Managing Switch Stacks

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

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

Prerequisites for Switch Stacks

Restrictions for Switch Stacks

Information About Switch Stacks

Switch Stack Overview

A switch stack is a set of up to Catalyst switch connected through their ports. One of the switch controls the operation of the stack and is called the active switchstack's active switch. The active switchstack's active

switch and the other switch in the stack are stack members. Layer 2 protocol present the entire switch stack as a single entity to the network.

> **Note** A switch stack is different from a switch cluster. A switch cluster is a set of switch connected through their LAN ports, such as the 10/100/1000 ports. For more information about how switch stacks differ from switch clusters, see the "Planning and Creating Clusters" chapter in the Getting Started with Cisco Network Assistant on Cisco.com.

The master is the single point of stack-wide management. From the master, you configure:

- System-level (global) features that apply to all members
- Interface-level features for each member

Every member is uniquely identified by its own stack member number.

All members are eligible masters. If the master becomes unavailable, the remaining members elect a new master from among themselves. One of the factors is the stack member priority value. The switch with the highest stack-member priority-value becomes the master.

The system-level features supported on the master are supported on the entire stack.

The master contains the saved and running configuration files for the stack. The configuration files include the system-level settings for the stack and the interface-level settings for each member. Each member has a current copy of these files for back-up purposes.

You manage the stack through a single IP address. The IP address is a system-level setting and is not specific to the master or to any other member. You can manage the stack through the same IP address even if you remove the master or any other member from the stack.

You can use these methods to manage stacks:

- Network Assistant (available on Cisco.com)
- Command-line interface (CLI) over a serial connection to the console port of any member
- A network management application through the Simple Network Management Protocol (SNMP)

> **Note** Use SNMP to manage network features across the stack that are defined by supported MIBs. The switch does not support MIBs to manage stacking-specific features such as stack membership and election.

- CiscoWorks network management software.

Switch Stack Membership

A standalone switch is a switch stack with one stack member that also operates as the active switchstack's active switch. You can connect one standalone switch to another (Figure - Creating a Switch Stack from Two Standalone switch) to create a switch stack containing two stack members, with one of them as the active switchstack's active switch. You can connect standalone switch to an existing switch stack (Figure - Adding a Standalone switch to a Switch Stack) to increase the stack membership.

If you replace a stack member with an identical model, the new switch functions with exactly the same configuration as the replaced switch, assuming that the new switch is using the same member number as the replaced switch.

The operation of the switch stack continues uninterrupted during membership changes unless you remove the active switchstack's active switch or you add powered-on standalone switch or switch stacks.

> **Note**
> To prevent interrupted stack operations, make sure the switch that you add to or remove from the stack are powered off.
>
> After adding or removing stack members, make sure that the switch stack is operating at full bandwidth (Gb/s). Press the Mode button on a stack member until the Stack mode LED is on. The last two port LEDs on all switch in the stack should be green. If one or both of these LEDs are not green, the stack is not operating at full bandwidth.

- Adding powered-on switch (merging) causes the active switchstack's active switch of the merging switch stacks to elect a active switchstack's active switch from among themselves. The new active switchstack's active switch keeps its role and configuration and so do its members. All remaining switch, including the former masters, reload and join the stack as members. They change their member numbers to the lowest available numbers and use the configuration of the new master.
- Removing powered-on members divides (partitions) the stack into two or more switch stacks, each with the same configuration. This can create an IP address configuration conflict in your network. If you want the stacks to remain separate, change the IP address or addresses of the newly created stacks.

Figure 1: Creating a Switch Stack from Two Standalone Switches
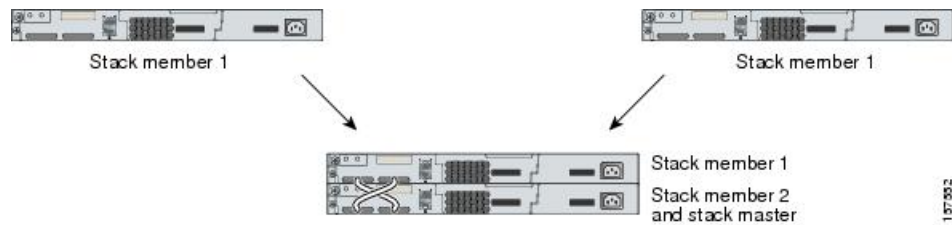
Figure 2: Adding a Standalone Switch to a Switch Stack
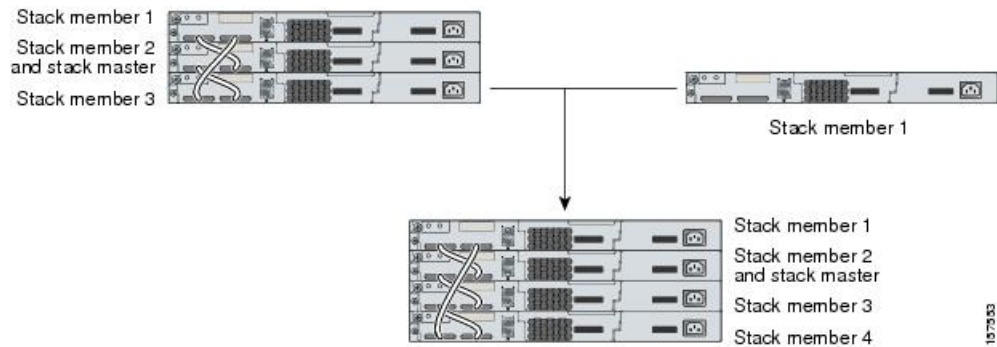
Master Election

The active switchstack's active switch is elected based on one of these factors in the order listed:

1. The switch that is currently the active switchstack's active switch.

2. The switch with the highest stack member priority value.

Note We recommend you assign the highest priority value to the switch that you want to be the master. The switch is then re-elected as master if a re-election occurs.

A active switchstack's active switch keeps its role unless one of these events occurs:

- The stack is reset.*
- The master is removed from the stack.
- The master is reset or powered off.
- The master fails.
- The stack membership is increased by adding powered-on standalone switch or switch stacks.*

In the events marked by an asterisk (*), the current active switchstack's active switch might be re-elected based on the listed factors.

When you power on or reset an entire stack, some stack members might not participate in the master election.

- All members participate in re-elections.

- Members that are powered on within the same 20-second time frame participate in the master election and have a chance to become the master.

- Members that are powered on after the 20-second time frame do not participate in this initial election and only become members.

The new master is available after a few seconds. In the meantime, the switch stack uses the forwarding tables in memory to minimize network disruption. The physical interfaces on the other available stack members are not affected while a new active switchstack's active switch is elected and is resetting.

When a new master is elected and the previous stack master becomes available, the previous master does not resume its role as active switchstack's active switch.

