

AOS-CX 10.13 Link Aggregation Guide

All Switch Series



**Hewlett Packard
Enterprise**

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This document describes features of the AOS-CX network operating system. It is intended for administrators responsible for installing, configuring, and managing Aruba switches on a network.

Applicable products

This document applies to the following products:

- Aruba 4100i Switch Series (JL817A, JL818A)
- Aruba 6000 Switch Series (R8N85A, R8N86A, R8N87A, R8N88A, R8N89A, R9Y03A)
- Aruba 6100 Switch Series (JL675A, JL676A, JL677A, JL678A, JL679A)
- Aruba 6200 Switch Series (JL724A, JL725A, JL726A, JL727A, JL728A, R8Q67A, R8Q68A, R8Q69A, R8Q70A, R8Q71A, R8V08A, R8V09A, R8V10A, R8V11A, R8V12A, R8Q72A, JL724B, JL725B, JL726B, JL727B, JL728B, S0M81A, S0M82A, S0M83A, S0M84A, S0M85A, S0M86A, S0M87A, S0M88A, S0M89A, S0M90A, S0G13A, S0G14A, S0G15A, S0G16A, S0G17A)
- Aruba 6300 Switch Series (JL658A, JL659A, JL660A, JL661A, JL662A, JL663A, JL664A, JL665A, JL666A, JL667A, JL668A, JL762A, R8S89A, R8S90A, R8S91A, R8S92A, S0E91A, S0X44A)
- Aruba 6400 Switch Series (R0X31A, R0X38B, R0X38C, R0X39B, R0X39C, R0X40B, R0X40C, R0X41A, R0X41C, R0X42A, R0X42C, R0X43A, R0X43C, R0X44A, R0X44C, R0X45A, R0X45C, R0X26A, R0X27A, JL741A, S0E48A, S0E48A #0D1, S1T83A, S1T83A #0D1)
- Aruba 8100 Switch Series (R9W94A, R9W95A, R9W96A, R9W97A)
- Aruba 8320 Switch Series (JL479A, JL579A, JL581A)
- Aruba 8325 Switch Series (JL624A, JL625A, JL626A, JL627A)
- Aruba 8360 Switch Series (JL700A, JL701A, JL702A, JL703A, JL706A, JL707A, JL708A, JL709A, JL710A, JL711A, JL700C, JL701C, JL702C, JL703C, JL706C, JL707C, JL708C, JL709C, JL710C, JL711C, JL704C, JL705C, JL719C, JL718C, JL717C, JL720C, JL722C, JL721C)
- Aruba 8400 Switch Series (JL366A, JL363A, JL687A)
- Aruba 9300 Switch Series (R9A29A, R9A30A, R8Z96A)
- Aruba 10000 Switch Series (R8P13A, R8P14A)

Latest version available online

Updates to this document can occur after initial publication. For the latest versions of product documentation, see the links provided in [Support and Other Resources](#).

Command syntax notation conventions

Convention	Usage
<code>example-text</code>	Identifies commands and their options and operands, code examples,

Convention	Usage
	filenames, pathnames, and output displayed in a command window. Items that appear like the example text in the previous column are to be entered exactly as shown and are required unless enclosed in brackets ([]).
example-text	In code and screen examples, indicates text entered by a user.
Any of the following: <ul style="list-style-type: none"> ▪ <code><example-text></code> ▪ <code><example-text></code> ▪ <code>example-text</code> ▪ <code>example-text</code> 	Identifies a placeholder—such as a parameter or a variable—that you must substitute with an actual value in a command or in code: <ul style="list-style-type: none"> ▪ For output formats where italic text cannot be displayed, variables are enclosed in angle brackets (< >). Substitute the text—including the enclosing angle brackets—with an actual value. ▪ For output formats where italic text can be displayed, variables might or might not be enclosed in angle brackets. Substitute the text including the enclosing angle brackets, if any, with an actual value.
	Vertical bar. A logical OR that separates multiple items from which you can choose only one. Any spaces that are on either side of the vertical bar are included for readability and are not a required part of the command syntax.
{ }	Braces. Indicates that at least one of the enclosed items is required.
[]	Brackets. Indicates that the enclosed item or items are optional.
... or ...	Ellipsis: <ul style="list-style-type: none"> ▪ In code and screen examples, a vertical or horizontal ellipsis indicates an omission of information. ▪ In syntax using brackets and braces, an ellipsis indicates items that can be repeated. When an item followed by ellipses is enclosed in brackets, zero or more items can be specified.

About the examples

Examples in this document are representative and might not match your particular switch or environment.

The slot and port numbers in this document are for illustration only and might be unavailable on your switch.

Understanding the CLI prompts

When illustrating the prompts in the command line interface (CLI), this document uses the generic term **switch**, instead of the host name of the switch. For example:

```
switch>
```

The CLI prompt indicates the current command context. For example:

```
switch>
```

Indicates the operator command context.

```
switch#
```

Indicates the manager command context.

```
switch(CONTEXT-NAME)#
```

Indicates the configuration context for a feature. For example:

```
switch(config-if)#
```

Identifies the **interface** context.

Variable information in CLI prompts

In certain configuration contexts, the prompt may include variable information. For example, when in the VLAN configuration context, a VLAN number appears in the prompt:

```
switch(config-vlan-100)#
```

When referring to this context, this document uses the syntax:

```
switch(config-vlan-<VLAN-ID>#
```

Where *<VLAN-ID>* is a variable representing the VLAN number.

Identifying switch ports and interfaces

Physical ports on the switch and their corresponding logical software interfaces are identified using the format:

```
member/slot/port
```

On the 4100i Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 on the switch.

On the 6000 and 6100 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 on the switch.

On the 6200 Switch Series

- *member*: Member number of the switch in a Virtual Switching Framework (VSF) stack. Range: 1 to 8. The primary switch is always member 1. If the switch is not a member of a VSF stack, then member is 1.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 in slot 1 on member 1.

On the 6300 Switch Series

- *member*: Member number of the switch in a Virtual Switching Framework (VSF) stack. Range: 1 to 10. The primary switch is always member 1. If the switch is not a member of a VSF stack, then member is 1.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 on member 1.

On the 6400 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Specifies physical location of a module in the switch chassis.
 - Management modules are on the front of the switch in slots 1/1 and 1/2.
 - Line modules are on the front of the switch starting in slot 1/3.
- *port*: Physical number of a port on a line module.

For example, the logical interface **1/3/4** in software is associated with physical port 4 in slot 3 on member 1.

On the 83xx, 9300, and 10000 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Always 1. This is not a modular switch, so there are no slots.
- *port*: Physical number of a port on the switch.

For example, the logical interface **1/1/4** in software is associated with physical port 4 on the switch.



If using breakout cables, the port designation changes to x:y, where x is the physical port and y is the lane when split to 4 x 10G or 4 x 25G. For example, the logical interface 1/1/4:2 in software is associated with lane 2 on physical port 4 in slot 1 on member 1.

On the 8400 Switch Series

- *member*: Always 1. VSF is not supported on this switch.
- *slot*: Specifies physical location of a module in the switch chassis.
 - Management modules are on the front of the switch in slots 1/5 and 1/6.
 - Line modules are on the front of the switch in slots 1/1 through 1/4, and 1/7 through 1/10.
- *port*: Physical number of a port on a line module

For example, the logical interface **1/1/4** in software is associated with physical port 4 in slot 1 on member 1.

