, ISSU has successfully **Completed**.

For information about automating LIF rebooting once the chassis has reached the **CFCs Upgraded** state, see "[ISSU Triggers](#)" on page 20.

How does ISSU work with VCStack Plus?

ISSU behaves in a similar manner when used with VCStack Plus as it does with a standalone chassis. However, with duplex VCStack Plus there are a total of four CFCs. One of these four CFCs is in Active/Master mode, and the other three are in Standby/Slave mode.

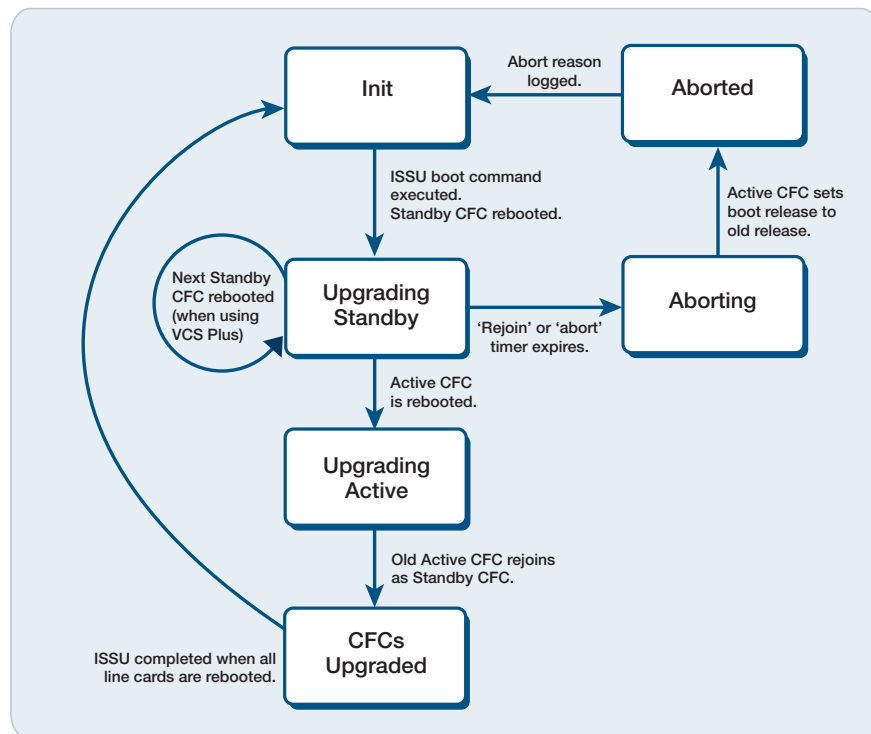
In a VCStack configuration, the switch sequentially reboots the three standby CFCs in the order of their **Card-ID** numbers, from highest to lowest. ISSU does not use each CFC's **Stack Priority** to determine the order in which the CFCs are sequentially rebooted. Then, once all the standby CFCs have been rebooted, the Master CFC is rebooted. The Stack Priority is then used to decide the new **Stack Master**.

For example: if Card 2.5 is the Active/Master CFC, then ISSU first reboots Card 2.6, followed by Card 1.6, Card 1.5, and then Card 2.5.

Note: Regardless of the Active/Master CFC's location, this CFC is always the last to be rebooted.

ISSU state diagram

The following shows the different states and processes in which ISSU functions:



What's the difference between Active and Progress?

As mentioned earlier, ISSU has two major phases, called the Automatic phase and the Manual phase. Within the Command Line Interface (CLI), the Automatic phase is known as **Active**, and the Manual phase is known as **In Progress**.

Note: During the entire ISSU process, ISSU is considered by the switch to be In Progress. However, from a user perspective, ISSU first appears Active, and then In Progress.

Active/ Automatic phase

No configuration changes can be made in the Active/Automatic state. For example, if a user is under a port configuration, they will be pushed back into global configuration mode.

ISSU is only in this state while the device upgrades and syncs chassis CFCs.

When ISSU has been initiated, it moves into the **Upgrading Standby** state, and proceeds to upgrade each CFC. Once the CFCs have finished upgrading, the Upgrading Standby process is complete, and ISSU moves to the Upgrading Active CFC state. The Active/Master CFC is then upgraded.