For all powering considerations that affect active switchstack's active switch elections, see the "Switch Installation" chapter in the hardware installation guide.

Stack MAC Address

The MAC address of the master determines the stack MAC address.

When the stack initializes, the MAC address of the master determines the bridge ID that the stack in the network.

If the master changes, the MAC address of the new master determines the new bridge ID. However, when the persistent MAC address feature is enabled, there is an approximate 4-minute delay before the stack MAC address changes. During this time period, if the previous master rejoins the stack, the stack continues to use its MAC address as the stack MAC address, even if the switch is now a member and not a master. If the previous master does not rejoin the stack during this period, the stack takes the MAC address of the new active switchstack's active switch as the stack MAC address. See the *Enabling Persistent MAC Address* section for more information.

Member Numbers

The member number (1 to) identifies each member in the stack. The member number also determines the interface-level configuration that a member uses.

A new, out-of-the-box switch (one that has not joined a stack or has not been manually assigned a member number) ships with a default member number of 1. When it joins a stack, its default stack member number changes to the lowest available member number in the stack.

Members in the same stack cannot have the same member number.

- If you manually change the member number by using the **switch** *current-stack-member-number* **renumber** *new-stack-member-number* global configuration command, the new number goes into effect after that member resets (or after you use the **reload slot** *stack-member-number* privileged EXEC command) and only if that number is not already changed.

  You can also change the stack member number is by using the SWITCH_NUMBER environment variable.

  If the number is being used by another member in the stack, the switch selects the lowest available number in the stack.

  If you manually change the member number and no interface-level configuration is associated with that number, that member resets to its default configuration.

  You cannot use the **switch** *current-stack-member-number* **renumber** *new-stack-member-number* global configuration command on a provisioned switch. If you do, the command is rejected.

- If you move a stack member to a different switch stack, the stack member keeps its number only if the number is not being used by another member in the stack. If it is being used by another member in the stack, the switch selects the lowest available number in the stack.

See the following sections for information about stack member configuration:

- The procedure to change a member number, see the *Assigning a Member Number* section.

- The SWITCH_NUMBER environment variable, see the *Controlling Environment Variables* section.

- Member numbers and configurations, see the *Stack Configuration Files* section.

- Merging stacks, see the *Stack Membership* section.

Member Priority Values

A higher priority value for a stack member increases the chance that it will be elected active switchstack's active switch and keep its member number. The priority value can be 1 to 15. The default priority value is 1.

Note We recommend that you assign the highest priority value to the switch that you want to be the active switchstack's active switch. The switch is then re-elected as master if a re-election occurs.

The new priority value takes effect immediately but does not affect the current master until the current master or the stack resets.

Stack Offline Configuration

You can use the offline configuration feature to provision (to configure) a new switch before it joins the stack. You can configure the member number, the switch type, and the interfaces associated with a switch that is not yet part of the stack. That configuration is the provisioned configuration. The switch to be added to the stack and to get this configuration is the provisioned switch.

The provisioned configuration is automatically created when a switch is added to a stack and when no provisioned configuration exists. You can manually create the provisioned configuration by using the switch stack-member-number provision type global configuration command.

When you configure the interfaces for a provisioned switch (for example, as part of a VLAN), the information appears in the stack running configuration whether or not the provisioned switch is part of the stack. The interface for the provisioned switch is not active and does not appear in the display of a specific feature (for example, in the show vlan user EXEC command output). Entering the no shutdown interface configuration command has no effect.

The startup configuration file ensures that the stack can reload and can use the saved information whether or not the provisioned switch is part of the stack.

Effects of Adding a Provisioned Switch to a Switch Stack

When you add a provisioned Switch to the switch stack, the stack applies either the provisioned configuration or the default configuration. This table lists the events that occur when the switch stack compares the provisioned configuration with the provisioned switch.

Table 1: Results of Comparing the Provisioned Configuration with the Provisioned Switch

Scenario		Result
The stack member numbers and the Switch types match.	1. If the stack member number of the provisioned switch matches the stack member number in the provisioned configuration on the stack, and 2. If the Switch type of the provisioned switch matches the Switch type in the provisioned configuration on the stack.	The switch stack applies the provisioned configuration to the provisioned switch and adds it to the stack.
The stack member numbers match but the Switch types do not match.	1. If the stack member number of the provisioned switch matches the stack member number in the provisioned configuration on the stack, but 2. The Switch type of the provisioned switch does not match the Switch type in the provisioned configuration on the stack.	The switch stack applies the default configuration to the provisioned switch and adds it to the stack. The provisioned configuration is changed to reflect the new information.
The stack member number is not found in the provisioned configuration.		The switch stack applies the default configuration to the provisioned switch and adds it to the stack. The provisioned configuration is changed to reflect the new information.

Scenario		Result
The stack member number of the provisioned switch is not found in the provisioned configuration.		The switch stack applies the default configuration to the provisioned switch and adds it to the stack.

If you add a provisioned switch that is a different type than specified in the provisioned configuration to a powered-down switch stack and then apply power, the switch stack rejects the (now incorrect) **switch** *stack-member-number* **provision** *type* global configuration command in the startup configuration file. However, during stack initialization, the nondefault interface configuration information in the startup configuration file for the provisioned interfaces (potentially of the wrong type) is executed. Depending on the differences between the actual Switch type and the previously provisioned switch type, some commands are rejected, and some commands are accepted.

Note If the switch stack does not contain a provisioned configuration for a new Switch, the Switch joins the stack with the default interface configuration. The switch stack then adds to its running configuration with a **switch** *stack-member-number* **provision** *type* global configuration command that matches the new Switch. For configuration information, see the *Provisioning a New Member for a Switch Stack* section.

Effects of Replacing a Provisioned Switch in a Switch Stack

When a provisioned switch in a switch stack fails, it is removed from the stack, and is replaced with another Switch, the stack applies either the provisioned configuration or the default configuration to it. The events that occur when the switch stack compares the provisioned configuration with the provisioned switch are the same as those when you add a provisioned switch to a stack.

Effects of Removing a Provisioned Switch from a Switch Stack

If you remove a provisioned switch from the switch stack, the configuration associated with the removed stack member remains in the running configuration as provisioned information. To completely remove the configuration, use the **no switch** *stack-member-number* **provision** global configuration command.

Stack Software Compatibility Recommendations

All stack members must run the same Cisco IOS software version to ensure compatibility in the stack protocol version among the members.

Stack Protocol Version

Each software image includes a *stack protocol version*. The stack protocol version has a *major* version number and a *minor* version number (for example 1.4, where 1 is the major version number and 4 is the minor version number). Both version numbers determine the level of compatibility among the stack members.

The switches with the same Cisco IOS software version have the same stack protocol version. Such switches are fully compatible, and all features function properly across the switch stack. A device with the same Cisco IOS software version as the active switch can immediately join the switch stack.

