



Managing Controller Stacks

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

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

Pre-requisites for Configuring Controller Stack

You must ensure the following before stacking controllers:

- Ensure that the controllers are connected using the stack cable. For more details on stack cables used, see the Information on Controller stack section.
- Only one controller other than the active unit is available to be stacked.
- Identify which controller needs to be in active and standby state based on your priorities.
- You must verify that the controllers in the stack run on Cisco IOS Software release 3.3 and later.
- You must verify that the licenses of the controllers in the stack; for more details, see the Cisco 5700 Series Wireless Controller Installation Guide.
- Verify the license used by the controllers in the stack. Ideally, the active controller must possess a valid license and the standby controller can either possess a valid license or a HA SKU license.

Restrictions for Configuring Controller Stack

You must ensure that the controllers in the stack are configured with the same Cisco IOS Software Release version and licenses.

When you reboot the controller while on stack, you must ensure that you deactivate the already existing licenses configured on the controllers. This is because while you perform a reboot, the controller uses the highest activated (EULA accepted) license level as the reboot license while on stack.

Information About Controller Stack

A controller stack can have one stacking-capable controller connected through their StackWise-480 ports; which implies that the stack has two members- an active and a standby controller. The stack member work together as a unified system using the use the StackWise-480 technology. If the active controller becomes unavailable, the standby controller assumes the role of the active switch, and continues to the keep the stack operational.

The active controller contains the saved and running configuration files for the controller stack. The configuration files include the system-level settings for the controller stack and the interface-level settings the stack member. The stack member has a current copy of all these files for back-up purposes. The controllers in the stack use Cisco StackWise-480 technology which provides a robust distributed forwarding architecture through each stack member switch and a unified, fully centralized control and management plane to simplify operation in a large-scale network design.

In the stack, all configuration in the active unit is synced to the standby unit once standby unit changes its state from member to the hot standby state. Thus, all the start-up configuration available in the unit prior to synchronization is lost. If you would need the start-up configuration of the standby unit again, you must save the startup configuration of the unit in secondary memory- Flash memory to reuse the configurations later.

You must use the following Cisco StackWise-480 and Cisco StackPower cables to connect the units in the stack.

Stack Cable	Description
STACK-T1-50CM	Cisco StackWise-480 50cm stacking cable spare
STACK-T1-1M	Cisco StackWise-480 1m stacking cable spare
STACK-T1-3M	Cisco StackWise-480 3m stacking cable spare
CAB-SPWR-30CM	Cisco Catalyst 3850 StackPower cable 30cm spare
CAB-SPWR-150CM	Cisco Catalyst 3850 StackPower cable 150cm spare

When you reboot the controller while on stack, you must ensure that you deactivate the already existing licenses configured on the controllers. This is because while you perform a reboot, the controller uses the highest activated (EULA accepted) license level as the reboot license while on stack.

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When you use the controller stack, all the six controller ports of both the controllers are combined hence providing an availability of 12 ports for usage. The bandwidth of a controller port is a 10 gig ethernet port; however on combination of 12 ports the controller, a throughput of 60 Gbps is only available for use. These ports can be combined to form an Etherchannel, a flex link, or a Link Aggregation Group (LAG).

Hello messages are sent and received by all stack members.

- If a stack member does not respond, that member is removed from the stack.
- If the standby controller does not respond, a new standby controller is elected.
- If the active controller does not respond, the standby controller becomes the active controller.

In addition, keepalive messages are sent and received between the active and standby controllers.

- If the standby controller does not respond, a new standby controller is elected.
- If the active controller does not respond, the standby controller becomes the active controller.

Configuring Controller Stack

SUMMARY STEPS

1. Connect two controllers that are up and running using the stack cable.
2. Power up and perform a boot on both controllers simultaneously or power and boot one controller.
3. Configure Etherchannel or LAG on the units. The deployment type of Etherchannel, LAG, and LACP is based on your network design.
4. Execute the command **show etherchannel summary** to view status of the configured Etherchannel.
5. Configure LACP .
6. Execute the commands defined for displaying stack information on the console of the active controller to verify that the redundancy high availability pair exists.

DETAILED STEPS

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- | | |
|---------------|--|
| Step 1 | Connect two controllers that are up and running using the stack cable. |
| Step 2 | Power up and perform a boot on both controllers simultaneously or power and boot one controller.