During this time, if you log in from Console, Telnet, SSH, or from an AMF Node, you are presented with the following message:

```
awplus-2.5 login: manager
Password:
AlliedWare Plus (TM) 5.4.4 07/17/14 15:11:52
ISSU is active. Changes to the configuration are currently blocked.
```

Progress/Manual Phase

Once the CFCs have finished upgrading, and synchronizing information, ISSU moves to the **CFCs Upgraded** state.

ISSU also moves from the Active phase to the In Progress phase, as shown below. As a result, configuration changes are now possible.

ISSU remains In Progress until all LIFs have been rebooted. If preferred, you can do this at a later, more convenient time.

```
awplus-2.5 login: manager
Password:

AlliedWare Plus (TM) 5.4.4 07/17/14 15:11:52

ISSU is in progress. There may be cards running different versions of
AW+.

awplus#show issu
ISSU configuration:
Rejoin timeout      : 10 mins (default)
Abort timeout       : 45 mins (default)

ISSU state          : CFCs Upgraded
Old boot release    : SBx81CFC960-5.4.4-1.1.rel
New boot release    : SBx81CFC960-5.4.4-1.2.rel
Process started     : Thu Aug 14 11:10:02 2014
Process elapsed     : 00:55:17

Progress on CFCs:
 card 1.5           : Upgraded
 card 1.6           : Upgraded
 card 2.5           : Upgraded
 card 2.6           : Upgraded
awplus#
```

The **show version** and **show system** commands also report this information:

```
awplus#show version

AlliedWare Plus (TM) 5.4.4 07/17/14 15:11:52

Build name : SBx81CFC960-5.4.4-1.2.rel*
Build date : Thu Jul 17 15:11:54 NZST 2014
Build type : RELEASE
* ISSU in progress - Run "show card detail" for more information
...
```



```

awplus#show system | begin Current software

...skipping
Current software   : SBx81CFC960-5.4.4-1.2.rel
Software version  : 5.4.4-1.2
Build date        : Thu Jul 17 15:11:54 NZST 2014

Warning: ISSU is currently in progress.
System may be running with different software versions

Current boot config: flash:/default.cfg (file exists)
...

```

Preparing for an In-Service Software Upgrade

Pre-conditions

You must perform the following actions before you can complete an In-Service Software Upgrade:

1) Confirm the system's Environmental Status is Normal

Confirm that the system's Environmental Status is Normal using the **show system** command:

```

awplus#show system
Stack System Status                               Thu Aug 14 10:55:50 2014

Stack member 1

Board      ID  Bay  Board Name                Rev  Serial number
-----
Chassis    374      AT-SBx8106                G-0  A045604132600004
Blade      317  Bay1  AT-SBx81GP24              C-0  A042774103000047
Controller 376  Bay5  AT-SBx81CFC960            X4-0 A04699H132100002
Controller 376  Bay6  AT-SBx81CFC960            B-0  A270E102T
PSU        319  PSUC  AT-SBxPWRSYS1/AC          A-0  A045804131700034
Fan module 375  FAN1  AT-SBxFAN06                D-0  A045614132500001
-----
RAM: Total: 1996672 kB Free: 1808260 kB
Flash: 253.9MB Used: 86.4MB Available: 167.5MB
-----
Environment Status : Normal
Uptime              : 0 days 00:06:57
Bootloader version  : 3.0.5

```

2) Verify that all Line Cards are booted and stable

Verify that all Line Cards are booted and stable using the **show card** command:

```
awplus#show card

Stack member 1

Card  Type                State
-----
1.1   AT-SBx81GP24           Online
1.2   -                       -
1.3   -                       -
1.4   -                       -
1.5   AT-SBx81CFC960         Online (Active)
1.6   AT-SBx81CFC960         Online (Standby)
-----
```

