Stacking and High Availability Configuration Guide, Cisco Catalyst IE9300 Rugged Series Switches

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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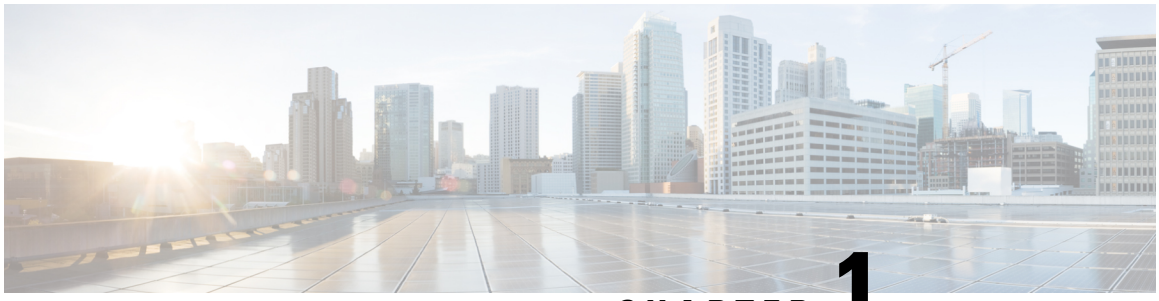


CHAPTER 1

Managing Switch Stacks

Switch Stacks

A switch stack has multiple stacking-capable switches connected through their StackWise ports. The stack members work together as a unified system. Layer 2 and Layer 3 protocols present the entire switch stack as a single entity to the network.

This document uses the following terms to refer to members of a switch stack:

- Active switch: Controls the operation of the switch stack, and is the single point of stack-wide management.
- Standby switch: Backup to the Active switch.
- Member switch: Neither an Active nor a Standby switch.

From the active switch, you configure the following:

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

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

Stacking and Cisco Catalyst IE9300 Rugged Series Switches

Cisco Catalyst IE9300 Rugged Series Switches with IE9320 model numbers have a stacking interface that allows multiple switches to act as a single switch. Each switch has two stack interface connectors, and each connector has its own LED.

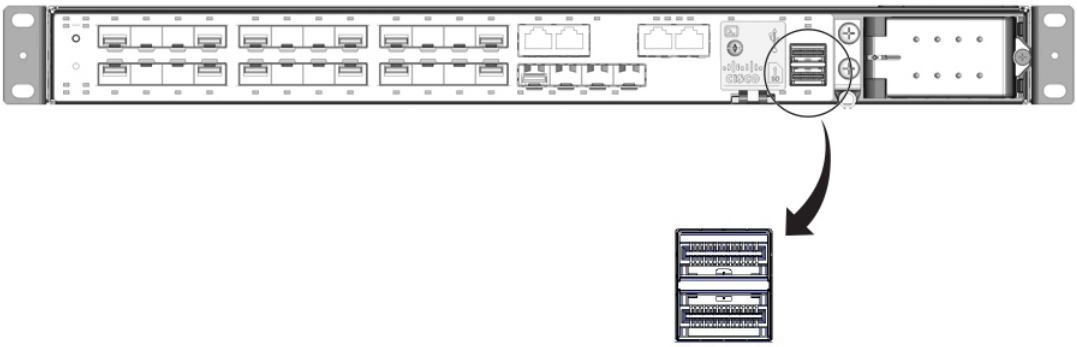
All IE9320 switch models are supported for stacking:

- IE9320 GE Fiber switch (IE-9320-26S2C-A and IE-9320-26S2C-E)
- IE9320 Fiber switch with 10 GE uplinks (IE-9320-22S2C4X-A and IE-9320-22S2C4X-E)
- IE9320 10 GE Copper Data switch (IE-9320-24T4X-A and IE-9320-24T4X-E)
- IE9320 10 GE PoE switch (IE-9320-24P4X-A and IE-9320-24P4X-E)
- IE9320 10 G mGig 4PPoE switch (IE-9320-16P8U4X-A and IE-9320-16P8U4X-E)
- IE9320 GE PoE switch (IE-9320-24P4S-A and IE-9320-24P4S-E)

Note The number of switches supported in a stack depends on the Cisco IOS XE. For information, see the section Feature History and Information for Switch Stacks, on page 24.

The following illustration shows the stacking interface on the front panel of a IE9320 GE Fiber ((IE-9320-26S2C-A and IE-9320-26S2C-E) switch. The interface is the same on other IE9320 switches.

Figure 1: IE9320 GE Fiber Stacking Interface



You can mount the switches in 19- or 23- inch racks. You must install the switches with the correct clearances. To install each switch, follow the instructions for the appropriate rack in the *Cisco Catalyst IE9300 Rugged Series Switch Hardware Installation Guide*.

You can connect the stack interfaces in such a way as to form a ring. For example, stack-port-1 of switch 1 can be connected to stack-port-2 of the next switch, and so on. The last switch's stack-port-1 connects back to stack-port-2 of the first switch to form a full ring.