The controllers boot up successfully, and forms a high availability pair. |
| Step 3 | Configure Etherchannel or LAG on the units. The deployment type of Etherchannel, LAG, and LACP is based on your network design. |
| Step 4 | Execute the command show etherchannel summary to view status of the configured Etherchannel.

On successful configuration, all the specified ports will be bundled in a single channel and listed in the command output of show etherchannel summary . |
| Step 5 | Configure LACP . |
| Step 6 | Execute the commands defined for displaying stack information on the console of the active controller to verify that the redundancy high availability pair exists. |
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Switch Stack Membership

A standalone controller is a controller stack with one stack member that also operates as the . You can connect one standalone controller to another to create a controller stack containing two stack members, with one of them as the . You can connect standalone controllers to an existing controller stack to increase the stack membership.

Hello messages are sent and received by all stack members.

- If a stack member does not respond, that member is removed from the stack.
- If the standby controller does not respond, a new standby controller is elected.
- If the active controller does not respond, the standby controller becomes the active controller.

In addition, keepalive messages are sent and received between the active and standby controllers.

- If the standby controller does not respond, a new standby controller is elected.
- If the active controller does not respond, the standby controller becomes the active controller.

Stack Member Numbers

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

Stack members in the same controller stack cannot have the same stack member number. Every stack member, including a standalone controller, retains its member number until you manually change the number or unless the number is already being used by another member in the stack.

- If you manually change the stack member number by using the **switch** *current-stack-member-number* **renumber** *new-stack-member-number* EXEC command, the new number goes into effect after that stack member resets (or after you use the **reload slot stack-member-number** privileged EXEC command) and only if that number is not already assigned to any other members in the stack. Another way to change the stack member number is by changing the controller_NUMBER environment variable.

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

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

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

- If you move a stack member to a different controller stack, the stack member retains its number only if the number is not being used by another member in the stack. If it is being used, the controller selects the lowest available number in the stack.
- If you merge controller stacks, the controller that join the controller stack of a new select the lowest available numbers in the stack.

As described in the hardware installation guide, you can use the controller port LEDs in Stack mode to visually determine the stack member number of each stack member.

In the **default** mode Stack LED will blink in green color only on the stack master. However, when we scroll the Mode button to **Stack** option - Stack LED will glow green on all the stack members.

When mode button is scrolled to **Stack** option, the switch number of each stack member will be displayed as LEDs on the first five ports of that switch. The switch number is displayed in binary format for all stack members. On the switch, the amber LED indicates value 0 and green LED indicates value 1.

Example for switch number 5 (Binary - 00101):

First five LEDs glow as follows on stack member with switch number 5.

- Port-1 : Amber
- Port-2 : Amber
- Port-3 : Green
- Port-4 : Amber
- Port-5 : Green

Similarly, the first five LEDs glow amber or green, depending on the switch number on all stack members.



Note

- If you connect a Horizontal stack port to a normal network port on other end, stack port transmission/reception will be disabled within 30 seconds if no SDP packets are received from the other end.
- Stack port will not go down but only transmission/reception will be disabled. The log message shown below will be displayed on the console. Once the peer end network port is converted to stack port, transmission/reception on this stack port will be enabled.

```
%STACKMGR-4-HSTACK_LINK_CONFIG: Verify peer stack port setting for hstack
StackPort-1 switch 5 (hostname-switchnumber)
```

Stack Member Priority Values

A higher priority value for a stack member increases the probability of it being elected and retaining its stack member number. The priority value can be 1 to 15. The default priority value is 1. You can display the stack member priority value by using the **show switch EXEC** command.



Note

We recommend assigning the highest priority value to the controller that you prefer to be the . This ensures that the controller is reelected as the if a reelection occurs.

To change the priority value for a stack member, use the **switch stack-member-number priority new priority-value EXEC** command. For more information, see the “Setting the Stack Member Priority Value” section.

The new priority value takes effect immediately but does not affect the current . The new priority value helps determine which stack member is elected as the new when the current or the switch stack resets.

Election and Reelection

The is elected or reelected based on one of these factors and in the order listed:

1. The switch that is currently the .
2. The switch with the highest stack member priority value.



Note

We recommend assigning the highest priority value to the switch that you prefer to be the . This ensures that the switch is reelected as if a reelection occurs.