3) Verify that the currently running software release is set as the boot image

Use the **show boot** command to confirm this:

```
awplus#show boot
Boot configuration
-----
Current software   : SBx81CFC960-5.4.4-1.1.rel
Current boot image : flash:/SBx81CFC960-5.4.4-1.1.rel (file exists)
Backup boot image  : Not set
Default boot config: flash:/default.cfg
Current boot config: flash:/default.cfg (file exists)
Backup boot config: Not set
Autoboot status    : disabled
Boot Security Level: none
```

4) Set the current boot release on all CFCs

In the event that one of the CFCs doesn't have the current boot image in Flash, ISSU will not start, and prompts you to set it using the **configure terminal > boot system X.rel** command:

```
awplus#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
awplus(config)#boot system SBx81CFC960-5.4.4-1.1.rel
Synchronizing file across the chassis, please wait...
File synchronization with card 1.6 successfully completed
File synchronization with card 2.5 successfully completed
File synchronization with card 2.6 successfully completed
```

The release is then synced to each controller card.

5) Copy new release on to VCStack Plus Active CFC

The example below is via a USB Storage device:

```
awplus#dir
 1954 -rw- Jul 31 2014 15:21:06 default.cfg
41574415 -rw- Jul 7 2014 13:53:17 SBx81CFC960-5.4.4-1.1.rel
awplus#dir usb
41574415 -rwx Aug 14 2014 11:02:23 SBx81CFC960-5.4.4-1.2.rel
awplus#copy usb:/SBx81CFC960-5.4.4-1.2.rel flash
Copying...
Successful operation
awplus#dir
 1954 -rw- Jul 31 2014 15:21:06 default.cfg
41574415 -rw- Jul 7 2014 13:57:00 SBx81CFC960-5.4.4-1.2.rel
41574415 -rw- Jul 7 2014 13:53:17 SBx81CFC960-5.4.4-1.1.rel
```

Note: The above example assumes that you want to initiate ISSU with the new release on the switch's Flash.

At this point, the system is ready for the In-Service Software Upgrade.

If you are using VCStack Plus:

Confirm that the VCStack Plus Switch is in **Normal operation** using the **show stack** command:

```
awplus#show stack
Virtual Chassis Stacking summary information

ID    Pending ID  MAC address          Priority  Status  Role
1.5   -            eccd.6d9e.3304      10       Ready  Active CFC
1.6   -            eccd.6db4.7f57      10       Ready  Backup Member
2.5   -            eccd.6d9e.330e      128      Ready  Backup Member
2.6   -            eccd.6d9e.3312      128      Ready  Backup Member

Operational Status          Normal operation
Stack MAC address           0000.cd37.0a57 (Virtual MAC)
```

ISSU example

Once preparation is complete, you can initiate an ISSU by using the command:

```
issu boot <new release>
```

The process then upgrades each CFC automatically.