Identifying modular switch components

- Power supplies are on the front of the switch behind the bezel above the management modules. Power supplies are labeled in software in the format: *member/power supply*:
 - *member*: 1.
 - *power supply*: 1 to 4.
- Fans are on the rear of the switch and are labeled in software as: *member/tray/fan*:
 - *member*: 1.
 - *tray*: 1 to 4.
 - *fan*: 1 to 4.
- Fabric modules are not labeled on the switch but are labeled in software in the format: *member/module*:

- *member: 1.*
- *member: 1 or 2.*
- The display module on the rear of the switch is not labeled with a member or slot number.

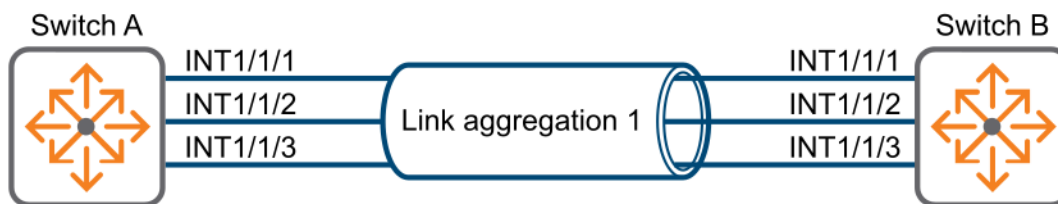
Overview

Ethernet link aggregation bundles multiple physical Ethernet links into one logical link, called a link aggregation group (LAG).

Link aggregation has the following benefits:

- Increased bandwidth beyond the limits of any single link. In an aggregate link, traffic is distributed across the member ports.
- Improved link reliability. The member ports dynamically back up one another. When a member port fails, its traffic is automatically switched to other member ports. As shown in the following figure Device A and Device B are connected by three physical Ethernet links. These physical Ethernet links are combined into an aggregate link called link aggregation 1. The bandwidth of this aggregate link can reach up to the total bandwidth of the three physical Ethernet links. At the same time, the three Ethernet links back up one another. When a physical Ethernet link fails, the traffic originally intended for the failed link is switched to the remaining active links.

Ethernet link aggregation diagram



Aggregation group, member port, and aggregate interface

An aggregation group is a collection of physical interfaces that are bundled together for the purpose of load distribution and redundancy. These physical interfaces are called member ports. They are configured through a logical aggregate interface.

An aggregate interface can be one of the following types:

- **Layer 2:** The member ports of the corresponding Link Aggregation Group can only be layer 2 Ethernet interfaces.
- **Layer 3:** The member ports of the corresponding Link Aggregation Group can only be layer 3 interfaces.



Layer 3 aggregation groups are not supported on the 4100i, 6000, 6100, and 6200 Switch Series.

The effective port rate of an aggregate interface equals the total rate of its member ports. Only full duplex mode members are eligible for aggregation.

Link aggregation modes

An aggregation group operates in one of the following modes:

- **Static LAG:** In the static LAG mode of operation, Link failure is not detected as there is no keep alive PDU communication between the devices. A misconfiguration on one side can cause much trouble and be difficult to troubleshoot, because no signaling takes place between the two peers.
- **Dynamic LAG or LACP:** The local device and the peer device automatically maintain the aggregation states of the member ports, resulting in link failure being quickly detected by exchanging the PDU. LACP reduces the workload of network administrators.

Dynamic LAG uses LACP packets to establish the association between two peers. This configuration results in the reduction of the misconfiguration probability. Also, link failures are intelligently handled by two participating devices through the LACP protocol, which is adaptive or dynamic to these network failures.

Layer 2 aggregation groups and layer 3 aggregation groups support both static and dynamic modes.

LACP

Dynamic aggregation is implemented through the IEEE 802.3ad Link Aggregation Control Protocol (LACP).

LACP uses LACPDUs to exchange aggregation information between LACP-enabled devices. Each member port in a dynamic aggregation group can exchange information with its peer. When a member port receives an LACPDU, it compares the received information with information received on the other member ports. In this way, the two systems agree on which ports are placed in Selected state.

The LACPDU fields convey data for the LACP functions, including:

- System LACP priority
- System MAC address
- Port priority
- Port number
- Operational key

LACP operating modes

LACP can operate in active or passive mode.

- **Active mode:** When the LACP is operating in active mode on either end of a link, both ports can send PDUs. The "active" LACP initiates an LACP connection by sending LACPDUs. The "passive" LACP will wait for the remote end to initiate the link.
- **Passive mode:** When the LACP is operating in passive mode on a local member port and as its peer port, both ports cannot send PDUs.



Two peer ports operating in "passive" mode will never establish an LACP link.

For an LACP LAG, one side must have LACP in active mode and the peer must have an LACP configuration of active or passive mode. If you do not enable LACP on a LAG, it is treated as a static LAG and the peer cannot negotiate LACP with the LAG.

LACP configuration settings

Task	Command	Example
Setting the LACP mode to active or passive.	<code>lacp mode {active passive}</code>	<code>switch(config-lag-if)# lacp mode active</code>
Setting the LACP mode to off.	<code>no lacp mode {active passive}</code>	<code>switch(config-lag-if)# no lacp mode active</code>
Setting the hash type.	<p>For 6000, 6100, and 8400 Switch Series:</p> <code>lacp hash [l2-src-dst l3-src-dst l4-src-dst]</code> <p>For 8320, 8325, 6200, 6300, 6400 and 10000 Switch Series:</p> <code>hash [l2-src-dst l3-src-dst l4-src-dst]</code>	<p>For 6000, 6100, and 8400 Switch Series:</p> <code>switch(config)# lacp hash l2-src-dst</code> <p>For 8320, 8325, 6200, 6300, 6400 and 10000 Switch Series:</p> <code>switch(config-lag-if)# hash l2-src-dst</code>
Setting the LACP rate to fast.	<code>lacp rate fast</code>	<code>switch(config)# interface lag 1</code> <code>switch(config-lag-if)# lacp rate fast</code>
Setting the LACP rate to slow.	<code>lacp rate slow</code>	<code>switch(config)# interface lag 1</code> <code>switch(config-lag-if)# lacp rate slow</code>
Applying shutdown on the LAG port.	<code>shutdown</code>	<code>switch(config)# interface lag 1</code> <code>switch(config-lag-if)# shutdown</code>
Resetting every interface in the LAG to the default (up)	<code>no shutdown</code>	<code>switch(config-lag-if)# no shutdown</code>

Interface LACP settings

Task	Command	Example
Setting the LACP port ID.	<code>lacp port-id <ID></code>	<code>switch(config-if)# lacp port-id 100</code>
Setting the LACP port ID to the default.	<code>no lacp port-id</code>	<code>switch(config-if)# no lacp port-id</code>
Setting the LACP port priority.	<code>lacp port-priority <PORT-PRIORITY></code>	<code>switch(config-if)# lacp port-priority 100</code>
Setting the LACP port priority to the default	<code>no lacp port-priority</code>	<code>switch(config-if)# no lacp port-priority</code>

LAG interface states

The output from the CLI commands `show lacp interfaces` and `show lacp interfaces multi-chassis` display the following interface states:

Interface state	Description
A - Active	An active LACP interface.
C - Collecting	Data frames are received through the aggregate link and sent onto the intended destination.
D - Distributing	Data frames are transmitted through the aggregate link to reach the intended destination.
F - Aggregable	The link can be used as part of an aggregate.
E - Default neighbor state	The link has the default state of the neighbor switch.
I - Individual	The link is used as an individual link.
L - Long-timeout	With the long timeout, an LACPDU is sent every 30 seconds. If no response comes from its partner after three LACPDU's are sent (90 seconds), a timeout event occurs. The LACP state machine then transitions to the appropriate state based on its current state.
N - InSync	The physical port is connected to the aggregate port that was last chosen by the logical election. The state variable selected is still true.
O - OutofSync	The hardware might be out of sync with the modified protocol information. If the hardware also has a status of collecting, do not transmit frames because they will be misdelivered.
P - Passive	The port participates in the protocol, as long as it has an active partner.
S - Short-timeout	In the short timeout configuration, an LACPDU is sent every second. If no response comes from its partner after three LACPDU's are sent, a timeout event occurs. The LACP state machine then transitions to the appropriate state based on its current state.
X - State m/c expired	The "current while" timer has expired. The "current while" timer then restarts with the short-timeout enabled. The term <code>State m/c</code> refers to a state machine.