3. The switch with the lowest MAC address.

Enabling the Persistent MAC Address Feature



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 MAC address elsewhere in the same domain could result in lost traffic.

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: <pre>Controller> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: <pre>Controller# configure terminal</pre>	Enters global configuration mode.

	Command or Action	Purpose
Step 3	stack-mac persistent timer [0 <i>time-value</i>] Example: <code>Controller(config)# stack-mac persistent timer 7</code>	<p>Enables a time delay after a stack-master change before the stack MAC address changes to that of the new . If the previous rejoins the stack during this period, the stack uses that MAC address as the stack MAC address.</p> <p>You can configure the time period as 0 to 60 minutes.</p> <ul style="list-style-type: none"> Enter the command with no value to set the default delay of approximately 4 minutes. We recommend that you always enter a value. <p>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.</p> <ul style="list-style-type: none"> Enter 0 to continue using the MAC address of the current indefinitely. <p>The stack MAC address of the previous is used until you enter the no stack-mac persistent timer command, which immediately changes the stack MAC address to that of the current .</p> <ul style="list-style-type: none"> Enter a <i>time-value</i> from 1 to 60 minutes to configure the time period before the stack MAC address changes to the new . <p>The stack MAC address of the previous is used until the configured time period expires or until you enter the no stack-mac persistent timer command.</p> <p>Note If you enter the no stack-mac persistent timer command after a new takes over, before the time expires, the switch stack moves to the current MAC address.</p>
Step 4	end Example: <code>Controller(config)# end</code>	Returns to privileged EXEC mode.
Step 5	copy running-config startup-config Example: <code>Controller# copy running-config startup-config</code>	(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 a Stack Member Number

This optional task is available only from the .

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: <pre>Controller> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: <pre>Controller# configure terminal</pre>	Enters global configuration mode.
Step 3	switch <i>current-stack-member-number</i> renumber <i>new-stack-member-number</i> Example: <pre>Controller# switch 3 renumber 4</pre>	Specifies the current stack member number and the new member number for the stack member. The range is 1 to 2. You can display the current stack member number by using the show switch user EXEC command.
Step 4	end Example: <pre>Controller(config)# end</pre>	Returns to privileged EXEC mode.
Step 5	reload slot <i>stack-member-number</i> Example: <pre>Controller# reload slot 4</pre>	Resets the stack member.

	Command or Action	Purpose
Step 6	show switch Example: <code>showController</code>	Verify the stack member number.
Step 7	copy running-config startup-config Example: <code>Controller# copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Setting the Stack Member Priority Value

This optional task is available only from the .

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: <code>Controller enable</code>	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	switch <i>stack-member-number</i> priority <i>new-priority-number</i> Example: <code>Controller# switch 3 priority 2</code>	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 . The new priority value helps determine which stack member is elected as the new when the current or switch stack resets.
Step 3	show switch <i>stack-member-number</i> Example: <code>Controller# show switch</code>	Verify the stack member priority value.
Step 4	copy running-config startup-config Example:	(Optional) Saves your entries in the configuration file.

	Command or Action	Purpose
	Controller# <code>copy running-config startup-config</code>	

Displaying Incompatible Switches in the Switch Stack

SUMMARY STEPS

1. `show switch`

DETAILED STEPS

	Command or Action	Purpose
Step 1	show switch Example: Controller# <code>show switch</code>	Displays any incompatible switches in the switch stack (indicated by a 'Current State' of 'V-Mismatch'). The V-Mismatch state identifies the switches with incompatible software. The output displays Lic-Mismatch for switches that are not running the same license level as the . For information about managing license levels, see the <i>System Management Configuration Guide (Catalyst 3850 Switches)</i> , <i>System Management Configuration Guide (Cisco WLC 5700 Series)</i> , <i>System Management Configuration Guide (Catalyst 3650 Switches)</i> .

Upgrading an Incompatible Switch in the Switch Stack

Before you begin

- Ensure the switches are install booted.
- Ensure that the stack is connected in full ring mode.

SUMMARY STEPS

1. `software auto-upgrade`
2. `copy running-config startup-config`

DETAILED STEPS

	Command or Action	Purpose
Step 1	software auto-upgrade Example: Controller# <code>software auto-upgrade</code>	Upgrades incompatible switches in the switch stack, or changes switches in bundle mode to installed mode.

	Command or Action	Purpose
Step 2	copy running-config startup-config Example: Controller# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