The following is an example of an ISSU on an x8100 Duplex VCStack Plus Switch:

```

awplus#issu boot ?
FILE URL of the release file

awplus#issu boot SBx81CFC960-5.4.4-1.2.rel
This will update the preferred release file to SBx81CFC960-5.4.4-1.2.rel.
The CFCs will then be rebooted one at a time and will rejoin running the new
release.
To complete ISSU, the line-cards must be manually rebooted at a later convenient
time.
Start the ISSU process now? (y/n): y
Synchronizing file across the chassis, please wait...
File synchronization with card 1.6 successfully completed
File synchronization with card 2.5 successfully completed
File synchronization with card 2.6 successfully completed
[DONE]
11:10:02 awplus chassis[2751]: ISSU process is now active.
11:10:02 awplus chassis[2751]: Automatically rebooting card 2.6 (AT-SBx81CFC960)
due to ISSU process
11:10:02 awplus chassis[2751]: Card 2.6 (AT-SBx81CFC960) has left the stack
11:10:02 awplus IMI[3039]: All users returned to config mode while ISSU is
active.
awplus#
11:11:31 awplus chassis[2751]: Card 2.6 (AT-SBx81CFC960) has joined the stack

11:11:34 awplus IMI[3039]: All users returned to config mode while switch
synchronization is in progress.
11:11:55 awplus-2.6 HPI: HOTSWAP Pluggable 2.6.1 hotswapped in: AT-SP10SR
11:11:55 awplus-2.6 HPI: HOTSWAP Pluggable 2.6.4 hotswapped in: AT-SP10SR
11:11:55 awplus-2.6 HPI: HOTSWAP Pluggable 2.6.3 hotswapped in: AT-SP10SR
11:11:55 awplus-2.6 HPI: HOTSWAP Pluggable 2.6.2 hotswapped in: AT-SP10SR
11:14:06 awplus chassis[2751]: Automatically rebooting card 2.5 (AT-SBx81CFC960)
due to ISSU process
11:14:06 awplus chassis[2751]: Card 2.5 (AT-SBx81CFC960) has left the stack
11:14:07 awplus-2.6 HPI: HOTSWAP Chassis 0 hotswapped in: AT-SBx8106
11:14:07 awplus-2.6 HPI: HOTSWAP card 1 hotswapped in: AT-SBx81GP24
11:14:07 awplus-2.6 HPI: HOTSWAP card 5 hotswapped in: AT-SBx81CFC960
11:14:07 awplus-2.6 HPI: HOTSWAP PSU C hotswapped in: AT-SBxPWRSYS1/AC
11:14:07 awplus-2.6 HPI: SENSOR PSU slot C - Device Present: now OK
11:14:07 awplus-2.6 HPI: SENSOR PSU slot C - PSU Power Input: now OK
11:14:08 awplus-2.6 HPI: HOTSWAP FAN 1 hotswapped in: AT-SBxFAN06
11:14:08 awplus-2.6 HPI: SENSOR FAN 1 - Device Present: now OK
11:15:35 awplus chassis[2751]: Card 2.5 (AT-SBx81CFC960) has joined the stack

11:15:38 awplus IMI[3039]: All users returned to config mode while switch
synchronization is in progress.
11:15:59 awplus-2.5 HPI: HOTSWAP Pluggable 2.5.1 hotswapped in: AT-SP10SR
11:15:59 awplus-2.5 HPI: HOTSWAP Pluggable 2.5.4 hotswapped in: AT-SP10SR
11:15:59 awplus-2.5 HPI: HOTSWAP Pluggable 2.5.3 hotswapped in: AT-SP10SR
11:15:59 awplus-2.5 HPI: HOTSWAP Pluggable 2.5.2 hotswapped in: AT-SP10SR
11:18:10 awplus chassis[2751]: Automatically rebooting card 1.6 (AT-SBx81CFC960)
due to ISSU process
11:18:10 awplus chassis[2751]: Card 1.6 (AT-SBx81CFC960) has left the chassis
11:19:37 awplus chassis[2751]: Card 1.6 (AT-SBx81CFC960) has joined the chassis

11:19:40 awplus IMI[3039]: All users returned to config mode while switch
synchronization is in progress.
11:20:00 awplus-1.6 HPI: HOTSWAP Pluggable 1.6.1 hotswapped in: AT-SP10SR
11:20:00 awplus-1.6 HPI: HOTSWAP Pluggable 1.6.4 hotswapped in: AT-SP10SR
11:20:00 awplus-1.6 HPI: HOTSWAP Pluggable 1.6.3 hotswapped in: AT-SP10SR
11:20:00 awplus-1.6 HPI: HOTSWAP Pluggable 1.6.2 hotswapped in: AT-SP10SR
11:22:11 awplus chassis[2751]: Automatically rebooting card 1.5 (AT-SBx81CFC960)
due to ISSU process

URGENT: broadcast message:
System going down IMMEDIATELY!