If an incompatibility exists, the fully functional stack members generate a system message that describes the cause of the incompatibility on the specific stack members. The active switch sends the message to all stack members.

For more information, see the *Major Version Number Incompatibility Among Switches* procedure and the *Minor Version Number Incompatibility Among Switches* procedure.

Major Stack Protocol Version Number Incompatibility Among Stack-Capable Switches

Switch with different major Cisco IOS software versions usually have different stack protocol versions. Switch with different major version numbers are incompatible and cannot exist in the same switch stack.

Minor Version Number Incompatibility Among Switches

switch with the same major version number but with a different minor version number as the master are considered partially compatible. When connected to a stack, a partially compatible switch enters version-mismatch mode and cannot join the stack as a fully functioning member. The software detects the mismatched software and tries to upgrade (or downgrade) the switch in version-mismatch mode with the stack image or with a tar file image from the stack flash memory. The software uses the automatic upgrade (auto-upgrade) and the automatic advise (auto-advise) features.

The port LEDs on switch in version-mismatch mode will also stay off. Pressing the Mode button does not change the LED mode.

Note Auto-advise and auto-copy identify which images are running by examining the info file and by searching the directory structure on the switch stack. If you download your image by using the **copy tftp:** command instead of by using the **archive download-sw** privileged EXEC command, the correct directory structure is not properly created. For more information about the info file, see the *tar File Format of Images on a Server* or *Cisco.com* section.

Understanding Auto-Upgrade and Auto-Advise

When the software detects mismatched software and tries to upgrade the Switch in VM mode, two software processes are involved: automatic upgrade and automatic advise.

- The automatic upgrade (auto-upgrade) process includes an auto-copy process and an auto-extract process. By default, auto-upgrade is enabled (the boot auto-copy-sw global configuration command is enabled). You can disable auto-upgrade by using the no boot auto-copy-sw global configuration command on the active switchstack's active switch. You can check the status of auto-upgrade by using the show boot privileged EXEC command and by checking the Auto upgrade line in the display.

  - Auto-copy automatically copies the software image running on any stack member to the Switch in VM mode to upgrade (auto-upgrade) it. Auto-copy occurs if auto-upgrade is enabled, if there is enough flash memory in the Switch in VM mode, and if the software image running on the switch stack is suitable for the Switch in VM mode.

    Note A Switch in VM mode might not run all released software. For example, new Switch hardware is not recognized in earlier versions of software.

  - Automatic extraction (auto-extract) occurs when the auto-upgrade process cannot find the appropriate software in the stack to copy to the Switch in VM mode. In that case, the auto-extract process searches all Switch in the stack, whether they are in VM mode or not, for the tar file needed to upgrade the switch stack or the Switch in VM mode. The tar file can be in any flash file system in

the switch stack (including the Switch in VM mode). If a tar file suitable for the Switch in VM mode is found, the process extracts the file and automatically upgrades that Switch.

The auto-upgrade (auto-copy and auto-extract) processes wait for a few minutes after the mismatched software is detected before starting.

When the auto-upgrade process is complete, the Switch that was in VM mode reloads and joins the stack as a fully functioning member. If you have both StackWise Plus cables connected during the reload, network downtime does not occur because the switch stack operates on two rings.

- Automatic advise (auto-advise) occurs when the auto-upgrade process cannot find appropriate stack member software to copy to the Switch in VM mode. This process tells you the command (archive copy-sw or archive download-sw privileged EXEC command) and the image name (tar filename) needed to manually upgrade the switch stack or the Switch in VM mode. The recommended image can be the running switch stack image or a tar file in any flash file system in the switch stack (including the Switch in VM mode). If an appropriate image is not found in the stack flash file systems, the auto-advise process tells you to install new software on the switch stack. Auto-advise cannot be disabled, and there is no command to check its status.

The auto-advise software does not give suggestions when the switch stack software and the software of the Switch in VM mode do not contain the same feature sets. For example, if the switch stack is running the IP base image and you add a Switch that is running the IP services image, the auto-advise software does not provide a recommendation.

You can use the **archive-download-sw /allow-feature-upgrade** privileged EXEC command to allow installing an different software image.

Examples of Auto-Advise Messages

When you add a switch that has a different minor version number to the switch stack, the software displays messages in sequence (assuming that there are no other system messages generated by the switch).

This example shows that the switch stack detected a new switch that is running a different minor version number than the switch stack. Auto-copy starts, finds suitable software to copy from a stack member to the switch in VM mode, upgrades the switch in VM mode, and then reloads it:

```
*Mar 11 20:31:19.247:%STACKMGR-6-STACK_LINK_CHANGE:Stack Port 2 Switch 2 has changed to
state UP
*Mar 11 20:31:23.232:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the
stack(VERSION_MISMATCH)
*Mar 11 20:31:23.291:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the
stack(VERSION_MISMATCH) (Stack_1-3)
*Mar 11 20:33:23.248:%IMAGEMGR-6-AUTO_COPY_SW_INITIATED:Auto-copy-software process initiated
 for switch number(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Searching for stack member to act
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:as software donor...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Found donor (system #2) for
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:member(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System software to be uploaded:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System Type: 0x00000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving c2960x-universalk9-mz.150-2.EX1
(directory)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving c2960x-universalk9-mz.150-2.EX1.bin
 (4945851 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving
c2960x-universalk9-mz.150-2.EX1/info(450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:examining image...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
```

```
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting
c2960x-universalk9-mz.150-2.EX1/info(450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Stacking Version Number:1.4
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System Type: 0x00000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Ios Image File Size: 0x004BA200
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Total Image File Size:0x00818A00
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Minimum Dram required:0x08000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Suffix:universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Directory:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Name:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image 1:flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Old image will be deleted after download.
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Extracting images from archive into flash on
 switch 1...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:c2960x-universalk9-mz.150-2.EX1 (directory)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting
c2960x-universalk9-mz.150-2.EX1/c2960x-universalk9-mz.150-2.EX1 (4945851 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting c2960x-universalk9-mz.150-2.EX1/info
 (450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Installing
(renaming):`flash1:update/c2960x-universalk9-mz.150-2.EX1' ->
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: `flash1:c2960x-universalk9-mz.150-2.EX1'
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:New software image installed in
flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Removing old
image:flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:All software images installed.
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Requested system reload in progress...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Software successfully copied to
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:system(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Done copying software
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Reloading system(s) 1
```

This example shows that the switch stack detected a new switch that is running a different minor version number than the switch stack. Auto-copy launches but cannot find software in the stack to copy to the switch in version-mismatch mode to make it compatible with the stack. The auto-advise process starts and recommends that you download a tar file from the network to the switch in version-mismatch mode:

```
*Mar 1 00:01:11.319:%STACKMGR-6-STACK_LINK_CHANGE:Stack Port 2 Switch 2 has changed to state
 UP
*Mar 1 00:01:15.547:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the stack
(VERSION_MISMATCH)
stack_2#
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW_INITIATED:Auto-copy-software process initiated
 for switch number(s) 1
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:Searching for stack member to act
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:as software donor...
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:Software was not copied
*Mar 1 00:03:15.562:%IMAGEMGR-6-AUTO_ADVISE_SW_INITIATED:Auto-advise-software process
initiated for switch number(s) 1
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:Systems with incompatible software
```

```
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:have been added to the stack. The
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:storage devices on all of the stack
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:members have been scanned, and it has
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:been determined that the stack can be
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:repaired by issuing the following
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:command(s):
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW: archive download-sw /force-reload /overwrite
 /dest 1 flash1:c2960x-universalk9-mz.150-2.EX1.tar
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
```

For information about using the **archive download-sw** privileged EXEC command, see the *Working with Software Images* section.