How static link aggregation groups are built

Reference port selection process

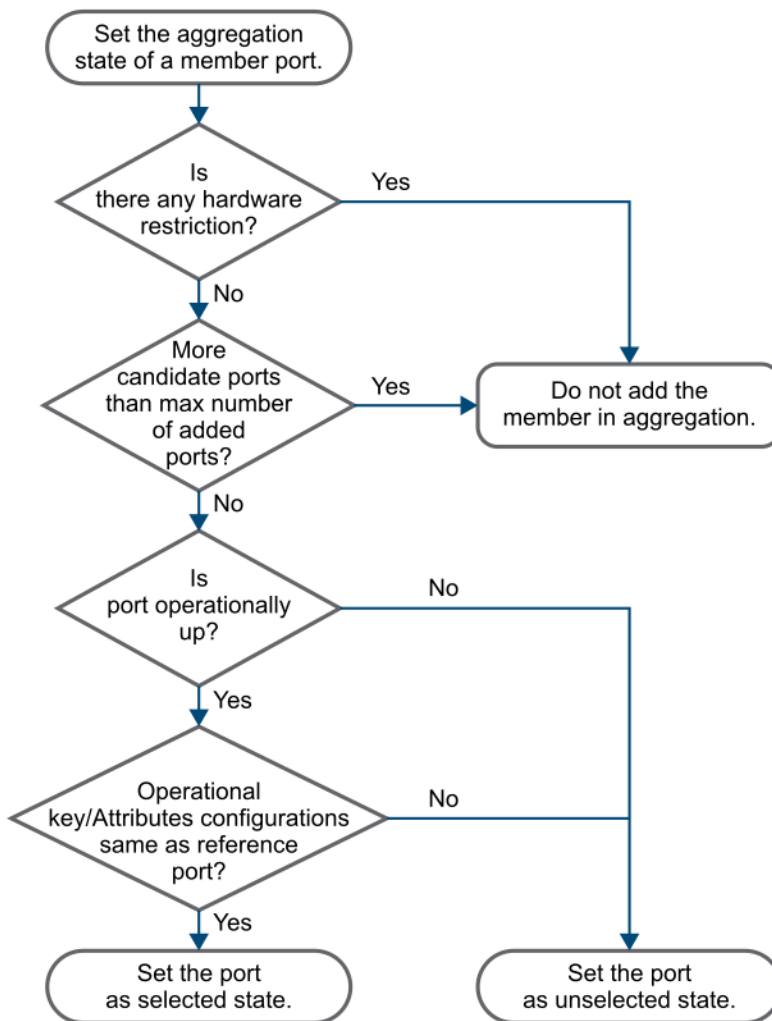
When setting the aggregation states of the ports in an aggregation group, the system automatically chooses a member port as the reference port. A selected port must have the same operational key and attribute configurations as the reference port.

The system chooses a reference port from the member ports in the up state. The first member interface which is operationally up is selected as reference port.

Setting the aggregation state of each member port

After the reference port is chosen, the system sets the aggregation state of each member port in the static aggregation group.

Setting the aggregation state of a member port in a static aggregation group



After the maximum limit of members is reached in a LAG, an additional port cannot be added to the aggregation group. If a port belongs to a card type with a different speed than the other aggregation members, the port can still be added to the aggregation group. If dynamic LAG is enabled, any port member with a speed different than other aggregation members is blocked or ineligible from the same aggregation group. Any operational keys/attributes or configuration changes might affect the aggregation states of the member ports.

How dynamic link aggregation groups are built

Choosing a reference port

The system chooses a reference port from the member ports in up state. A selected port must have the same operational key and attribute configurations as the reference port.

The process by which the local system (the actor) and the peer system (the partner) negotiate a reference port occurs as follows:

1. The two systems determine the system with the smaller system ID. A system ID contains the system LACP priority and the system MAC address.
 - a. The two systems compare their LACP priority values.
The lower the LACP priority, the smaller the system ID. If the LACP priority values are the same, the two systems proceed to step b.
 - b. The two systems compare their MAC addresses.
The lower the MAC address, the smaller the system ID.
2. The system with the smaller system ID chooses the first operationally up port as the reference port.

A port ID contains a port priority and a port number. The lower the port priority, the smaller the port ID.

Setting the aggregation state of each member port

After the reference port is chosen, the system with the smaller system ID sets the state of each member port on its side.

The system with the greater system ID can detect the aggregation state changes on the peer system. The system with the greater system ID sets the aggregation state of local member ports the same as their peer ports.

When you aggregate interfaces in dynamic mode, follow these guidelines:

- A dynamic link aggregation group chooses only full-duplex ports as the selected ports.
- For stable aggregation and service continuity, do not change the operational key or attribute configurations on any member port.

LAG configuration guidelines

Aggregation member interface restrictions

- If any features in the following list are configured on the interface, you cannot assign an interface to a Layer 2 aggregation group:
 - MAC authentication
 - Port security
 - 802.1X
- Do not assign a reflector port for port mirroring to an aggregation group.

Requirements for adding interfaces

Keep in mind the following requirements when adding interfaces to a LAG:

- To determine the maximum number of LAG interfaces for your type of switch, look at the output from the `show capacities lag` command; however, the number of LAGs that can be created depends on the availability of the physical interface since each LAG interface needs at least one physical interface as a member link. After the maximum limit of members is reached in a LAG, an additional port cannot be added to the aggregation group. If a port belongs to a card type with a different speed than the other aggregation members, the port can still be added to the aggregation group. If dynamic LAG is enabled, any port member with a speed different than other aggregation members is blocked or ineligible from the same aggregation group. Any operational keys/attributes or configuration changes might affect the aggregation states of the member ports.
- The nondefaults configuration on an interface is removed automatically when the interface is added to a link aggregation. For example: Assume that you remove a member interface from an existing LAG and add it to another LAG. The software removes the nondefault configurations on the interface when it is added to the new LAG.

Configuration consistency requirements

- Configure at least one active mode aggregation in two devices.
- For a successful static aggregation, make sure the ports at both ends of each link are in the same aggregation state.
- For a successful dynamic aggregation, make sure the peer ports of the ports aggregated at one end are also aggregated, and that one of the ends is configured as "active". The two ends can automatically negotiate the aggregation state of each member port.

Removing interfaces

- Deleting an aggregate interface also deletes its aggregation group and causes all member ports to leave the aggregation group.
- When a member interface is removed from a LAG:
 - **4100i, 6000, 6100, 6200, 6300, and 6400 switches:** The interface goes to its default status of `unshut`.
 - **8100, 8320, 8325, 8360, 8400, 9300, or 10000 switches:** The interface becomes disabled.