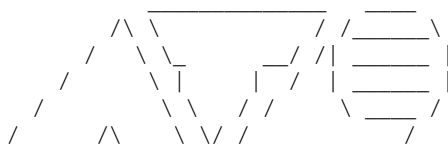
```

```
... Rebooting due to ISSU process ...
```

```
Flushing file system buffers...
Unmounting any remaining filesystems...
Restarting system.
```

```
Bootloader 3.0.5 loaded
Press <Ctrl+B> for the Boot Menu
```

```
Reading filesystem...
Loading flash:SBx81CFC960-5.4.4-1.2.rel...
Verifying release... OK
Booting...
Starting base/first... [ OK ]
Mounting virtual filesystems... [ OK ]
```



```
Allied Telesis Inc.
AlliedWare Plus (TM) v5.4.4
Current release filename:SBx81CFC960-5.4.4-1.2.rel
Original release filename: SBx81CFC960-5.4.4-1.2.rel
Built: Thu Jul 17 15:11:52 NZST 2014
```

```
Mounting static filesystems... [ OK ]
Checking flash filesystem... [ OK ]
Mounting flash filesystem... [ OK ]
Checking for last gasp debug output... [ OK ]
Checking NVS filesystem... [ OK ]
Mounting NVS filesystem... [ OK ]
Starting base/setup-eth... [ OK ]
Starting base/dbus... [ OK ]
Starting base/syslog... [ OK ]
Starting base/lif_ok... [ OK ]
Starting base/loopback... [ OK ]
Starting base/poe_done... [ OK ]
Starting base/sysctl... [ OK ]
Received event poefw.done
Starting base/portmapper... [ OK ]
Received event syslog.done
Starting base/reboot-stability... [ OK ]
Checking system reboot stability... [ OK ]
Starting base/cron... [ OK ]
Starting base/appmond... [ OK ]
Starting hardware/openhpi... [ OK ]
Starting hardware/timeout... [ OK ]
Starting base/inet... [ OK ]
Starting base/modules... [ OK ]
Received event modules.done
Received event board.inserted
Received event hardware.done
Starting network/startup... [ OK ]
Starting base/external-media... [ OK ]
Starting network/stackd... [ OK ]
Starting network/election.timeout... [ OK ]
Received event network.enabled
```

```
Initializing HA processes:
atmfd, auth, bgpd, cntrd, epsr, exfx, hostd
hsl, imiproxyd, irdpd, lacp, lldpd, loopprot, mstp
nsm, ospf6d, ospfd, pdmd, pim6d, pimd, ripd
ripngd, rmon, sflowd, udlld, vrrpd, imi

Received event network.initialized
11:23:40 awplus-1.5 chassis[2814]: Waiting for all chassis cards to
initialize...
11:23:41 awplus-1.5 chassis[2814]: Card 1.6 (AT-SBx81CFC960) has joined the
chassis
11:23:41 awplus-1.5 chassis[2814]: Card 1.6 (AT-SBx81CFC960) has become the
Active CFC
11:23:41 awplus-1.5 chassis[2814]: Stack Virtual MAC is 0000.cd37.0a57
11:23:41 awplus-1.5 chassis[2814]: Card 2.6 (AT-SBx81CFC960) has joined the
stack
11:23:41 awplus-1.5 chassis[2814]: Card 2.5 (AT-SBx81CFC960) has joined the
stack
11:23:41 awplus-1.5 chassis[2814]: Card 2.1 (AT-SBx81GP24) has joined the stack
11:23:41 awplus-1.5 chassis[2814]: Card 1.1 (AT-SBx81GP24) has joined the
chassis
Received event vcs.elected-slave
Assigning Hot-Standby Workload to HA processes:
11:24:05 awplus-1.5 HPI: HOTSWAP Pluggable 1.5.1 hotswapped in: AT-SP10SR
11:24:06 awplus-1.5 HPI: HOTSWAP Pluggable 1.5.4 hotswapped in: AT-SP10SR
11:24:06 awplus-1.5 HPI: HOTSWAP Pluggable 1.5.3 hotswapped in: AT-SP10SR
11:24:06 awplus-1.5 HPI: HOTSWAP Pluggable 1.5.2 hotswapped in: AT-SP10SR
bgpd, hsl, irdpd, lacpd, lldpd, loopprot, mstp
nsm, ospf6d, ospfd, pdmd, pim6d, pimd, ripd
ripngd, rmond, sflowd, vrrpd, authd, epsrd, imi
imiproxyd

Received event network.active

Loading configuration file from active CFC, please wait.
....

done!
Received event network.configured

awplus-1.5 login:

awplus-1.5 login: 11:26:16 awplus chassis[2742]: ISSU process has finished
rebooting CFCs
11:26:16 awplus chassis[2742]: Please reboot all cards running the previous
release to complete ISSU. Run "show card" for more information.
```