See the procedures in this document for details of configuring stacking.

Prerequisites for Switch Stacks

Before you configure a switch stack, make sure that you have the following:

- All Cisco Catalyst IE9300 Rugged Series Switches with IE9320 model numbers are supported for stacking. See the section Stacking and Cisco Catalyst IE9300 Rugged Series Switches, on page 2 in this guide for the list of switches.
- Switches that are running compatible software versions.
- Switches that have the same license level.

Restrictions for Switch Stacks

The following are the restrictions for switch stack configuration:

- Only Cisco Catalyst IE9300 Rugged Series Switches supported for stacking can be used in stacks. See the section Stacking and Cisco Catalyst IE9300 Rugged Series Switches, on page 2 in this guide for the list of switches.
- A switch stack can have multiple stacking-capable switches connected through their StackWise ports.

  For information about how many switches are supported in each release, see the section Feature History and Information for Switch Stacks, on page 24.
- Stacks must be homogenous: That is, a stack must consist only of IE9320 switches that support stacking.
- REP over stacking is supported, however, increased convergence time (3 seconds to 20 seconds) will be observed, if a stack-member REP port goes down.
- A switch stack cannot contain a mix of different license levels.
- A switch stack does not support the following features (which standalone switches support):
  - Dying gasp
  - Management through PROFINET or CIP
  - Modicon Communication Bus (MODBUS)
  - Parallel Redundancy Protocol (PRP)
  - Precision Time Protocol (PTP)

Switch Stack Bridge ID and MAC Address

A switch stack is identified in the network by its bridge ID and, if it is operating as a Layer 3 device, its router MAC address. The bridge ID and router MAC address are determined by the MAC address of the active switch.

If the active switch changes, the MAC address of the new active switch determines the new bridge ID and router MAC address.

If the entire switch stack reloads, the switch stack uses the MAC address of the active switch.

Persistent MAC Address on the Switch Stack

You can use the persistent MAC address feature to set a time delay before the stack MAC address changes. During this period, if the previous active switch rejoins the stack, the stack continues to use its MAC address as the stack MAC address, even if the switch is now a stack member and not an active switch.

If the previous active switch does not rejoin the stack during the delay, the switch stack takes the MAC address of the new active switch as the stack MAC address. By default, the stack MAC address is the MAC address of the first active switch, even if a new active switch takes over.

Note You can also configure stack MAC persistency so that the stack MAC address never changes to the new active switch MAC address. You do so by using the `stack-mac persistent timer 0`command. Configuring persistency avoids Link Aggregation Control Protocol (LACP) and Port Aggregation Protocol (PAgP) flaps or inconsistencies.

Auto-upgrading the Stack

StackWise architecture enables you to increase the number of ports in the wiring closet without needing to configure the management plane or upgrade the newly installed switch manually. The newly added switch automatically upgrades to the software that the stack is currently running. IE9320 GE Fiber switches provide backward compatibility to dynamically insert a new switch into the stack ring without a major network disruption. The system and management operation, network configuration, and topologies remain transparent for network upgrades.

As a best practice, the newly joined switch can automatically receive consistent software versions from an active switch and bring the system online without any user intervention. To automatically download consistent software versions to newly joined switches, you can use the following command from the global configuration mode.

```
STACK# conf t
Enter configuration commands, one per line. End with CNTL/Z.
STACK(config)# software auto-upgrade enable
```

With the preceding command enabled, any member switch that is added to the stack automatically upgrades to the current stack software.

Note The auto-upgrade feature is not supported in bundled mode.