Incompatible Software and Stack Member Image Upgrades

You can upgrade a Switch that has an incompatible universal software image by using the archive copy-sw privileged EXEC command. It copies the software image from an existing stack member to the one with incompatible software. That Switch automatically reloads and joins the stack as a fully functioning member.

Switch Stack Configuration Files

The active switch has the saved and running configuration files for the switch stack. All stack members periodically receive synchronized copies of the configuration files from the active switch. If the active switch becomes unavailable, any stack member assuming the role of active switch has the latest configuration files.

The configuration files record these settings:

- System-level (global) configuration settings such as IP, STP, VLAN, and SNMP settings that apply to all stack members

- Stack member interface-specific configuration settings that are specific for each stack member

Note The interface-specific settings of the active switch are saved if the active switch is replaced without saving the running configuration to the startup configuration.

A new, out-of-box device joining a switch stack uses the system-level settings of that switch stack. If a device is moved to a different switch stack before it is powered on, that device loses its saved configuration file and uses the system-level configuration of the new switch stack. If the device is powered on as a standalone device before it joins the new switch stack, the stack will reload. When the stack reloads, the new device may become the device, retain its configuration and overwrite the configuration files of the other stack members.

The interface-specific configuration of each stack member is associated with the stack member number. Stack members retain their numbers unless they are manually changed or they are already used by another member in the same switch stack. If the stack member number changes, the new number goes into effect after that stack member resets.

- If an interface-specific configuration does not exist for that member number, the stack member uses its default interface-specific configuration.

- If an interface-specific configuration exists for that member number, the stack member uses the interface-specific configuration associated with that member number.

If you replace a failed member with an identical model, the replacement member automatically uses the same interface-specific configuration as the failed device. You do not need to reconfigure the interface settings. The replacement device (referred to as the provisioned device) must have the same stack member number as the failed device.

You back up and restore the stack configuration in the same way as you would for a standalone device configuration.

Switch Stack Management Connectivity

You manage the switch stack and the stack member interfaces through the active switch. You can use the CLI, SNMP, and any of the supported network management applications. You cannot manage stack members on an individual device basis.

Connectivity to the Switch Stack Through an IP Address

The switch stack is managed through a single IP address. The IP address is a system-level setting and is not specific to the active stack or to any other stack member. You can still manage the stack through the same IP address even if you remove the active stack or any other stack member from the stack, provided there is IP connectivity.

Note
Stack members retain their IP addresses when you remove them from a switch stack. To avoid a conflict by having two devices with the same IP address in your network, change the IP addresses of any active stack that you remove from the switch stack.

For related information about switch stack configurations, see the *Switch Stack Configuration Files section*.

Connectivity to the Switch Stack Through an SSH Session

The Secure Shell (SSH) connectivity to the stack can be lost if a active switchstack's active switch running the cryptographic version fails and is replaced by a switch that is running a noncryptographic version. We recommend that a switch running the cryptographic version of the software be the active switchstack's active switch. Encryption features are unavailable if the active switchstack's active switch is running the noncryptographic software image.

Connectivity to the Switch Stack Through Console Ports or Ethernet Management Ports

You can connect to the active switch by using one of these methods:

• You can connect a terminal or a PC to the active switch through the console port of one or more stack members.

• You can connect a PC to the active switch through the Ethernet management ports of one or more stack members. For more information about connecting to the switch stack through Ethernet management ports, see the *Using the Ethernet Management Port section*.

You can connect to the active switch by connecting a terminal or a PC to the active switch through the console port of one or more stack members.

When you use the console port of a stack member, a VTY session is created with the IP address in the 192.168.0.1/24 subnet.

Be careful when using multiple CLI sessions to the active switch. Commands that you enter in one session are not displayed in the other sessions. Therefore, it is possible that you might not be able to identify the session from which you entered a command.

We recommend using only one CLI session when managing the switch stack.

Connectivity to Specific Stack Members

If you want to configure a specific member port, you must include the stack member number in the CLI notation.

To access a specific member, see the *Accessing the CLI of a Specific Member* section.

Switch Stack Configuration Scenarios

Most of these switch stack configuration scenarios assume that at least two switch are connected through their ports.

Table 2: Configuration Scenarios

Scenario		Result
Active switch election specifically determined by existing active switches	Connect two powered-on switch stacks through the ports.	Only one of the two active switches becomes the new active switch.
Active switch election specifically determined by the stack member priority value	1. Connect two switches through their ports. 2. Use the **switch** *stack-member-number* **priority** *new-priority-number* global configuration command to set one stack member with a higher member priority value. 3. Restart both stack members at the same time.	The stack member with the higher priority value is elected active switch.
Active switch election specifically determined by the configuration file	Assuming that both stack members have the same priority value: 1. Make sure that one stack member has a default configuration and that the other stack member has a saved (nondefault) configuration file. 2. Restart both stack members at the same time.	The stack member with the saved configuration file is elected active switch.
Active switch election specifically determined by the MAC address	Assuming that both stack members have the same priority value, configuration file, and feature set, restart both stack members at the same time.	The stack member with the lower MAC address is elected active switch.

Scenario		Result
Stack member number conflict	Assuming that one stack member has a higher priority value than the other stack member: 1. Ensure that both stack members have the same stack member number. If necessary, use the **switch** *current-stack-member-number* **renumber** *new-stack-member-number* global configuration command. 2. Restart both stack members at the same time.	The stack member with the higher priority value retains its stack member number. The other stack member has a new stack member number.
Add a stack member	1. Power off the new switch. 2. Through their ports, connect the new switch to a powered-on switch stack. 3. Power on the new switch.	The active switch is retained. The new switch is added to the switch stack.
Active switch failure	Remove (or power off) the active switch.	One of the remaining stack members becomes the new active switch. All other stack members in the stack remain as stack members and do not reboot.
	1. Through their ports, connect switch. 2. Power on all switch.	Two switch become active switches. One active switch has stack members. The other active switch remains as a standalone switch. Use the Mode button and port LEDs on the switch to identify which switch are active switches and which switch belong to each active switch.