Verify ISSU progress

There are several commands you can execute during ISSU to verify progress. These are detailed below.

Confirm ISSU's state

To confirm the state of ISSU, use the **show issu** command:

```
awplus#show issu
ISSU configuration:
Rejoin timeout      : 10 mins (default)
Abort timeout       : 45 mins (default)

ISSU state          : Upgrading Active CFC
Old boot release    : SBx81CFC960-5.4.4-1.1.rel
New boot release    : SBx81CFC960-5.4.4-1.2.rel
Process started     : Thu Aug 14 11:10:02 2014
Process elapsed     : 00:15:10
Rejoin timer        : 00:06:59 remaining
Abort timer         : 00:29:50 remaining

Progress on CFCs:
card 1.5           : Upgrading
card 1.6           : Upgraded
card 2.5           : Upgraded
card 2.6           : Upgraded
```

Confirm each CFC's state

To confirm each CFC's state, use the **show card** command:

```
awplus#show card

Stack member 1

Card  Type          State
-----
1.1   AT-SBx81GP24      Online
1.2   -                  -
1.3   -                  -
1.4   -                  -
1.5   AT-SBx81CFC960   Syncing (Standby) *
1.6   AT-SBx81CFC960   Online (Active) *
-----

* ISSU is upgrading CFCs
```

Confirm the currently active software version

To confirm the currently active software version while ISSU is Active or In Progress, use the **show version** command. The release reported here is based on which release the currently Active CFC, or Stack Master is running:

```
awplus#show version

AlliedWare Plus (TM) 5.4.4 07/17/14 15:11:52

Build name : SBx81CFC960-5.4.4-1.2.rel*
Build date : Thu Jul 17 15:11:54 NZST 2014
Build type : RELEASE
* ISSU in progress - Run "show card detail" for more information
...

awplus#show system | begin Current software

...skipping
Current software   : SBx81CFC960-5.4.4-1.2.rel
Software version  : 5.4.4-1.2
Build date        : Thu Jul 17 15:11:54 NZST 2014

Warning: ISSU is currently in progress.
System may be running with different software versions

Current boot config: flash:/default.cfg (file exists)
...
```

Upgrade methods

ISSU supports upgrading via two methods: Flash and USB. However, although the USB method is supported, it is not recommended. As such, this How To Note only covers ISSU via Flash.

The behavior of USB is to set the system boot configuration of the switch to a release on a USB storage device. Each CFC then requires a USB storage device to be plugged in, from which the new software release will be booted.

To initiate an ISSU with a release on USB, refer to the below example:

```
awplus#issu boot usb:/SBx81CFC960-5.4.4-1.2.rel
```


Upgrading Line Interface Cards

Once the CFCs have finished upgrading, and synchronizing information, ISSU moves to the CFCs Upgraded state.

You can now verify which LIFs now need to be manually upgraded, or pre-configure this via a trigger. This is explained more in ["ISSU Triggers" on page 20](#).

```
awplus#show card

Stack member 1

Card  Type                State
-----
1.1   AT-SBx81GP24           Online *
1.2   -                      -
1.3   -                      -
1.4   -                      -
1.5   AT-SBx81CFC960        Online (Standby)
1.6   AT-SBx81CFC960        Online (Active)
-----

* Is running a different SW version to the Active CFC - needs a reboot

Stack member 2

Card  Type                State
-----
2.1   AT-SBx81GP24           Online *
2.2   -                      -
2.3   -                      -
2.4   -                      -
2.5   AT-SBx81CFC960        Online (Standby)
2.6   AT-SBx81CFC960        Online (Standby)
-----

* Is running a different SW version to the Active CFC - needs a reboot
awplus#
```

The software version running on each card can also be verified using the **show card detail** command:

```
awplus#show card detail | begin "Card 1.1"

...skipping
Card 1.1:
-----
Type                AT-SBx81GP24
State               Online
Uptime              0 days 01:19:21
Bootloader Version  2.0.7
Mac Address         eccd.6d03.2353
Software Version    5.4.4-1.1

awplus#show card detail | begin "Card 1.5"

...skipping
Card 1.5:
-----
Type                AT-SBx81CFC960
State               Online (Standby)
Uptime              0 days 00:46:57
Bootloader Version  3.0.5
Mac Address         eccd.6d9e.3304
Software Version    5.4.4-1.2
```