Disabling an interface

When an interface LAG is disabled with the `shutdown` command, all its members also become operationally down.

Layer 2 aggregation groups

All switches support static and dynamic layer 2 aggregation groups.



On the 6400 Switch Series, port identification differs. Line card ports start at 1/3/1.

Configuring a layer 2 static aggregation group

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Create a layer 2 aggregate interface and access the layer 2 aggregate interface view by entering:

```
switch(config)# interface lag <ID>
```

The range of the LAG interface ID is 1 to 256.

While creating the layer 2 aggregate interface, the system automatically creates a layer 2 static aggregation group numbered the same.

2. Set the operational state of every interface in the LAG to up by entering:

```
switch(config-lag-if)# no shutdown
```

This command does not impact the administrative state of the member interfaces because the command was entered at the level of the LAG. To change the administrative state of a member interface, enter the command at the interface level. For example:



```
switch(config)# interface 1/1/2  
switch(config-if)# no shutdown
```

3. On the 8100, 8320, 8325, 8360, 8400, 9300 and 10000, disable routing by entering:

```
switch(config-lag-if)# no routing
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `no routing` command.



On the 4100i, 6000, 6100, and 6200 Switch Series, routing is not supported on physical interfaces.

On the 6300 and 6400 Switch Series, routing is disabled by default.

For example:

4. Assign a native VLAN ID to a trunk interface on the LAG by entering:

```
switch(config-lag-if)# vlan trunk native <VLAN-ID>
```

```
switch(config-lag-if)# vlan trunk native 1
```

5. Use the following steps to add a maximum of 16 interfaces to the LAG:
 - a. To assign an interface to the LAG:

```
switch(config-lag-if)# interface <PORT-ID>
```

To assign a range of interfaces to a LAG:

```
switch(config-lag-if) # interface <PORT-ID>-<PORT-ID>
```

For example:

```
switch(config-lag-if) # interface 1/1/1-1/1/4
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `interface <PORT-ID>` command.

- b. Assign an ID to the LAG:

```
switch(config-if) # lag <ID>
```

For example:

```
switch(config-if-<1/1/1-1/1/4>) # lag 100
```

- c. Set the administrative state of the member interface to up:

```
switch(config-if-<1/1/1-1/1/4>) # no shutdown
```

6. View the configuration by entering the following:

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```
switch(config-if-<1/1/1-1/1/4>) # show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>) # show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : N/A
```

```
Hash           : 13-src-dst
Aggregate mode : Off
```

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name   : lag100
Interfaces      : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate  : N/A
Hash            : 13-src-dst
Aggregate mode   : Off
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

C

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : N/A
Hash                : 13-src-dst
Aggregate mode     : Off
```

O

Configuring a layer 2 dynamic aggregation group

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Create a layer 2 aggregate interface and access the layer 2 aggregate interface view by entering:

```
switch(config)# interface lag <ID>
```

While creating the layer 2 aggregate interface, the system automatically creates a layer 2 dynamic aggregation group numbered the same.

The range of the LAG interface ID is 1 to 256.

2. Set the operational state of every interface in the LAG to up by entering:

```
switch(config-lag-if)# no shutdown
```



This command does not impact the administrative state of the member interfaces because the command was entered at the level of the LAG. To change the administrative state of a member interface, enter the command at the interface level. For example:

```
switch(config)# interface 1/1/2  
switch(config-if)# no shutdown
```

3. On the 8100, 8320, 8325, 8360, 8400, 9300 and 10000, disable routing by entering:

```
switch(config-lag-if)# no routing
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `no routing` command.



On the 4100i, 6000, 6100, and 6200 Switch Series, routing is not supported on physical interfaces.

On the 6300 and 6400 Switch Series, routing is disabled by default.

4. Configure the aggregation group to operate in dynamic mode by entering:

```
switch(config-lag-if)# lACP mode {active | passive}
```

For example:

```
switch(config-lag-if)# lACP mode active
```

5. Configure the aggregation group to operate in fast or slow mode by entering:

```
switch(config-lag-if)# lACP rate {fast | slow}
```

For example:

```
switch(config-lag-if)# lACP rate fast
```

6. Assign a native VLAN ID to a trunk interface by entering:

```
switch(config-lag-if)# vlan trunk native <VLAN-ID>
```

For example:

```
switch(config-lag-if)# vlan trunk native 1
```


7. Use the following steps to add a maximum of 16 interfaces to the LAG:
 - a. To assign an interface to the LAG:

```
switch(config-lag-if)# interface <PORT-ID>
```

To assign a range of interfaces to a LAG:

```
switch(config-lag-if)# interface <PORT-ID>-<PORT-ID>
```

For example:

```
switch(config-lag-if)# interface 1/1/1-1/1/4
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `interface <PORT-ID>` command.

- b. Assign an ID to the LAG:

```
switch(config-if)# lag <ID>
```

For example:

```
switch(config-if-<1/1/1-1/1/4>)# lag 20
```

- c. Set the administrative state of the member interface to up:

```
switch(config-if-<1/1/1-1/1/4>)# no shutdown
```

8. View the configuration by entering:

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 20
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
    lacp rate fast
interface 1/1/1
    no shutdown
    lag 20

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name    : lag100
```

```
Interfaces      : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate  : Fast
Hash            : l3-src-dst
Aggregate mode  : Active
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 20
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
    lacp rate fast
interface 1/1/1
    no shutdown
    lag 20

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name   : lag100
Interfaces       : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate   : Fast
Hash             : l3-src-dst
Aggregate mode   : Active
```

Layer 3 aggregation groups

Layer 3 aggregation groups are supported on all switch series except 6000, and 6100 Switch Series.

Configuring a layer 3 static aggregation group

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Create a layer 3 aggregate interface and access the layer 3 aggregate interface view by entering:

```
switch(config)# interface lag <ID>
```

The range of the LAG interface ID is 1 to 256.

While creating the layer 3 aggregate interface, the system automatically creates a layer 3 static aggregation group numbered the same.

2. Set the operational state of every interface in the LAG to up by entering:
 - For 6200, 6300 and 6400 switch series:

```
switch(config-lag-if) # no shutdown
switch(config-lag-if) # routing
```

This command does not impact the administrative state of the member interfaces because the command was entered at the level of the LAG. To change the administrative state of a member interface, enter the command at the interface level. For example:



```
switch(config) # interface 1/1/2
switch(config-if) # no shutdown
switch(config-if) # routing
```

- For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config-lag-if) # no shutdown
```

This command does not impact the administrative state of the member interfaces because the command was entered at the level of the LAG. To change the administrative state of a member interface, enter the command at the interface level. For example:



```
switch(config) # interface 1/1/2
switch(config-if) # no shutdown
```

3. Set the IP address on the LAG interface by entering:

```
switch(config-lag-if) # ip address <IPV4-ADDR>/<MASK>
```

For example:

```
switch(config-lag-if) # ip address 192.0.2.1/30
```

4. Use the following steps to add a maximum of 16 interfaces to the LAG:
 - a. To assign an interface to the LAG:

```
switch(config-lag-if) # interface <PORT-ID>
```

To assign a range of interfaces to a LAG:

```
switch(config-lag-if) # interface <PORT-ID>-<PORT-ID>
```

For example:

```
switch(config-lag-if) # interface 1/1/1-1/1/4
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `interface <PORT-ID>` command.

b. Assign an ID to the LAG:

```
switch(config-if) # lag <ID>
```

For example:

```
switch(config-if-<1/1/1-1/1/4>) # lag 100
```

c. Set the administrative state of the member interface to up:

```
switch(config-if-<1/1/1-1/1/4>) # no shutdown
```

5. View the configuration by entering the following:

For 6200, 6300 and 6400 switch series:

```
switch(config-if-<1/1/1-1/1/4>) # show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    routing
    ip address 192.0.2.1/30
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>) # show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : N/A
Hash                : 13-src-dst
Aggregate mode     : Off
```

For 6200, 6300 and 6400 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    routing
    ip address 192.0.2.1/30
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : N/A
Hash                : 13-src-dst
Aggregate mode      : Off
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    ip address 192.0.2.1/30
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : N/A
```

```
Hash : 13-src-dst
Aggregate mode : Off
```

Configuring a layer 3 dynamic aggregation group

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Create a layer 3 aggregate interface and access the layer 3 aggregate interface view by entering:

```
switch(config)# interface lag <ID>
```

The range of the LAG interface ID is 1 to 256.