The following example shows logs for a two-member stack:

```
IOS loaded on Switch1 & Switch2:
==========================

Switch-1 (Active): BLD_DEV_LATEST_20220418_072148_V17_9_0_3
Switch-2 (Standby): BLD_DEV_LATEST_20220325_072116_V17_9_0_13
```

```
Switch-1 Log:
==========

IE9300-2member#show switch
Switch/Stack Mac Address : 6c03.09a0.1d00 - Local Mac Address
Mac persistency wait time: Indefinite
                                             H/W   Current
Switch#   Role    Mac Address     Priority Version  State
-------------------------------------------------------------------------------------
*1       Active   6c03.09a0.1d00     1      V00     Ready
 2       Member   84eb.efd2.d100     1      V00     V-Mismatch

IE9300-2member#show running-config | i auto
software auto-upgrade enable
IE9300-2member#


Switch-2 Log:
===========

Switch number is 2
All switches in the stack have been discovered. Accelerating discovery

Chassis is declared incompatible.
FAILED: Version 'BLD_DEV_LATEST_20220325_072116_V17_9_0_13' mismatch with Active's running
 version 'BLD_DEV_LATEST_20220418_072148_V17_9_0_3' for package: 'rp_base'


Autoupgrade Log:
=============

*Apr 21 08:34:44.269: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
1 on Switch 1 is up
*Apr 21 08:34:44.277: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
2 on Switch 1 is up
*Apr 21 08:34:46.731: %STACKMGR-4-SWITCH_ADDED: Switch 1 R0/0: stack_mgr: Switch 2 has been
 added to the stack.
*Apr 21 08:34:51.496: %STACKMGR-4-SWITCH_ADDED: Switch 1 R0/0: stack_mgr: Switch 2 has been
 added to the stack.
*Apr 21 08:34:51.855: %BOOT-3-BOOTTIME_INCOMPATIBLE_SW_DETECTED: Switch 1 R0/0: issu_stack:
 Incompatible software detected. Details: Active's subpackage boot mode does not match with
 member's super boot mode. Please boot switch 2 in subpackage mode.
*Apr 21 08:34:52.901: %AUTO_UPGRADE-5-AUTO_UPGRADE_START_CHECK: Switch 1 R0/0:
auto_upgrade_client_helper: Auto upgrade start checking for incompatible switches.
*Apr 21 08:34:53.919: %AUTO_UPGRADE-5-AUTO_UPGRADE_INITIATED: Switch 1 R0/0:
auto_upgrade_client_helper: Auto upgrade initiated for switch 2/R0.
*Apr 21 08:34:53.982: %AUTO_UPGRADE-5-AUTO_UPGRADE_SEARCH: Switch 1 R0/0:
auto_upgrade_client_helper: Searching stack for software to upgrade switch 2/R0.
*Apr 21 08:34:53.993: %AUTO_UPGRADE-5-AUTO_UPGRADE_FOUND: Switch 1 R0/0:
auto_upgrade_client_helper: Found donor switch 1 to auto upgrade switch 2/R0.
*Apr 21 08:34:54.002: %AUTO_UPGRADE-5-AUTO_UPGRADE_START: Switch 1 R0/0:
auto_upgrade_client_helper: Upgrading switch 2/R0 with software from switch 1.
*Apr 21 08:34:57.610: %IOSD_INFRA-6-IFS_DEVICE_OIR: Device sdflash-2 added
*Apr 21 08:34:57.776: %IOSD_INFRA-6-IFS_DEVICE_OIR: Device sdflash-2 added
*Apr 21 08:35:33.132: %SMART_LIC-3-COMM_FAILED: Communications failure with the Cisco Smart
 License Utility (CSLU) : Unable to resolve server hostname/domain name
*Apr 21 08:35:44.454: %AUTO_UPGRADE_MODULAR-5-SMU_AUTO_UPGRADE_INITIATING: Switch 1 R0/0:
auto_upgrade_client_helper: Initiating SMU autoupgrade for switch 2/R0
*Apr 21 08:35:45.784: %AUTO_UPGRADE-5-AUTO_UPGRADE_FINISH: Switch 1 R0/0:
auto_upgrade_client_helper: Finished installing software on switch 2/R0.
*Apr 21 08:35:45.825: %AUTO_UPGRADE-5-AUTO_UPGRADE_RELOAD: Switch 1 R0/0:
auto_upgrade_client_helper: Reloading switch 2 to complete the auto upgrade.
```

Switch Stack Management Connectivity

You manage the switch stack and the stack member interfaces through the active switch. You cannot manage stack members on an individual basis.

You can use WebUI and DNAC, both of which recognize and support the stack. You can also use CiscoWorks, the CLI, and SNMP.

Configuring a Switch Stack

The following section provides information for monitoring the device stack, configuration scenarios, and configuration examples.

Monitoring the Device Stack

This section shows the commands for displaying stack information.

show module

Description: Displays summary information about the stack.
Example:

```
switch#show module
Switch  Ports    Model                Serial No.   MAC address     Hw Ver.       Sw
Ver.
------  -----   ---------            -----------  --------------  -------      --------

 1       29     IE-9320-22S2C4X      FDO2637J1UF  dc05.39c7.2e00  V00          17.12.01

 2       29     IE-9320-24T4X        FDO2701J7LD  5cb1.2ec8.e280  V00          17.12.01

 3       29     IE-9320-24P4X        FDO2701JB7J  5cb1.2ec8.e580  V00          17.12.01

switch#
```

show switch detail

Description: Displays detailed information about the stack.
Example:

```
switch#show switch detail
Switch/Stack Mac Address : dc05.39c7.2e00 - Local Mac Address
Mac persistency wait time: Indefinite
                                             H/W   Current
Switch#   Role    Mac Address     Priority Version  State
-----------------------------------------------------------------------------------
*1       Active   dc05.39c7.2e00     15     V00     Ready

 2       Standby  5cb1.2ec8.e280     10     V00     Ready

 3       Member   5cb1.2ec8.e580     5      V00     Ready



         Stack Port Status             Neighbors
Switch#  Port 1     Port 2           Port 1   Port 2
-----------------------------------------------------
```

```
  1          OK          OK                3         2
  2          OK          OK                1         3
  3          OK          OK                2         1

switch#
```

show switch neighbors

Description: Displays the stack neighbors.

Example:

```
switch#show switch neighbors
  Switch #    Port 1       Port 2
  --------    ------       ------
      1         3             2
      2         1             3
      3         2             1

switch#
```

show switch stack-ports [summary]

Description: Displays port information for the stack. Use the **summary** keyword to display the stack cable length, the stack link status, and the loopback status.