Example: manually rebooting line cards, and completing ISSU

```
awplus#reboot card 1.1
reboot card 1.1 system? (y/n): y
awplus#14:40:21 awplus chassis[2742]: Card 1.1 (AT-SBx81GP24) has left the chassis
14:40:21 awplus NSM[2753]: Removal event on unit 1.1 has been completed

awplus#14:41:04 awplus chassis[2742]: Card 1.1 (AT-SBx81GP24) has joined the
chassis

14:41:06 awplus IMI[2783]: All users returned to config mode while switch
synchronization is in progress.
14:41:16 awplus NSM[2753]: Insertion event on unit 2.1 has been completed
14:41:17 awplus IMI[2783]: Configuration update completed for port2.1.1-2.1.24

awplus#
awplus#reboot card 2.1
reboot card 2.1 system? (y/n): y
awplus#14:43:32 awplus chassis[2742]: Card 2.1 (AT-SBx81GP24) has left the stack
14:43:32 awplus chassis[2742]: ISSU process successfully completed.
14:43:32 awplus NSM[2753]: Removal event on unit 2.1 has been completed

awplus#
awplus#14:44:12 awplus chassis[2742]: Card 2.1 (AT-SBx81GP24) has joined the stack

14:44:15 awplus IMI[2783]: All users returned to config mode while switch
synchronization is in progress.
14:44:26 awplus NSM[2753]: Insertion event on unit 2.1 has been completed
14:44:27 awplus IMI[2783]: Configuration update completed for port2.1.1-2.1.24

awplus#show issu
ISSU configuration:
Rejoin timeout      : 10 mins (default)
Abort timeout       : 45 mins (default)

ISSU process is not in progress.
Last ISSU status : Completed successfully at Fri Aug 15 14:43:32 2014
```

ISSU Triggers

You can configure the chassis to match on several different ISSU states, and you can customize an action by using a script.

Triggers include:

- **Aborted**

If ISSU fails to successfully upgrade the chassis' CFCs, ISSU moves into the **Aborted** state. While this is an unlikely scenario, there are several different configurations or actions you may wish to occur in this state.

- **CFCs Upgraded**

This is the most commonly used ISSU trigger. This trigger executes as soon as the system is in the CFCs Upgraded state.

Refer to the following example for how to configure this:

```
awplus#edit reboot_lifs.scp
<Paste the following>
enable
reboot card 1.2
Y
wait 120
reboot card 1.3
Y
wait 120
reboot card 1.4
Y
wait 120
reboot card 1.11
Y
wait 120
reboot card 1.12
Y

awplus#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
awplus(config)#trigger 1
awplus(config-trigger)#type issu cfcs-upgraded
awplus(config-trigger)#description ISSU Trigger to reboot LIFs
awplus(config-trigger)#script 1 reboot_lifs.scp
awplus(config-trigger)#end

awplus#show trigger
TR# Type & Details      Description          Ac Te Tr Repeat      #Scr Days/Date
-----
001 ISSU cfcs-upgraded ISSU Trigger to r... Y  N  Y Continuous  1  smtwtfS
-----
```

For more detail, run the command **show trigger 1** command.

- **Completed**

This trigger executes as soon as the last LIF has been rebooted. There are several different configurations or actions you may wish to occur in this state.

For more on scripting, please refer to the AlliedWare Plus Tips and Tricks, or the Triggers section in the x8100 Software Reference Manual.

Troubleshooting ISSU

In the unlikely event that ISSU fails, the chassis will perform several steps to attempt to ensure device stability. The actions taken will depend on how far through the ISSU process the chassis is.

We recommend that a device administrator be present during the whole ISSU process.

We also recommend access to the device via a console connection, due to the nature of ISSU, where controller cards will be rebooting.

Note: If a new feature is introduced in a software upgrade, we advise that you do not enable or configure the new feature until all CFCs and line cards are running the new release, and ISSU has completed.