While creating the layer 3 aggregate interface, the system automatically creates a layer 3 dynamic aggregation group numbered the same.

2. Set the operational state of every interface in the LAG to up by entering:
 - For 6200, 6300 and 6400 switch series:

```
switch(config-lag-if)# no shutdown
switch(config-lag-if)# routing
```

This command does not impact the administrative state of the member interfaces because the command was entered at the level of the LAG. To change the administrative state of a member interface, enter the command at the interface level. For example:



```
switch(config)# interface 1/1/2
switch(config-if)# no shutdown
switch(config-if)# routing
```

- For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config-lag-if)# no shutdown
```

This command does not impact the administrative state of the member interfaces because the command was entered at the level of the LAG. To change the administrative state of a member interface, enter the command at the interface level. For example:



```
switch(config)# interface 1/1/2
switch(config-if)# no shutdown
```

3. Configure the aggregation group to operate in dynamic mode by entering:

```
switch(config-lag-if) # lacp mode {active | passive}
```

For example:

```
switch(config-lag-if) # lacp mode active
```

4. Configure the aggregation group to operate in fast or slow mode by entering:

```
switch(config-lag-if) # lacp rate {fast | slow}
```

For example:

```
switch(config-lag-if) # lacp rate fast
```

5. Set the IP address on the LAG interface by entering:

```
switch(config-lag-if) # ip address <IPV4-ADDR>/<MASK>
```

For example:

```
switch(config-lag-if) # ip address 192.0.3.1/30
```

6. Use the following steps to add a maximum of 16 interfaces to the LAG:
 - a. To assign an interface to the LAG:

```
switch(config-lag-if) # interface <PORT-ID>
```

To assign a range of interfaces to a LAG:

```
switch(config-lag-if) # interface <PORT-ID>-<PORT-ID>
```

For example:

```
switch(config-lag-if) # interface 1/1/1-1/1/4
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `interface <PORT-ID>` command.

- b. Assign an ID to the LAG:

```
switch(config-if) # lag <ID>
```

For example:

```
switch(-<1/1/1-1/1/4>)# lag 100
```

c. Set the administrative state of the member interface to up:

```
switch(-<1/1/1-1/1/4>)# no shutdown
```

7. View the configuration by entering:

For 6200, 6300 and 6400 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    routing
    ip address 192.0.3.1/30
    lacp mode active
    lacp rate fast
interface 1/1/1
    no shutdown
    lag 100
interface 1/1/2
    no shutdown
    lag 100
interface 1/1/3
    no shutdown
    lag 100
interface 1/1/4
    no shutdown
    lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : Fast
Hash                : 13-src-dst
Aggregate mode      : Active
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
    no shutdown
    ip address 192.0.3.1/30
    lacp mode active
    lacp rate fast
```



```

interface 1/1/1
  no shutdown
  lag 100
interface 1/1/2
  no shutdown
  lag 100
interface 1/1/3
  no shutdown
  lag 100
interface 1/1/4
  no shutdown
  lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : Fast
Hash                : l3-src-dst
Aggregate mode      : Active

```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```

switch(config-if-<1/1/1-1/1/4>)# show running-config

Current configuration:
!
vlan 1
interface lag 100
  no shutdown
  ip address 192.0.3.1/30
  lacp mode active
  lacp rate fast
interface 1/1/1
  no shutdown
  lag 100
interface 1/1/2
  no shutdown
  lag 100
interface 1/1/3
  no shutdown
  lag 100
interface 1/1/4
  no shutdown
  lag 100

switch(config-if-<1/1/1-1/1/4>)# show lacp aggregates

Aggregate name      : lag100
Interfaces          : 1/1/3 1/1/1 1/1/4 1/1/2
Heartbeat rate     : Fast
Hash                : l3-src-dst
Aggregate mode      : Active

```

Removing a LAG

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

Delete the LAG. Enter:

```
switch(config)# no interface lag <ID>
```

For example:

```
switch(config)# no interface lag 100
```

All interfaces assigned to the LAG are automatically removed from the LAG as part of the deletion process of the LAG. After removing a physical interface from a LAG,

- **4100i, 6000, 6100, 6200, 6300, and 6400 switches:** The interface associated with the LAG becomes layer 2 ports with the default layer 2 configurations and `admin` status enabled.
- **8100, 8320, 8235, 8360, and 8400 switches:** The interface associated with the LAG becomes layer 3 ports with default layer 3 configurations and administrative down.

Removing an interface from a LAG

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

Remove an interface from the LAG. Enter:

```
switch(config)# interface <PORT-NUM>  
switch(config-if)# no lag <ID>
```

For example:

```
switch(config)# interface 1/1/1  
switch(config-if)# no lag 100  
switch(config-if)# show running-config  
...  
!  
vlan 1  
interface lag 100  
interface 1/1/1  
interface 1/1/2  
    lag 100  
switch(config-if)#
```

To assign a range of interfaces to a LAG:

```
switch(config-lag-if)# interface <PORT-ID>-<PORT-ID>
```

For example:

```
switch(config-lag-if) # interface 1/1/1-1/1/4
```

After removing a physical interface from a LAG:

- **4100i, 6000, 6100, 6200, 6300, and 6400 switches:** The interface associated with LAG becomes layer 2 ports with default layer 2 configurations and with admin status of `enabled`
- **8100, 8320, 8325, 8360, 8400, 9300 and 10000 switches:** The interface associated with the LAG becomes L3 ports with default L3 configurations and administrative down. For example, suppose interface 1/1/1 was part of LAG 3 and you had administratively enabled the interface. If you later remove interface 1/1/1 from LAG 3, the administrative status automatically changes to down. If you want to use the interface again, you must administratively enable it again.