How to Configure a Switch Stack

Default Switch Stack Configuration

The table shows the default switch stack configuration.

Table 3: Default Switch Stack Configuration

Feature	Default Setting
Stack MAC address timer	Disabled.
Stack member number	1

Stack member priority value	1
Offline configuration	The switch stack is not provisioned.
Persistent MAC address	Disabled.

Enabling the Persistent MAC Address Feature

The MAC address of the active switch determines the stack MAC address. When an active switch is removed from the stack and a new active switch takes over, the MAC address of the new active switch to become the new stack MAC address. However, you can set the persistent MAC address feature with a time delay before the stack MAC address changes. During this time period, if the previous active switch rejoins the stack, the stack continues to use that MAC address as the stack MAC address, even if the device is now a member and not an active switch. You can also configure stack MAC persistency so that the stack MAC address never changes to the new active switch MAC address.

Note　When you enter the command to configure this feature, a warning message appears with the consequences of your configuration. You should use this feature cautiously. Using the old active switch MAC address elsewhere in the same domain could result in lost traffic.

You can configure the time period as 0 to 60 minutes.

- If you enter the command with no value, the default delay is 4 minutes. We recommend that you always enter a value. If the command is entered without a value, the time delay appears in the running-config file with an explicit timer value of 4 minutes.

- If you enter **0**, the stack MAC address of the previous active switch is used until you enter the **no stack-mac persistent timer** command, which immediately changes the stack MAC address to that of the current active switch of the stack. If you do not enter the **no stack-mac persistent timer** command, the stack MAC address never changes.

- If you enter a time delay of 1 to 60 minutes, the stack MAC address of the previous active switch is used until the configured time period expires or until you enter the **no stack-mac persistent timer** command.

Note　If the entire switch stack reloads, it uses the MAC address of the stack's active switch as the stack MAC address.

Follow these steps to enable persistent MAC address:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **stack-mac persistent timer** [**0** | *time-value*]
4. **end**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** Device> **enable**	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Device# **configure terminal**	Enters global configuration mode.
Step 3	**stack-mac persistent timer** [**0** | *time-value*] **Example:** Device(config)# **stack-mac persistent timer 7**	Enables a time delay after a stack-active switch change before the stack MAC address changes to that of the new ac. If the previous active switch rejoins the stack during this period, the stack uses that MAC address as the stack MAC address. You can configure the time period as 0 to 60 minutes. • Enter the command with no value to set the default delay of approximately 4 minutes. We recommend that you always enter a value. If the command is entered without a value, the time delay appears in the running-config file with an explicit timer value of 4 minutes. • Enter **0** to continue using the MAC address of the current active switch indefinitely. The stack MAC address of the previous active switch is used until you enter the **no stack-mac persistent timer** command, which immediately changes the stack MAC address to that of the current active switch. • Enter a *time-value* from 1 to 60 minutes to configure the time period before the stack MAC address changes to the new active switch. The stack MAC address of the previous active switch is used until the configured time period expires or until you enter the **no stack-mac persistent timer** command. **Note** If you enter the **no stack-mac persistent timer** command after a new active switch takes over, before the time expires, the switch stack moves to the current active switch MAC address.

	Command or Action	**Purpose**
Step 4	**end** **Example:** Device(config)# **end**	Returns to privileged EXEC mode.
Step 5	**copy running-config startup-config** **Example:** Device# **copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

What to do next

Use the **no stack-mac persistent timer** global configuration command to disable the persistent MAC address feature.

Assigning Stack Member Information

-

Assigning a Stack Member Number

This optional task is available only from the active stack.

Follow these steps to assign a member number to a stack member:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **switch** *current-stack-member-number* **renumber** *new-stack-member-number*
4. **end**
5. **reload slot** *stack-member-number*
6. **show switch**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** Switch> **enable**	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:**	Enters global configuration mode.

	Command or Action	**Purpose**
	Switch# **configure terminal**	
Step 3	**switch** *current-stack-member-number* **renumber** *new-stack-member-number* **Example:** Switch(config)# **switch 3 renumber 4**	You can display the current stack member number by using the **show switch** user EXEC command.
Step 4	**end** **Example:** Switch(config)# **end**	Returns to privileged EXEC mode.
Step 5	**reload slot** *stack-member-number* **Example:** Switch# **reload slot 4**	Resets the stack member.
Step 6	**show switch** **Example:** **show**Switch	Verify the stack member number.
Step 7	**copy running-config startup-config** **Example:** Switch# **copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Setting the Stack Member Priority Value

This optional task is available only from the active stack.

Follow these steps to assign a priority value to a stack member:

SUMMARY STEPS

1. **enable**
2. **switch** *stack-member-number* **priority** *new-priority-number*
3. **show switch** *stack-member-number*
4. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** Switch **enable**	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**switch** *stack-member-number* **priority** *new-priority-number* **Example:** Switch# **switch 3 priority 2**	You can display the current priority value by using the **show switch** user EXEC command. The new priority value takes effect immediately but does not affect the current active stack. The new priority value helps determine which stack member is elected as the new active stack when the current active stack or switch stack resets.
Step 3	**show switch** *stack-member-number* **Example:** Switch# **show switch**	Verify the stack member priority value.
Step 4	**copy running-config startup-config** **Example:** Switch# **copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Provisioning a New Member for a Switch Stack

Note   This task is available only from the active switchstack's active switch.

To remove provisioned information and to avoid receiving an error message, remove the specified Switch from the stack before you use the no form of this command.

For example, if you are removing a provisioned Switch in a stack with this configuration:

- The stack has four members
- Stack member 1 is the master
- Stack member 3 is a provisioned switch

To remove the provisioned information and to avoid receiving an error message, you can remove power from stack member 3, disconnect the StackWise Plus cables between the stack member 3 and Switch to which it is connected, reconnect the cables between the remaining stack members, and enter the no switch stack-member-number provision global configuration command.

Follow these steps to provision a new member for a switch stack: This procedure is optional.

SUMMARY STEPS

1.   **enable**

2. **show switch**
3. **configure terminal**
4. **switch** *stack-member-number* **provision type**
5. **end**
6. **show running-config**
7. **show switch** *stack-member-number*
8. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** `Switch>` **`enable`**	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show switch**	Display summary information about the switch stack.
Step 3	**configure terminal** **Example:** `Switch#` **`configure terminal`**	Enters global configuration mode.
Step 4	**switch** *stack-member-number* **provision type**	Specify the stack member number for the preconfigured Switch. By default, no Switch are provisioned. For stack-member-number, the range is 1 to 9. Specify a stack member number that is not already used in the switch stack. See Step 1. For type, enter the model number of a supported Switch that is listed in the command-line help strings.
Step 5	**end** **Example:** `Switch(config)#` **`end`**	Returns to privileged EXEC mode.
Step 6	**show running-config** **Example:** `Switch#` **`show running-config`**	Verifies your entries.
Step 7	**show switch** *stack-member-number*	Verify the status of the provisioned switch. For stack-member-number, enter the same number as in Step 1.