Example:

```
switch#show switch stack-ports summary
Sw#/Port#  Port Status  Neighbor/Port  Cable Length   Link OK   Link Active   Sync OK   #Changes to LinkOK  In
Loopback
-----------------------------------------------------------------------------------------------------------------
1/1        OK          3/2            50cm           Yes       Yes           Yes       1                   No

1/2        OK          2/1            100cm          Yes       Yes           Yes       1                   No

2/1        OK          1/2            100cm          Yes       Yes           Yes       1                   No

2/2        OK          3/1            50cm           Yes       Yes           Yes       1                   No

3/1        OK          2/2            50cm           Yes       Yes           Yes       1                   No

3/2        OK          1/1            50cm           Yes       Yes           Yes       1                   No
```

show switch stack-ports [detail]

Description: Displays the stack link status and information for each stack member. Use the **detail** keyword to display the stack interface status, errors, drops, packet transmission and bandwidth details.

Example:

```
switch#show switch stack-ports detail
1/1 is OK Loopback No
Cable Length 50cm     Neighbor 3
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  1062 bytes/sec
 Five minute output rate 778 bytes/sec
     8377526285 bytes input
     1164675742 bytes output
 CRC Errors
              Data CRC 0
           Ringword CRC 0
            InvRingWord 0
            PcsCodeWord 0
1/2 is OK Loopback No
Cable Length 100cm    Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  1325 bytes/sec
 Five minute output rate 1016 bytes/sec
     8727757021 bytes input
```

```
    1634152515 bytes output
 CRC Errors
             Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0
2/1 is OK Loopback No
Cable Length 100cm    Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  445 bytes/sec
 Five minute output rate 539 bytes/sec
     652376830 bytes input
     7590551492 bytes output
 CRC Errors
             Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0
2/2 is OK Loopback No
Cable Length 50cm     Neighbor 3
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  561 bytes/sec
 Five minute output rate 720 bytes/sec
     912545469 bytes input
     7918619712 bytes output
 CRC Errors
             Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0
3/1 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  356 bytes/sec
 Five minute output rate 551 bytes/sec
     543539448 bytes input
     818158430 bytes output
 CRC Errors
             Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0
3/2 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  485 bytes/sec
 Five minute output rate 627 bytes/sec
     773201871 bytes input
     843637340 bytes output
 CRC Errors
             Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0

switch#
```

show redundancy

Description: Displays the redundant system and the current processor information. The redundant system information includes the following:

- System uptime
- Standby failures
- Switchover reason
- Hardware
- Configured mode
- Operating redundancy mode

The current processor information displayed includes the active location, the software state, the uptime in the current state and so on.

Example:

```
switch#show redundancy
Redundant System Information :
------------------------------
       Available system uptime = 6 days, 5 hours, 54 minutes
Switchovers system experienced = 0
              Standby failures = 0
        Last switchover reason = none

                 Hardware Mode = Duplex
    Configured Redundancy Mode = sso
     Operating Redundancy Mode = sso
               Maintenance Mode = Disabled
                 Communications = Up

Current Processor Information :
-------------------------------
               Active Location = slot 1
        Current Software state = ACTIVE
       Uptime in current state = 6 days, 5 hours, 54 minutes
                 Image Version = Cisco IOS Software [Dublin], Catalyst L3 Switch Software
 (IE9K_IOSXE), Experimental Version 17.12.20230419:095045
[BLD_POLARIS_DEV_LATEST_20230419_085112:/nobackup/mcpre/s2c-build-ws 101]
Copyright (c) 1986-2023 by Cisco Systems, Inc.
Compiled Wed 19-Apr-23 02:52 by mcpre
                          BOOT = flash:packages.conf;
        Configuration register = 0x102
             Fast Switchover   = Enabled
                Initial Garp   = Enabled

Peer Processor Information :
----------------------------
              Standby Location = slot 2
        Current Software state = STANDBY HOT
       Uptime in current state = 6 days, 5 hours, 51 minutes
                 Image Version = Cisco IOS Software [Dublin], Catalyst L3 Switch Software
 (IE9K_IOSXE), Experimental Version 17.12.20230419:095045
[BLD_POLARIS_DEV_LATEST_20230419_085112:/nobackup/mcpre/s2c-build-ws 101]
Copyright (c) 1986-2023 by Cisco Systems, Inc.
Compiled Wed 19-Apr-23 02:52 by mcpre
                          BOOT = flash:packages.conf;
        Configuration register = 0x102


switch#
```

show redundancy states

Description: Displays all the redundancy states of the active and standby devices.

Example:

```
switch#show redundancy states
       my state = 13 -ACTIVE
     peer state = 8  -STANDBY HOT
           Mode = Duplex
           Unit = Primary
        Unit ID = 1

Redundancy Mode (Operational) = sso
Redundancy Mode (Configured)  = sso
Redundancy State              = sso
     Maintenance Mode = Disabled
    Manual Swact = enabled
 Communications = Up

   client count = 90
 client_notification_TMR = 30000 milliseconds
           RF debug mask = 0x0

switch#
```

sh switch stack-bandwidth

Description: Displays the bandwith and state of each switch.