Changing the LAG membership for an interface

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Remove an interface from the LAG. Enter:

```
switch(config) # interface <PORT-NUM>  
switch(config-if) # no lag <ID>
```

For example:

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```
switch(config) # interface 1/1/1  
switch(config-if) # no lag 100  
switch(config-if) # show running-config  
Current configuration:  
!  
...  
!  
vlan 1  
interface lag 100  
    no shutdown  
    vlan trunk native 1  
    vlan trunk allowed all  
interface 1/1/1  
interface 1/1/2  
    no shutdown  
    lag 100  
switch(config-if) #
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config) # interface 1/1/1  
switch(config-if) # no lag 100  
switch(config-if) # show running-config
```

```

Current configuration:
!
...
!
vlan 1
interface lag 100
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
interface 1/1/2
    no shutdown
    lag 100
switch(config-if)#

```

After removing a physical interface from a LAG, the interface associated with the LAG becomes L3 ports with default L3 configurations and administrative down. For example, suppose interface 1/1/1 was part of LAG 3 and you had administratively enabled the interface. If you later remove interface 1/1/1 from LAG 3, the administrative status automatically changes to down. If you want to use the interface again, you must administratively enable it again.

On 4100i, 6000, 6100, and 6200 Switch Series, after removing a physical interface from a LAG, the interface associated with the LAG becomes layer 2 ports with default layer 2 configurations and admin status enabled.

2. Create the LAG to which you want to add the interface:

```

switch(config-if)# interface lag 10

```

For example:

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```

switch(config-if)# interface lag 10
switch(config-lag-if)# no shutdown
switch(config-lag-if)# vlan trunk native 1

```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```

switch(config-if)# interface lag 10
switch(config-lag-if)# no shutdown
switch(config-lag-if)# no routing
switch(config-lag-if)# vlan trunk native 1

```

3. Add the interface from Step 1 to the newly created LAG:

```

switch(config)# interface 1/1/1
switch(config-if)# lag 10

```

For example:

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```
switch(config)# interface 1/1/1
switch(config-if)# lag 10
switch(config-if)# show running-config
Current configuration:
!
...
!
vlan 1
interface lag 10
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
interface lag 100
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    lag 10
interface 1/1/2
    no shutdown
    lag 100
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config)# interface 1/1/1
switch(config-if)# lag 10
switch(config-if)# show running-config
Current configuration:
!
...
!
vlan 1
interface lag 10
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface lag 100
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    lag 10
interface 1/1/2
    no shutdown
    lag 100
```

Notice that interface 1/1/1 in the previous example is still not active, even though it has been added to LAG 10. To change the administrative state of the member interface, enter the `no shutdown` command at the interface level.

For example:

For 4100i, 6000, 6100, 6200, 6300, and 6400 switch series:

```
switch(config-if)# interface 1/1/1
switch(config-if)# no shutdown
switch(config-if)# show running-config
Current configuration:
!
...
!
vlan 1
interface lag 10
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
interface lag 100
    no shutdown
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    no shutdown
    lag 10
interface 1/1/2
    no shutdown
    lag 100
```

For 8100, 8320, 8325, 8360, 8400, 9300 and 10000 switch series:

```
switch(config-if)# interface 1/1/1
switch(config-if)# no shutdown
switch(config-if)# show running-config
Current configuration:
!
...
!
vlan 1
interface lag 10
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface lag 100
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed all
interface 1/1/1
    no shutdown
    lag 10
interface 1/1/2
    no shutdown
    lag 100
```

Configuration of an aggregate Interface

Configuring the description of an aggregate interface

You can configure the description of an aggregate interface for administration purposes, for example, describing the purpose of the interface.

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Create a layer 3 aggregate interface and enter layer 3 aggregate interface view by entering:

```
switch(config)# interface lag <ID>
```

2. Configure the description of the aggregate interface:

```
switch(config-if)# description <text>
```

Setting the MTU for a layer 2 member link interface

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Enter a layer 2 member link interface view by entering:

```
switch(config)# interface <INTERFACE-ID>
```

2. Set the MTU for the layer 2 member link interface:

```
switch(config-if)# mtu <VALUE>
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `mtu <VALUE>` command. When allowing jumbo frames under a layer 2 aggregation interface, make sure that the MTU value is set appropriately under all member interfaces.

Setting the MTU for a layer 3 aggregate interface



Layer 3 aggregation groups are not supported on the 4100i, 6000, 6100, and 6200 Switch Series.

The MTU of an interface affects IP packets fragmentation and reassembly on the interface.

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

1. Enter layer 3 aggregate interface view by entering:

```
switch(config)# interface lag <INTERFACE-ID>
```

2. Set the MTU for the layer 3 aggregate interface:

```
switch(config-lag-if) # ip mtu <VALUE>
```

See the *Command-Line Interface Guide* for your switch and software version for more information about the `ip mtu <VALUE>` command. When allowing jumbo frames under a layer 2 aggregation interface, make sure that the MTU value is set appropriately under all member interfaces.



If the IP MTU is configured as 9198, the MTU on the physical interfaces must also be configured as 9198.

Impact of shutting down or bringing up an aggregate interface

By default, an aggregate interface is down. Shutting down or bringing up an aggregate interface affects the aggregation states and link states of member ports in the corresponding aggregation group as follows:

- When an aggregate interface is shut down, all Selected ports in the corresponding aggregation group become Unselected ports and all member ports go to an operationally down state.
- When an aggregate interface is brought up, the aggregation states of member ports in the corresponding aggregation group are recalculated. LAG members, which are administratively up, will become operationally up. The members that are not administratively up will be in the same state and not made eligible for aggregation.

Shutting down an aggregate interface

Prerequisites

You must be in the global configuration context: `switch(config)#`.

Procedure

Enter the layer 3 aggregate interface view by entering:

```
switch(config) # interface lag <ID>
```

Shut down the aggregate interface:

```
switch(config-lag-if) # shutdown
```

Supported hashing algorithms

- Source MAC and destination MAC
- Source IP and destination IP
- Source port and destination port.

Configuration verification

Task	Command	Example
Viewing LACP global information	<code>show lacp configuration</code>	<pre>switch# show lacp configuration System-id : 70:72:cf:ef:fc:d9 System-priority : 65534 Hash : l3-src-dst</pre>

The output displayed for the `show lacp configuration` is from the 8400 series switch.

Viewing LACP aggregate information	<code>show lacp aggregates</code>	<pre>switch# show lacp aggregates Aggregate-name : lag100 Aggregated-interfaces : 1/1/2 Heartbeat rate : N/A Hash : l3-src-dst Aggregate mode : off Aggregate-name : lag110 Aggregated-interfaces : 1/1/1, 1/1/3 Heartbeat rate : slow Hash : l3-src-dst Aggregate mode : active</pre>
------------------------------------	-----------------------------------	---

Viewing LACP aggregate information for a LAG	<code>show lacp aggregates lag100</code>	<pre>switch# show lacp aggregates lag100 Aggregate-name : lag100 Aggregated-interfaces : Heartbeat rate : N/A Hash : l3-src-dst Aggregate mode : off</pre>
--	--	---

Viewing LACP interface details	<code>show lacp interfaces</code>	<pre>switch# show lacp interfaces</pre>
--------------------------------	-----------------------------------	---

The output is too wide to display in a column. The command output is provided in the CLI topic for the command.

BFD reports a LAG as down even when healthy links are still available

Symptom



BFD is not supported on the 4100i, 6000, 6100, and 6200 Switch Series.

The Bidirectional Forward Detection (BFD) feature reports a Link Aggregation (LAG), as being down, even though there are healthy LAG links available. The LAG, containing the downed link, will eventually rebalance the traffic to its other links.

Cause

This notification occurs when the minimum BFD control packet reception interval is set at a faster rate than the Link Aggregation Control Protocol (LACP) rate and LAG rebalancing occurs. BFD assumes that the link is down without realizing that the LAG is rebalancing the traffic load.

Action

Set the minimum BFD control packet reception interval to a slower rate than the LACP rate or set the LACP rate to a faster rate than the minimum BFD control packet reception interval.

1. To find the current settings of the minimum BFD control packet reception interval, enter the `show running-config` command.
The minimum BFD control packet reception interval setting is listed as `bfd min-receive-interval` in the command output and the measurement is in ms.
2. To find the current rate of LACP, enter the `show lacp aggregates` command.
The LACP rate is listed as the `Heatbeat rate` in the command output.
3. To change the minimum BFD control packet reception interval, enter the `bfd min-receive-interval` command.
4. To change the LACP rate, enter the `lacp rate {fast | slow}` command.

LACP and LAG commands

description (lag)