	Command or Action	Purpose
Step 8	**copy running-config startup-config** **Example:** Switch# **copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Changing the Stack Membership

If you remove powered-on members but do not want to partition the stack:

SUMMARY STEPS

1. Power off the newly created stacks.
2. Reconnect them to the original stack through their ports.
3. Power on the switch.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Power off the newly created stacks.	
Step 2	Reconnect them to the original stack through their ports.	
Step 3	Power on the switch.	

Accessing the CLI of a Specific Stack Member

Note   This task is only for debugging purposes, and is only available from the master.

You can access all or specific members by using the **remote command** {**all** | *stack-member-number*} privileged EXEC command. The stack member number range is 1 to 9.

You can access specific members by using the session *stack-member-number* privileged EXEC command. The member number is appended to the system prompt. For example, the prompt for member 2 is Switch-2#, and system prompt for the master is Switch#. Enter exit to return to the CLI session on the master. Only the **show** and **debug** commands are available on a specific member.

Displaying Stack Information

To display saved configuration changes after resetting a specific member or the stack, use these privileged EXEC commands:

Table 4: Commands for Displaying Stack Information

Command	Description
show platform stack passive-links all	Display all stack information, such as the stack protocol version.

show switch	Display summary information about the stack, including the status of provisioned switches and switch in version-mismatch mode.
show switch *stack-member-number*	Display information about a specific member.
show switch detail	Display detailed information about the stack ring.
show switch neighbors	Display the stack neighbors.
show switch stack-ports	Display port information for the stack.

Troubleshooting Stacks

•

Manually Disabling a Stack Port

If a stack port is flapping and causing instability in the stack ring, to disable the port, enter the **switch** *stack-member-number* **stack port** *port-number* **disable** privileged EXEC command. To re-enable the port, enter the **switch** *stack-member-number* **stack port** *port-number* **enable** command.

> **Note** Be careful when using the **switch** *stack-member-number* **stack port** *port-number* **disable** command. When you disable the stack port, the stack operates at half bandwidth.

- A stack is in the *full-ring* state when all members are connected through the stack ports and are in the ready state.
- The stack is in the *partial-ring* state when

  - All members are connected through the stack ports, but some all are not in the ready state.
  - Some members are not connected through the stack ports.

When you enter the **switch** *stack-member-number* **stack port** *port-number* **disable** privileged EXEC command and

- The stack is in the full-ring state, you can disable only one stack port. This message appears:

  ```
  Enabling/disabling a stack port may cause undesired stack changes. Continue?[confirm]
  ```

- The stack is in the partial-ring state, you cannot disable the port. This message appears:

  ```
  Disabling stack port not allowed with current stack configuration.
  ```

Re-Enabling a Stack Port While Another Member Starts

Stack Port 1 on Switch 1 is connected to Port 2 on Switch 4. If Port 1 is flapping, disable Port 1 with the **switch 1 stack port 1 disable** privileged EXEC command.

While Port 1 on Switch 1 is disabled and Switch 1 is still powered on:

- Disconnect the stack cable between Port 1 on Switch 1 and Port 2 on Switch 4.
- Remove Switch 4 from the stack.
- Add a switch to replace Switch 4 and assign it switch-number 4.
- Reconnect the cable between Port 1 on Switch 1 and Port 2 on Switch 4 (the replacement switch).

- Re-enable the link between the Switch. Enter the **switch 1 stack port 1 enable** privileged EXEC command to enable Port 1 on Switch 1.
- Power on Switch 4.

Note Caution: Powering on Switch 4 before enabling the Port 1 on Switch 1 might cause one of the switches to reload.

If Switch 4 is powered on first, you might need to enter the **switch 1 stack port 1 enable** and the **switch 4 stack port 2 enable** privileged EXEC commands to bring up the link.

Understanding the show switch stack-ports summary Output

Only Port 1 on stack member 2 is disabled.

```
Switch# show switch stack-ports summary
Switch#/ Stack Neighbor Cable Link Link Sync # In
Port# Port Length OK Active OK Changes Loopback
Status To LinkOK
-------- ------ -------- -------- ---- ------ ---- --------- --------
1/1 OK 3 50 cm Yes Yes Yes 1 No
1/2 Down None 3 m Yes No Yes 1 No
2/1 Down None 3 m Yes No Yes 1 No
2/2 OK 3 50 cm Yes Yes Yes 1 No
3/1 OK 2 50 cm Yes Yes Yes 1 No
3/2 OK 1 50 cm Yes Yes Yes 1 No
```

Table 5: show switch stack-ports summary Command Output

Field	Description
Switch#/Port#	Member number and its stack port number.
Stack Port Status	• Absent—No cable is detected on the stack port. • Down—A cable is detected, but either no connected neighbor is up, or the stack port is disabled. • OK—A cable is detected, and the connected neighbor is up.
Neighbor	Switch number of the active member at the other end of the stack cable.
Cable Length	Valid lengths are 50 cm, 1 m, or 3 m. If the switch cannot detect the cable length, the value is no cable. The cable might not be connected, or the link might be unreliable.
Link OK	This shows if the link is stable. The link partner is a stack port on a neighbor switch. • No—The link partner receives invalid protocol messages from the port. • Yes—The link partner receives valid protocol messages from the port.
Link Active	This shows if the stack port is in the same state as its link partner. • No—The port cannot send traffic to the link partner. • Yes—The port can send traffic to the link partner.

Sync OK	• No—The link partner does not send valid protocol messages to the stack port.
	• Yes—The link partner sends valid protocol messages to the port.
# Changes to LinkOK	This shows the relative stability of the link.
	If a large number of changes occur in a short period of time, link flapping can occur.
In Loopback	• No—At least one stack port on the member has an attached stack cable.
	• Yes—None of the stack ports on the member has an attached stack cable.

Provisioning a New Member for a Switch Stack: Example

This example shows how to provision a switch with a stack member number of 2 for the switch stack. The **show running-config** command output shows the interfaces associated with the provisioned switch:

Examples of Auto-Advise Messages

When you add a switch that has a different minor version number to the switch stack, the software displays messages in sequence (assuming that there are no other system messages generated by the switch).