Example:

```
switch#sh switch stack-bandwidth
Stack Current
Switch#    Role      Bandwidth    State
-----------------------------------------------------------
1          Standby   160G         Ready
2          Member    160G         Ready
3          Member    160G         Ready
*4         Active    160G         Ready

switch#
```

sh switch stack-mode

Description: Displays the version, mode, and state of each switch.

Example:

```
switch#sh switch stack-mode
Switch# Role      Mac Address     Version Mode  Configured   State
-------------------------------------------------------------------------------------------------
1       Standby   dc0b.093f.4b00   V00    N+1   None         Ready
2       Member    dc0b.093f.3a80   V00    N+1   None         Ready
3       Member    dc0b.093f.5f00   V00    N+1   None         Ready
*4      Active    dc0b.093f.4100   V00    N+1   None         Ready

switch#
```

switch stack-ring speed

Description: Displays the ring speed, configuration, and protocol of the stack.

Example:

```
switch#sh switch stack-ring speed

Stack Ring Speed : 160G
Stack Ring Configuration: Full
Stack Ring Protocol : StackWise
```

```
switch#
```

Switch Stack Configuration Scenarios

This section lists switch stack configuration scenarios and steps, and the step results.

Note In the following table, the *active* switch is the switch member that operates the control plane. Active switch is also the interface point for all configuration management operations (CLI, SNMP, and WEB).

Table 1: Switch Stack Configuration Scenarios

Scenario	Task	Result
Active switch election determined by existing active switches.	Connect two powered-on switch stacks through the StackWise ports.	Only one of the two active switches becomes the new active switch.
Active switch election determined by the stack member priority value.	1. Connect two switches through their StackWise ports. 2. Use the **switch** *stack-member-number* **priority** *new-priority-number* command to set one stack member with a higher member priority value.	The stack member with the higher priority value is elected active switch.
Active switch election determined by the MAC address.	Assuming that both member switches have the same priority value, configuration file, and license level, restart both member switches at the same time.	The stack member with the lower MAC address is elected active switch.
Stack member number conflict.	Assuming that one stack member has a higher priority value than the other stack member: 1. Ensure that both member switches have the same stack member number. If necessary, use the switch current-stack-member-number renumber new-stack-member-number command. 2. Restart both member switches 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.

Scenario	Task	Result
Add a stack member.	1. Power off the new switch. 2. Through their StackWise 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 member switches becomes the new active switch. All other member switches in the stack remain as member switches and do not reboot.
Remove member switches.	1. Through their StackWise ports, disconnect the devices. 2. Power on all devices.	Two devices become active switches. One active switch has member switches. The other active switch remains as a standalone device. Use the Mode button and port LEDs on the device to identify which devices are active switches and which devices belong to each active switch.

Example: Enabling the Persistent MAC Address Feature

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

```
Device (config)#stack-mac persistent timer 7
WARNING: The stack continues to use the base MAC of the old active
WARNING: as the stack-mac after a active 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.
clarke-stack(config)#

clarke-stack#show sw
clarke-stack#show switch
Switch/Stack Mac Address : 6c03.09a0.0f80 - Local Mac Address
Mac persistency wait time: Indefinite
                                                     H/W        Current
Switch#  Role       Mac Address       Priority   Version    State
-----------------------------------------------------------------------
*1       Active     6c03.09a0.0f80    1          V00        Ready

 2       Standby    6c03.09a0.1200    1          V00        Ready
```

Example: show switch stack-ports summary

```
Switch# show switch stack-ports summary

SW#/Port#  Port    Neighbor/ Cable     Link   Link    Sync   #Changes    In
           Status  Port      Length    OK     Active  OK     To LinkOK   Loopback
--------   ------  --------  --------  ----  ------   ----   ---------   --------
1/1        OK      2/1       50 cm     Yes    Yes     Yes       1        No
1/2        OK      2/2       50 cm     Yes    Yes     Yes       1        No
2/1        OK      1/1       50 cm     Yes    Yes     Yes       1        No
2/2        OK      1/2       50 cm     Yes    Yes     Yes       1        No

Switch#
```

Table 2: show switch stack-ports summary Fields

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.
Cable length	Valid lengths are 50 cm or 1 m.
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.

Field	Description
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 this counter is incrementing, stack link flapping may be occurring, which affects the stack functionality and performance. A cable or port issue may be possible.
In Loopback	Whether the stackports on the member are in loopback. • No: At least one stack port on the member has an attached stack cable. • Yes: On a standalone switch, when no stack cable is connected to the switch, stack ports are put in software Loopback mode.