```
description <TEXT>  
no description <TEXT>
```

Description

Provides a brief description of the LAG interface. The description text is saved in the configuration of the LAG. It is available even after a reboot.

The no form of this command removes the description of the LAG interface from the configuration.

Parameter	Description
<TEXT>	Specifies the description of the LAG interface.

Example

```
switch(config)# interface lag 10  
switch(config-lag-if)# description This LAG is used for an example.  
switch(config-lag-if)# show running-config  
...  
vlan 1  
interface lag 10  
    description This LAG is used for an example.  
interface lag 60  
switch(config-lag-if)#
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	<code>config-lag-if</code>	Administrators or local user group members with execution rights for this command.

hash

hash [12-src-dst | 13-src-dst | 14-src-dst]

Description

This command controls the selection of an interface in a group of aggregate interfaces. The hash type value helps transmit a frame. This configuration must be done at the LAG interface level.

Parameter	Description
12-src-dst	Specifies the load-balancing calculation to include only layer 2 items, such as source and destination MAC addresses.
13-src-dst	Specifies the load-balancing calculation to include only layer 3 items, such as source and destination IP addresses. Default setting.
14-src-dst	Specifies the load-balancing calculation to include only layer 4 items, such as source and destination UDP/TCP ports.

Example

```
switch(config-lag-if) # hash 12-src-dst
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6200 6300 6400 8100 8320 8325 10000	config-lag-if	Administrators or local user group members with execution rights for this command.

interface lag

```
interface lag <ID>
no interface lag <ID>
```

Description

Creates a Link Aggregation Group (LAG) interface represented by an ID.

The **no** form of this command deletes a LAG interface represented by an ID.

Parameter	Description
<ID>	Specifies a LAG interface ID.

Usage

Keep in mind the following requirements when adding interfaces to a LAG:

- To determine the maximum number of LAG interfaces for your type of switch, look at the output from the **show capacities lag** command; however, the number of LAGs that can be created depends on the availability of the physical interface since each LAG interface needs at least one physical interface as a member link.
- After the maximum limit of members is reached in a LAG, an additional port cannot be added to the aggregation group. If a port belongs to a card type with a different speed than the other aggregation members, the port can still be added to the aggregation group. If dynamic LAG is enabled, any port member with a speed different than other aggregation members is blocked or ineligible from the same aggregation group. Any operational keys/attributes or configuration changes might affect the aggregation states of the member ports.
- The nondefaults configuration on an interface is removed automatically when the interface is added to a link aggregation. For example: Assume that you remove a member interface from an existing LAG and add it to another LAG. The software removes the nondefault configurations on the interface when it is added to the new LAG.

Examples

Creating a Link Aggregation Group (LAG) interface represented by an ID of 100:

```
switch(config)# interface lag 100
```

Deleting a Link Aggregation Group (LAG) interface represented by an ID of 100:

```
switch(config)# no interface lag 100
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config	Administrators or local user group members with execution rights for this command.

ip address (interface lag)

```
ip address <IPV4-ADDR>/<MASK> [secondary]
no ip address <IPV4-ADDR>/<MASK> [secondary]
```

Description

Sets an IPv4 address and subnet mask to a LAG interface. One primary and up to 31 secondary address can be configured per interface.

The **no** form of this command removes the IPv4 address from the interface.

Parameter	Description
<IPV4-ADDR>	Specifies an IP address in IPv4 format (x.x.x.x), where x is a decimal number from 0 to 255. You can remove leading zeros. For example, the address 192.169.005.100 becomes 192.168.5.100 .
<MASK>	Specifies the number of bits in the address mask in CIDR format (x), where x is a decimal number from 0 to 32.
secondary	Specifies a secondary IP address.

Examples

Setting an IP address on the LAG interface 1 to 198.51.100.1 with a mask of 24 bits:

```
switch(config)# interface lag 1
switch(config-lag-if)# ip address 198.51.100.1/24
```

Removing the IP address 198.51.100.1 with a mask of 24 bits from LAG interface 1:

```
switch(config)# interface lag 1
switch(config-lag-if)# no ip address 198.51.100.1/24
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-lag-if	Administrators or local user group members with execution rights for this command.

ipv6 address (lag)

```
ipv6 address <IPV6-ADDR>/<MASK>  
no ipv6 address <IPV6-ADDR>/<MASK>
```

Description

Sets an IPv6 address and subnet mask to a LAG interface.

The **no** form of this command removes the IPv6 address from the interface.

Parameter	Description
<IPV6-ADDR>	Specifies the IP address in IPv6 format (xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx), where x is a hexadecimal number from 0 to F. You can use two colons (::) to represent consecutive zeros (but only once), remove leading zeros, and collapse a quartet of four zeros to a single 0. For example, this address 2222:0000:3333:0000:0000:0000:4444:0055 becomes 2222:0:3333::4444:55 .
<MASK>	Specifies the number of bits in the address mask in CIDR format (x), where x is a decimal number from 0 to 128.

Examples

Setting the IPv6 address on LAG interface 1 to 2001:0db8:85a3::8a2e:0370:7334 with a mask of 24 bits:

```
switch(config)# interface lag 1  
switch(config-lag-if)# ipv6 address 2001:0db8:85a3::8a2e:0370:7334/24
```

Removing the IP address 2001:0db8:85a3::8a2e:0370:7334 with mask of 24 bits with a mask of 24 bits from LAG interface 1:

```
switch(config)# interface lag 1
switch(config-lag-if)# no ipv6 address 2001:0db8:85a3::8a2e:0370:7334/24
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6300 6400 8100 8320 8325 8360 8400 9300 10000	config-lag-if	Administrators or local user group members with execution rights for this command.

lacp fallback

```
lacp fallback
no lacp fallback
```

Description

Configures the LACP fallback on LAG port.

The no form of this command sets the LAG to BLOCK state if no LACP partner is detected.

Usage

This makes members of the LAG function as non-bonded interfaces when no LACP partner is detected. This configuration is only applicable when the LAG is of type MCLAG. If the member port does not get an LACP frame, the port is in IE state.

Examples

Configuring LACP fallback on LAG port.

```
switch(config)# int lag 1 multi-chassis
switch(config-lag-if)# no sh
switch(config-lag-if)# lacp mode active
switch(config-lag-if)# lacp fallback
```

Configuring the LAG to BLOCK state when no LACP partner is detected.

```
switch(config)# int lag 1 multi-chassis
switch(config-lag-if)# no sh
switch(config-lag-if)# lacp mode active
switch(config-lag-if)# no lacp fallback
```

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6400 8100 8320 8325 8400 9300 10000	config-if config-lag-if	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

lacp fallback-static

```
lacp fallback-static
no lacp fallback-static
```

Description

Configures the LACP fallback-static on LAG port.

The no form of this command sets the LAG to BLOCK state if no LACP partner is detected.

Usage

This makes members of the LAG function as non-bonded interfaces when no LACP partner is detected. One member interface that is part of the LAG stays up and forwards traffic, while the other members are in lacp-block state. This configuration is applicable when the lag is of type LACP and ignored in other cases. When this command is configured, only one member of LAG is selected to be UP. Enabling multiple members results in configuration mismatch on peer, loop, mac-learning issues, and more.