Common Standby/Slave Abort reasons

If ISSU fails while Standby or Slave CFCs are upgrading, ISSU aborts and prints the error reason to the permanent log. To view this log, use the **show log permanent** command. ISSU also prints the error to the output of the **show issu** command.

Note: If ISSU aborts and the Active CFC is still running the old release, ISSU will reset the Current Boot Image back to the original configuration.

The following are some common reasons why ISSU might fail.

1) Standby/Slave CFC automatically rebooted by ISSU cannot boot the new release

Action taken: If the Standby/Slave CFC is unable to boot the new release, it will gracefully reboot and boot the backup release. When the Slave CFC attempts to join the chassis/stack, ISSU will abort as it detects the Slave CFC running the wrong release, and no other controller cards will be rebooted.

Depending on the backup release that is configured, the Slave CFC may be auto-synced to the same release that is running on the Active CFC.

If no backup release is specified, user intervention may be required on the CFC's console port.

2) Standby/Slave CFC automatically rebooted by ISSU is physically removed from chassis

Action taken: ISSU will wait for the Slave/Standby CFC to rejoin for the period remaining in the ISSU **rejoin timer**. Once this timer expires, ISSU moves into the Aborted state, and no other controller cards will be rebooted.

3) Standby/Slave CFC still doing config-replay, or synchronizing when the ISSU rejoin timer expires

While unlikely, it is possible for the device configuration to be large enough that a 10 minute timer per controller card is not long enough. Testing of ISSU in-house has been completed with large configurations and found the default timer was satisfactory for most typical customer scenarios.

Action taken: If ISSU aborts due to a Standby/Slave CFC timing out, and the output from the specific CFC's console shows it was due to time taken for configuration, then we recommended that you increase ISSU's timers, as shown below:

```
awplus#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
awplus(config)#issu ?
  abort-timeout  Abort timeout
  rejoin-timeout Rejoin timeout for CFC

awplus(config)#issu abort-timeout ?
  <20-120> Timeout in minutes (default: 45)

awplus(config)#issu rejoin-timeout ?
  <7-30> Timeout in minutes (default: 10)
```

Once you have increased the timers and saved the configuration, you can attempt ISSU again.

Note: Ensure you increase the **abort-timeout** when changing the **rejoin-timeout**. The **abort-timeout** is a timer for the whole ISSU process during the Active phase. The default of 45 minutes is deemed satisfactory for most ISSU scenarios, including a standalone chassis, and VCStack Plus. In the case of VCStack Plus, the **abort-timeout** takes into account the upgrading and syncing of each controller card. If one CFC takes 12 minutes to complete, then it's fair to assume each CFC will take this long, meaning the default timer of 45 minutes is not long enough for the overall Active/Automatic phase.

Common Active/Master “Abort” reasons

If the state of ISSU is Upgrading Active CFC, and the old Active CFC fails to re-join, ISSU will not abort and instead change its state to CFCs Upgraded.

This is because all likely failure scenarios involve the old Active CFC no longer being able to boot correctly, or to rejoin the chassis correctly. ISSU will change state to CFCs Upgraded because every other CFC in the chassis or VCStack Plus is running the new software version.

ISSU will print an alert message to the log before this, stating the specific reason for the alert.

1) Active/Master CFC automatically rebooted by ISSU is unable to boot the new release

Action taken: If the Active/Master CFC cannot boot the new release, it will gracefully reboot and boot the backup release.

If no backup release is specified, user intervention is required on the CFC's console port.

If the CFC does not rejoin the chassis/stack before the rejoin timer expires, ISSU will change to the CFCs Upgraded state, but will also print an alert message to the other CFCs' consoles, and log.

Depending on the backup release configured, the chassis may attempt to auto-sync the CFC to the same release running on the new Active CFC.

2) Active/Master CFC automatically rebooted by ISSU is physically removed from chassis.

Action taken: ISSU waits for the old Active CFC to rejoin for the period remaining in the ISSU rejoin timer. Once this expires, ISSU will change to the CFCs Upgraded state, but will also print an alert message to the other CFCs' consoles, and log.