Example: show switch stack-ports detail

The following is a sample output of the command for a working stack:

```
Switch#
Switch#
Switch#show switch stack-port detail
1/1 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  435 bytes/sec
 Five minute output rate 423 bytes/sec
     6064931845 bytes input
     516798417781 bytes output
 CRC Errors
              Data CRC 7
           Ringword CRC 8882
            InvRingWord 0
            PcsCodeWord 274
1/2 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  389 bytes/sec
 Five minute output rate 376 bytes/sec
     5123997908 bytes input
     458569034166 bytes output
 CRC Errors
```

```
              Data CRC 0
           Ringword CRC 0
            InvRingWord 0
            PcsCodeWord 0
2/1 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  371 bytes/sec
 Five minute output rate 475 bytes/sec
     60933821787 bytes input
     463001301291 bytes output
 CRC Errors
              Data CRC 3
           Ringword CRC 1
            InvRingWord 1
            PcsCodeWord 0
2/2 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  328 bytes/sec
 Five minute output rate 417 bytes/sec
     52317602279 bytes input
     399572815361 bytes output
 CRC Errors
              Data CRC 0
           Ringword CRC 0
            InvRingWord 0
            PcsCodeWord 0

Switch#
```

Table 3: show switch stack-ports detail Fields

Field	Description
Neighbor	Switch number of the active member at the other end of the stack cable.
Cable Length	Valid lengths are 50 cm or 1 m. If the switch cannot detect the cable length, the value is *Unknown*. 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.

Field	Description
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 many changes occur in a short time, link flapping can occur.
Five minute input rate	The average rate (calculated over a 5-minute period) at which packets are received, measured in packets/sec. For example, in 5 minutes, 356 bytes per second would be 356 x 300 or 106,800 bytes.
Five minute output rate	The average rate (calculated over a five minute period) at which packets are transmitted, measured in packets/sec.
CRC Errors	Different types of CRC errors that are seen on a stack interface: • Data CRC: Stack interface data CRC error • Ringword CRC: Stack interface ring word CRC error • InvRingWord: Stack interface invalid ring word error • PcsCodeWord: Stack interface Physical Coding Sublayer (PCS) error These errors normally occur when a stack interface state changes due to a switchover or a switch reload. You can ignore such errors. But when these error counters increase significantly or when they increase continuously over time, check the stack cable for issues.

The following is a sample output when the stack port flaps:

```
Switch#show switch stack-ports detail
1/1 is DOWN Loopback No
Cable Length 50cm     Neighbor NONE
Link Ok Yes Sync Ok Yes Link Active No
Changes to LinkOK 1
 Five minute input rate  512 bytes/sec
 Five minute output rate 492 bytes/sec
     6068997305 bytes input
     516803876697 bytes output
 CRC Errors
              Data CRC 7
          Ringword CRC 8906
           InvRingWord 0
           PcsCodeWord 274
1/2 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  410 bytes/sec
 Five minute output rate 454 bytes/sec
     5127433411 bytes input
     458573731026 bytes output
 CRC Errors
              Data CRC 0
          Ringword CRC 0
           InvRingWord 136
           PcsCodeWord 139
2/1 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  354 bytes/sec
 Five minute output rate 537 bytes/sec
     60934298929 bytes input
     463006840274 bytes output
 CRC Errors
              Data CRC 3
          Ringword CRC 1
           InvRingWord 1
           PcsCodeWord 0
2/2 is DOWN Loopback No
Cable Length 50cm     Neighbor NONE
Link Ok Yes Sync Ok Yes Link Active No
Changes to LinkOK 1
 Five minute input rate  410 bytes/sec
 Five minute output rate 527 bytes/sec
     52318079851 bytes input
     399577555753 bytes output
 CRC Errors
              Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0
```

The following is a sample output when a switch reloads:

```
Switch#switch 1 stack port 1 enable
WARNING: Enabling the switch port may result in a configuration change for the stack. Do
you want to continue?[y/n]? [yes]: yes
Switch#
*Jan 27 02:37:58.908: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
1 on Switch 1 is up
*Jan 27 02:37:58.903: %STACKMGR-6-STACK_LINK_CHANGE: Switch 2 R0/0: stack_mgr: Stack port
```

Example: show switch stack-ports detail

```
2 on Switch 2 is up
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#show swi
Switch#show switch s
*Jan 27 02:38:06.750: %SIF_MGR-1-FAULTY_CABLE: Switch 1 R0/0: sif_mgr: High hardware interrupt
 seen on switch 1t
Switch#show switch stack-p
Switch#show switch stack-ports de
Switch#show switch stack-ports detail
1/1 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 2
 Five minute input rate  512 bytes/sec
 Five minute output rate 492 bytes/sec
     6069131764 bytes input
     516804010939 bytes output
 CRC Errors
              Data CRC 7
          Ringword CRC 8908
           InvRingWord 0
           PcsCodeWord 274
1/2 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  410 bytes/sec
 Five minute output rate 454 bytes/sec
     5127456236 bytes input
     458573756883 bytes output
 CRC Errors
              Data CRC 0
          Ringword CRC 0
           InvRingWord 136
           PcsCodeWord 139
2/1 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  354 bytes/sec
 Five minute output rate 537 bytes/sec
     60934319023 bytes input
     463006865289 bytes output
 CRC Errors
              Data CRC 3
          Ringword CRC 1
           InvRingWord 1
           PcsCodeWord 0
2/2 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 2
 Five minute input rate  410 bytes/sec
 Five minute output rate 527 bytes/sec
     52318195521 bytes input
     399577703600 bytes output
 CRC Errors
              Data CRC 0
          Ringword CRC 0
```

```
           InvRingWord 0
           PcsCodeWord 0
```