This example shows that the switch stack detected a new switch that is running a different minor version number than the switch stack. Auto-copy starts, finds suitable software to copy from a stack member to the switch in VM mode, upgrades the switch in VM mode, and then reloads it:

```
*Mar 11 20:31:19.247:%STACKMGR-6-STACK_LINK_CHANGE:Stack Port 2 Switch 2 has changed to
state UP
*Mar 11 20:31:23.232:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the
stack(VERSION_MISMATCH)
*Mar 11 20:31:23.291:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the
stack(VERSION_MISMATCH) (Stack_1-3)
*Mar 11 20:33:23.248:%IMAGEMGR-6-AUTO_COPY_SW_INITIATED:Auto-copy-software process initiated
 for switch number(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Searching for stack member to act
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:as software donor...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Found donor (system #2) for
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:member(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System software to be uploaded:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System Type: 0x00000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving c2960x-universalk9-mz.150-2.EX1
(directory)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving c2960x-universalk9-mz.150-2.EX1.bin
 (4945851 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving
c2960x-universalk9-mz.150-2.EX1/info(450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:examining image...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting
c2960x-universalk9-mz.150-2.EX1/info(450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Stacking Version Number:1.4
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System Type: 0x00000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Ios Image File Size: 0x004BA200
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Total Image File Size:0x00818A00
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Minimum Dram required:0x08000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Suffix:universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Directory:c2960x-universalk9-mz.150-2.EX1
```

```
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Name:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image 1:flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Old image will be deleted after download.
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Extracting images from archive into flash on
 switch 1...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:c2960x-universalk9-mz.150-2.EX1 (directory)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting
c2960x-universalk9-mz.150-2.EX1/c2960x-universalk9-mz.150-2.EX1 (4945851 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting c2960x-universalk9-mz.150-2.EX1/info
 (450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Installing
(renaming):`flash1:update/c2960x-universalk9-mz.150-2.EX1' ->
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: `flash1:c2960x-universalk9-mz.150-2.EX1'
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:New software image installed in
flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Removing old
image:flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:All software images installed.
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Requested system reload in progress...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Software successfully copied to
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:system(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Done copying software
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Reloading system(s) 1
```

This example shows that the switch stack detected a new switch that is running a different minor version number than the switch stack. Auto-copy launches but cannot find software in the stack to copy to the switch in version-mismatch mode to make it compatible with the stack. The auto-advise process starts and recommends that you download a tar file from the network to the switch in version-mismatch mode:

```
*Mar 1 00:01:11.319:%STACKMGR-6-STACK_LINK_CHANGE:Stack Port 2 Switch 2 has changed to state
 UP
*Mar 1 00:01:15.547:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the stack
(VERSION_MISMATCH)
stack_2#
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW_INITIATED:Auto-copy-software process initiated
 for switch number(s) 1
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:Searching for stack member to act
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:as software donor...
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:Software was not copied
*Mar 1 00:03:15.562:%IMAGEMGR-6-AUTO_ADVISE_SW_INITIATED:Auto-advise-software process
initiated for switch number(s) 1
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:Systems with incompatible software
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:have been added to the stack. The
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:storage devices on all of the stack
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:members have been scanned, and it has
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:been determined that the stack can be
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:repaired by issuing the following
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:command(s):
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW: archive download-sw /force-reload /overwrite
 /dest 1 flash1:c2960x-universalk9-mz.150-2.EX1.tar
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
```

For information about using the **archive download-sw** privileged EXEC command, see the *Working with Software Images* section.

Examples of Auto-Advise Messages

When you add a switch that has a different minor version number to the switch stack, the software displays messages in sequence (assuming that there are no other system messages generated by the switch).

This example shows that the switch stack detected a new switch that is running a different minor version number than the switch stack. Auto-copy starts, finds suitable software to copy from a stack member to the switch in VM mode, upgrades the switch in VM mode, and then reloads it:

```
*Mar 11 20:31:19.247:%STACKMGR-6-STACK_LINK_CHANGE:Stack Port 2 Switch 2 has changed to
state UP
*Mar 11 20:31:23.232:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the
stack(VERSION_MISMATCH)
*Mar 11 20:31:23.291:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the
stack(VERSION_MISMATCH) (Stack_1-3)
*Mar 11 20:33:23.248:%IMAGEMGR-6-AUTO_COPY_SW_INITIATED:Auto-copy-software process initiated
 for switch number(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Searching for stack member to act
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:as software donor...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Found donor (system #2) for
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:member(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System software to be uploaded:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System Type: 0x00000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving c2960x-universalk9-mz.150-2.EX1
(directory)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving c2960x-universalk9-mz.150-2.EX1.bin
 (4945851 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving
c2960x-universalk9-mz.150-2.EX1/info(450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:archiving info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:examining image...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting
c2960x-universalk9-mz.150-2.EX1/info(450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Stacking Version Number:1.4
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:System Type: 0x00000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Ios Image File Size: 0x004BA200
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Total Image File Size:0x00818A00
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Minimum Dram required:0x08000000
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Suffix:universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Directory:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image Name:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Image 1:flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: Old image will be deleted after download.
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Extracting images from archive into flash on
 switch 1...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:c2960x-universalk9-mz.150-2.EX1 (directory)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting
c2960x-universalk9-mz.150-2.EX1/c2960x-universalk9-mz.150-2.EX1 (4945851 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting c2960x-universalk9-mz.150-2.EX1/info
 (450 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:extracting info (104 bytes)
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Installing
(renaming):`flash1:update/c2960x-universalk9-mz.150-2.EX1' ->
```

```
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW: `flash1:c2960x-universalk9-mz.150-2.EX1'
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:New software image installed in
flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Removing old
image:flash1:c2960x-universalk9-mz.150-2.EX1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:All software images installed.
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Requested system reload in progress...
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Software successfully copied to
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:system(s) 1
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Done copying software
*Mar 11 20:36:15.038:%IMAGEMGR-6-AUTO_COPY_SW:Reloading system(s) 1
```

This example shows that the switch stack detected a new switch that is running a different minor version number than the switch stack. Auto-copy launches but cannot find software in the stack to copy to the switch in version-mismatch mode to make it compatible with the stack. The auto-advise process starts and recommends that you download a tar file from the network to the switch in version-mismatch mode:

```
*Mar 1 00:01:11.319:%STACKMGR-6-STACK_LINK_CHANGE:Stack Port 2 Switch 2 has changed to state
 UP
*Mar 1 00:01:15.547:%STACKMGR-6-SWITCH_ADDED_VM:Switch 1 has been ADDED to the stack
(VERSION_MISMATCH)
stack_2#
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW_INITIATED:Auto-copy-software process initiated
 for switch number(s) 1
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:Searching for stack member to act
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:as software donor...
*Mar 1 00:03:15.554:%IMAGEMGR-6-AUTO_COPY_SW:Software was not copied
*Mar 1 00:03:15.562:%IMAGEMGR-6-AUTO_ADVISE_SW_INITIATED:Auto-advise-software process
initiated for switch number(s) 1
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:Systems with incompatible software
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:have been added to the stack. The
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:storage devices on all of the stack
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:members have been scanned, and it has
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:been determined that the stack can be
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:repaired by issuing the following
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:command(s):
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW: archive download-sw /force-reload /overwrite
 /dest 1 flash1:c2960x-universalk9-mz.150-2.EX1.tar
*Mar 1 00:04:22.537:%IMAGEMGR-6-AUTO_ADVISE_SW:
```

For information about using the **archive download-sw** privileged EXEC command, see the *Working with Software Images* section.

Configuration Examples for Switch Stacks

Enabling the Persistent MAC Address Feature: Example

This example shows how to configure the persistent MAC address feature for a 7-minute time delay and to verify the configuration:

```
Switch(config)# stack-mac persistent timer 7
  WARNING: The stack continues to use the base MAC of the old Master
  WARNING: as the stack MAC after a master switchover until the MAC
  WARNING: persistency timer expires. During this time the Network
  WARNING: Administrators must make sure that the old stack-mac does
  WARNING: not appear elsewhere in this network domain. If it does,
  WARNING: user traffic may be blackholed.
Switch(config)# end
Switch# show switch
Switch/Stack Mac Address : 0016.4727.a900
Mac persistency wait time: 7 mins
                                         H/W    Current
Switch#   Role   Mac Address    Priority Version State
---------------------------------------------------------
*1        Master 0016.4727.a900    1      P2B    Ready
```

Provisioning a New Member for a Switch Stack: Example

This example shows how to provision a switch with a stack member number of 2 for the switch stack. The **show running-config** command output shows the interfaces associated with the provisioned switch:

show switch stack-ports summary Command Output: Example

Only Port 1 on stack member 2 is disabled.

```
Switch# show switch stack-ports summary
  Switch#/ Stack  Neighbor  Cable    Link  Link   Sync     #        In
  Port#    Port             Length   OK    Active  OK     Changes  Loopback
           Status                                         To LinkOK
  -------- ------ --------  --------  ----  ------  ----  --------- --------
    1/1     OK      3       50 cm    Yes    Yes    Yes       1        No
    1/2     Down   None     3 m      Yes    No     Yes       1        No
    2/1     Down   None     3 m      Yes    No     Yes       1        No
    2/2     OK      3       50 cm    Yes    Yes    Yes       1        No
    3/1     OK      2       50 cm    Yes    Yes    Yes       1        No
    3/2     OK      1       50 cm    Yes    Yes    Yes       1        No
```

Table 6: show switch stack-ports summary Command Output

Field	Description
Switch#/Port#	Member number and its stack port number.
Stack Port Status	Status of the stack port. • Absent—No cable is detected on the stack port. • Down—A cable is detected, but either no connected neighbor is up, or the stack port is disabled. • OK—A cable is detected, and the connected neighbor is up.
Neighbor	Switch number of the active member at the other end of the stack cable.

Field	Description
Cable Length	Valid lengths are 50 cm, 1 m, or 3 m.
	If the switch cannot detect the cable length, the value is *no cable*. The cable might not be connected, or the link might be unreliable.
Link OK	Whether the stack cable is connected and functional. There may or may not be a neighbor connected on the other end.
	The *link partner* is a stack port on a neighbor switch.
	• No—There is no stack cable connected to this port or the stack cable is not functional.
	• Yes—There is a functional stack cable connected to this port.
Link Active	Whether a neighbor is connected on the other end of the stack cable.
	• No—No neighbor is detected on the other end. The port cannot send traffic over this link.
	• Yes—A neighbor is detected on the other end. The port can send traffic over this link.
Sync OK	Whether the link partner sends valid protocol messages to the stack port.
	• No—The link partner does not send valid protocol messages to the stack port.
	• Yes—The link partner sends valid protocol messages to the port.
# Changes to LinkOK	The relative stability of the link.
	If a large number of changes occur in a short period of time, link flapping can occur.
In Loopback	Whether a stack cable is attached to a stack port on the member.
	• No—At least one stack port on the member has an attached stack cable.
	• Yes—None of the stack ports on the member has an attached stack cable.

Additional References for Switch Stacks

Related Documents

Related Topic	Document Title
Cabling and powering on a switch stack.	

Error Message Decoder

Description	Link
To help you research and resolve system error messages in this release, use the Error Message Decoder tool.	https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi

Standards and RFCs

Standard/RFC	Title
None	—

MIBs

MIB	MIBs Link
All the supported MIBs for this release.	To locate and download MIBs for selected platforms, Cisco IOS releases, and , use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Troubleshooting Managing Switch Stacks

Overview

This chapter provides links to documents authored by Cisco subject matter experts (SMEs). They aim to help you resolve technical issues without requiring a support ticket. If these documents are unable to resolve your issue, we recommend visiting the applicable Cisco Community. There is a wealth of information and advice available from fellow Cisco customers who may have experienced this issue already and provided a solution. If you are not able to find a resolution on the Community, it may be best that you raise a support ticket at Cisco Support. In cases where a support ticket has to be raised, these documents provide guidance about the

data that should be collected and added to the support ticket. Specify the support document you referred, and TAC can create an improvement request with the document owner.

Support Articles

The support articles listed in this section were created based on specific software and hardware listed in the **Components Used** section of each article. This does not, however, mean that they are limited only to what is listed in the corresponding **Components Used** section. The support articles usually remain relevant for later versions of software and hardware too. However, at times, there could be some changes in the software or hardware that might cause certain commands to stop working, change syntax, and look different, or a GUI to change appearance from one release to another.

Note that these documents are owned and maintained by multiple teams within Cisco. If you identify a problem in any of these documents, use one of following options:

- Provide feedback using the feedback method described in the corresponding support article. The document owner will be notified, and will either update the article, or flag it for removal.

- Open a TAC case with Cisco Support. In addition, you can inform TAC about the document you referred to and how it was unable to resolve your issue. TAC can then create a document improvement request to be evaluated.

Support Articles

Configure a New Member Switch to the Stack Switch

https://techzone.cisco.com/t5/Technologies-Staging/Configure-a-New-Member-Switch-to-the-Stack-Switch/ta-p/1961246

Feedback Request

Your input helps. A key aspect to improving these support documents is customer feedback. Note that these documents are owned and maintained by multiple teams within Cisco. If you find an issue specific to the document (unclear, confusing, information missing, etc):

- Provide feedback using the **Feedback** button located at the right panel of the corresponding article. The document owner will be notified, and will either update the article, or flag it for removal.

- Include information regarding the section, area, or issue you had with the document and what could be improved. Provide as much detail as possible.

Disclaimer and Caution

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.