The following is a sample output after a member is reloaded:

```
Switch#sh switch stack-ports detail
1/1 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 3
 Five minute input rate  9752 bytes/sec
 Five minute output rate 13982 bytes/sec
     6072578128 bytes input
     516808638473 bytes output
 CRC Errors
              Data CRC 37
          Ringword CRC 8943
           InvRingWord 22
           PcsCodeWord 351
1/2 is OK Loopback No
Cable Length 50cm     Neighbor 2
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 2
 Five minute input rate  8918 bytes/sec
 Five minute output rate 11567 bytes/sec
     5130578537 bytes input
     458589810996 bytes output
 CRC Errors
              Data CRC 196
          Ringword CRC 100
           InvRingWord 240
           PcsCodeWord 368
2/1 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  1178 bytes/sec
 Five minute output rate 9969 bytes/sec
     60934969353 bytes input
     463010330927 bytes output
 CRC Errors
              Data CRC 3
          Ringword CRC 1
           InvRingWord 1
           PcsCodeWord 0
2/2 is OK Loopback No
Cable Length 50cm     Neighbor 1
Link Ok Yes Sync Ok Yes Link Active Yes
Changes to LinkOK 1
 Five minute input rate  931 bytes/sec
 Five minute output rate 9113 bytes/sec
     52318756819 bytes input
     399580839136 bytes output
 CRC Errors
              Data CRC 0
          Ringword CRC 0
           InvRingWord 0
           PcsCodeWord 0

Switch#
```

Examples: Stack Operations

In a stack with two members, stack cables connect all the members:

```
Switch# show switch stack-ports summary

SW#/Port#  Port    Neighbor/ Cable     Link   Link    Sync   #Changes    In
           Status  Port      Length    OK     Active  OK     To LinkOK   Loopback
--------   ------  --------  --------  ----  ------   ----   ---------   --------
1/1        OK      2/1       50 cm     Yes    Yes     Yes       1        No
1/2        OK      2/2       50 cm     Yes    Yes     Yes       1        No
2/1        OK      1/1       50 cm     Yes    Yes     Yes       1        No
2/2        OK      1/2       50 cm     Yes    Yes     Yes       1        No

Switch#
```

If you disconnect the stack cable from Port 1 on Switch 1, these messages appear on the console:

```
*Jun 27 06:25:01.654: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
1 on Switch 1 is cable-not-connected
*Jun 27 06:25:01.654: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
2 on Switch 1 is down
*Jun 27 06:25:01.654: %STACKMGR-6-STACK_LINK_CHANGE: Switch 1 R0/0: stack_mgr: Stack port
2 on Switch 1 is cable-not-connected
```

The output of the following command also shows when port is disconnected:

```
Switch#show switch stack-ports summary

SW#/Port#  Port    Neighbor/  Cable     Link   Link    Sync   #Changes    In
           Status  Port       Length    OK     Active  OK     To LinkOK   Loopback
--------   ------  --------   --------  ----  ------   ----   ---------   --------
1/1        DOWN    NONE/NONE  No cable  No     No      No        1        No
1/2        OK      2/2        50 cm     Yes    Yes     Yes       1        No
2/1        OK      1/1        50 cm     Yes    Yes     Yes       1        No
2/2        OK      1/2        50 cm     Yes    Yes     Yes       1        No

Switch#
```

If you disconnect the stack cable from Port 2 on Switch 1, the stack splits.

Switch 1 is a standalone switch:

```
Switch#show switch stack-ports summary

SW#/Port#  Port    Neighbor/  Cable     Link   Link    Sync   #Changes    In
           Status  Port       Length    OK     Active  OK     To LinkOK   Loopback
--------   ------  --------   --------  ----  ------   ----   ---------   --------
1/1        DOWN    NONE/NONE  No cable  No     No      No        1        No
1/2        DOWN    NONE/NONE  No cable  No     No      No        1        No

Switch#
```

Examples: Software Loopback with Connected Stack Cables

- On Port 1 on Switch 1, the port status is *Down*, and a cable is connected.

  On Port 2 on Switch 1, the port status is *Down*, and no cable is connected.

```
# show switch stack-ports summary
  #
 Sw#/Port#  Port    Neighbor/ Cable     Link  Link    Sync  #Changes   In
            Status  Port      Length    OK    Active  OK    To LinkOK  Loopback
  --------  ------  --------  --------  ---- ------  ----  ---------  --------
    1/1     Down      None    50 Cm      No     No     No       1          No
```

```
    1/2     Down      None    No cable   No     No     No       1          No
```

- In a *physical loopback*, a cable connects both stack ports on a switch. You can use this configuration to test
  - Cables on a switch that is running properly
  - Stack ports with a cable that works properly

```
# show switch stack-ports summary
  #
 Sw#/Port#  Port    Neighbor/ Cable     Link  Link    Sync  #Changes   In
            Status  Port      Length    OK    Active  OK    To LinkOK  Loopback
  --------  ------  --------  --------  ----  ------  ----  ---------  --------
    2/1       OK       2      50 cm     Yes    Yes    Yes       1         No
    2/2       OK       2      50 cm     Yes    Yes    Yes       1         No
```

The port status shows that

- Switch 2 is a standalone switch.
- The ports can send and receive traffic.

Example: Software Loopback with no Connected Stack Cable

```
# show switch stack-ports summary
#
#SW#/Port#  Port    Neighbor/ Cable      Link   Link    Sync   #Changes    In
            Status  Port      Length     OK     Active  OK     To LinkOK   Loopback
--------    ------  --------  --------   ----  ------   ----   ---------   --------
1/1         Down    None      No cable   No     No      No     1           Yes
1/2         Down    None      No cable   No     No      No     1           Yes
```

Example: Finding a Disconnected Stack Cable

Stack cables connect all stack members. Port 2 on Switch 1 connects to Port 1 on Switch 2.

This is the port status for the members:

```
# show switch stack-ports summary
  #
 Sw#/Port#  Port    Neighbor/ Cable     Link  Link    Sync  #Changes   In
            Status  Port      Length    OK    Active  OK    To LinkOK  Loopback
  --------  ------  --------  --------  ----  ------  ----  ---------  --------
    1/1     OK       2/1      50 cm     Yes    Yes    Yes       1         No
    1/2     OK       2/2      50 cm     Yes    Yes    Yes       1         No
    2/1     OK       1/1      50 cm     Yes    Yes    Yes       1         No
    2/2     OK       1/2      50 cm     Yes    Yes    Yes       1         No
```

If you disconnect the cable from Port 2 on Switch 1, these messages appear:

```
%STACKMGR-4-STACK_LINK_CHANGE: Stack Port 1 Switch 2 has changed to state DOWN

  %STACKMGR-4-STACK_LINK_CHANGE: Stack Port 2 Switch 1 has changed to state DOWN
```

This is now the port status:

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

Only one end of the cable connects to a stack port, Port 1 on Switch 2.

- The *Stack Port Status* value for Port 2 on Switch 1 is *Down*, and the value for Port 1 on Switch 2 is *Down*.
- The *Cable Length* value is *No cable*.

Diagnosing the problem:

- Verify the cable connection for Port 2 on Switch 1.
- Port 2 on Switch 1 has a port or cable problem if
  - The *In Loopback* value is *Yes*.

  or
  - The *Link OK*, *Link Active*, or *Sync OK* value is *No*.

Example: Fixing a Bad Connection Between Stack Ports

Stack cables connect all members. Port 2 on Switch 1 connects to Port 1 on Switch 2.

This is the port status:

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

Diagnosing the problem:

- The Stack Port Status value is *Down*.
- Link OK, Link Active, and Sync OK values are *No*.
- The Cable Length value is *50 cm*. The switch detects and correctly identifies the cable.

The connection between Port 2 on Switch 1 and Port 1 on Switch 2 is unreliable on at least one of the connector pins.

Additional References for Switch Stacks

Related Documents

Related Topic	Document Title
Cabling and powering on a switch stack.	Cisco Catalyst IE9300 Rugged Series Switch Hardware Installation Guide

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

Feature History and Information for Switch Stacks

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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

Table 4: Feature History

Release	Feature	Feature Information

Cisco IOS XE Dublin 17.12.1	Stacking support for Cisco Catalyst IE9300 Rugged Series Switches	• Stacking became supported for four-member stacks.
		• Switches introduced in this release:
		  • IE-9320-24T4X-A and IE-9320-24T4X-E
		  • IE-9320-24P4X-A and IE-9320-24P4X-E
		  • IE-9320-16P8U4X-A and IE-9320-16P8U4X-E
		  • IE-9320-24P4S-A and IE-9320-24P4S-E

Cisco IOS XE Dublin 17.11.1	Stacking support for Cisco Catalyst IE9300 Rugged Series Switches	Stacking became supported for new switches: IE-9320-22S2C4X-A and IE-9320-22S2C4X-E.
Cisco IOS XE Cupertino 17.8.1	Stacking support for Cisco Catalyst IE9300 Rugged Series Switches	Stacking became supported for three-member stacks. (IE-9320-26S2C-A and IE-9320-26S2C-E)
Cisco IOS XE Cupertino 17.7.1	Stacking support for Cisco Catalyst IE9300 Rugged Series Switches	The switch became available, with stacking supported for two-member stacks. (IE-9320-26S2C-A and IE-9320-26S2C-E)