Examples

Configuring LACP fallback-static on LAG port.

```
switch(config)# interface lag 1
switch(config-lag-if)# lacp mode active
switch(config-lag-if)# lacp fallback-static
```

Configuring the LAG to BLOCK state when no LACP partner is detected.

```
switch(config)# interface lag 1
switch(config-lag-if)# no lacp fallback-static
```


Configuring LACP fallback-static on static port.

```
switch(config-lag-if)# lacp fallback-static
Cannot enable LACP fallback-static on static LAG.
```

Release	Modification
10.11	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	config-if config-lag-if	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

lacp hash

```
lacp hash [l2-src-dst | l3-src-dst | l4-src-dst]
no lacp hash [l2-src-dst | l3-src-dst | l4-src-dst]
```

Description

Controls the selection of an interface in a group of aggregate interfaces. The hash type value helps transmit a frame. This configuration must be done at the global level.

Parameter	Description
l2-src-dst	Specifies the load-balancing calculation to include only layer 2 items, such as source and destination MAC addresses.
l3-src-dst	Specifies the load-balancing calculation to include only layer 3 items, such as source and destination IP addresses.
l4-src-dst	Specifies the load-balancing calculation to include only layer 4 items, such as source and destination UDP/TCP ports.

Example

```
switch(config)# lacp hash l2-src-dst
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 8400 9300	config	Administrators or local user group members with execution rights for this command.

lacp mode

```
lacp mode {active | passive}  
no lacp mode {active | passive}
```

Description

Sets an LACP mode to active or passive.

The **no** form of this command sets the LACP mode to **off**, returning the LAG to a static mode aggregation.

Parameter	Description
active	Specifies that the local switch will transmit LACP Data Units (LACPDUs) to attempt to negotiate with the remote device.
passive	Specifies that the local switch will listen for LACPDUs from the remote device for LACP negotiation.

NOTE:
A momentary traffic drop occurs because LACP partners reconverge when changing the mode from active to passive or from passive to active.

Examples

Setting the LACP mode to `active`:

```
switch(config)# interface lag 1  
switch(config-lag-if)# lacp mode active
```

Setting the LACP mode to `off`:

```
switch(config)# interface lag 1  
switch(config-lag-if)# no lacp mode active
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-lag-if	Administrators or local user group members with execution rights for this command.

lacp port-id

```
lacp port-id <PORT-ID>
no lacp port-id
```

Description

Sets the LACP port ID value of the member interface of the LAG. The **no** form of this command removes the LACP port ID value from the interface.

Parameter	Description
<PORT-ID>	Specifies a port ID value. Range: 1 to 65535.

Examples

Setting an LACP port ID to a value of 10:

```
switch(config-if) # lacp port-id 10
```

Removing the LACP port ID value:

```
switch(config-if) # no lacp port-id
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

lacp port-priority

```
lacp port-priority <PORT-PRIORITY>  
no lacp port-priority
```

Description

Sets an LACP port priority value for the member interface of the LAG.

The **no** form of this command reverts the LACP port priority to the default, which is 1.

Parameter	Description
<PORT-PRIORITY>	Specifies a port priority value. Range: 1 to 65535.

Examples

Setting a LACP port priority value of 10:

```
switch(config-if) # lacp port-priority 10
```

Reverting the LACP port ID to the default:

```
switch(config-if) # no lacp port-priority
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

lacp rate

```
lacp rate {fast | slow}  
no lacp rate {fast | slow}
```

Description

Sets an LACP heartbeat request time to fast or slow.

The **no** form of the command sets an LACP rate to **slow**.

Parameter	Description
fast	Specifies the heartbeat request to every second, and the timeout period is a three-consecutive heartbeat loss that is 3 seconds.
slow	Specifies the heartbeat request to every 30 seconds. The timeout period is three-consecutive heartbeat loss that is 90 seconds. Default setting.

Examples

Setting the LACP heartbeat request time to `fast`:

```
switch(config)# interface lag 1
switch(config-lag-if)# lacp rate fast
```

Resetting the LACP heartbeat request time to the default, which is `slow`:

```
switch(config)# interface lag 1
switch(config-lag-if)# no lacp rate
```

Another way to set the LACP heartbeat request time to the default, which is `slow`:

```
switch(config)# interface lag 1
switch(config-lag-if)# lacp rate slow
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-lag-if	Administrators or local user group members with execution rights for this command.

lacp system-priority

```
lacp system-priority <SYSTEM-PRIORITY-VALUE>
no lacp system-priority <SYSTEM-PRIORITY-VALUE>
```

Description

Sets a Link Aggregation Control Protocol (LACP) system priority.

The **no** form of this command sets an LACP system priority to the default, which is 65534.

Parameter	Description
<SYSTEM-PRIORITY-VALUE>	Specifies a system priority value. Range: 0 to 65535.

Examples

Setting a Link Aggregation Control Protocol (LACP) system priority to 100:

```
switch(config)# lacp system-priority 100
```

Setting an LACP system priority to the default (65534):

```
switch(config)# no lacp system-priority
```

A momentary traffic drop can be seen in case the LACP state machine must renegotiate.



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config	Administrators or local user group members with execution rights for this command.

lag

```
lag <ID>
no lag <ID>
```

Description

Adds an interface to a specified LAG interface ID.

The **no** form of this command removes an interface from a specified LAG interface ID. The member loses its LACP configuration when removed from the LAG. The member also reaches the default state with an administrative shutdown. For 6300 and 6400 series switches, the administrative state is enabled. Configurations, such as MTU and UDLD, are retained.

Parameter	Description
<ID>	Specifies a LAG interface ID. Range: 1 to 256.

Usage

- All members of the LAG must have the same speed. If a member comes up late with a different speed, it will not participate in the LAG/LACP. The hardware restriction is applied before adding an interface to LAG. The member belongs to the card type that has the same maximum speed as the reference port card type.
- To move an interface from LagA to LagB, first remove the interface from LagA and then add it to LagB. When a member is attached to a LAG, the nondefault configurations on the member are removed silently.
- After removing a physical interface from a LAG, the interface associated with the LAG becomes L3 ports with default L3 configurations and administrative down. For example, suppose interface 1/1/1 was part of LAG 3 and you had administratively enabled the interface. If you later remove interface 1/1/1 from LAG 3, the administrative status automatically changes to down. If you want to use the interface again, you must administratively enable it again.

Examples

Adding an interface to a Link Aggregation Group (LAG) represented by an ID of 100:

```
switch(config)# interface 1/1/1
switch(config-if)# lag 100
```

Deleting an interface from a Link Aggregation Group (LAG) represented by an ID of 100:

```
switch(config)# interface 1/1/1
switch(config-if)# no lag 100
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if	Administrators or local user group members with execution rights for this command.

show interface (LAG)

```
show interfaces <LAG-NAME> [vsx-peer]
```

Description

Displays information about a specific LAG.

Parameter	Description
<LAG-NAME>	Specifies a LAG name.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Displaying information about LAG 100:

```
switch# show interface lag100
Aggregate lag100 is up
Admin state is up
Description :
MAC Address           : 48:0f:cf:af:43:9c
Aggregated-interfaces : 1/1/2
Aggregation-key       : 100
Aggregate mode        : active
Speed                 : 2000 Mb/s
L3 Counters: Rx Disabled, Tx Disabled
qos trust none
VLAN Mode: access
Access VLAN: 1
```

Statistics	RX	TX	Total
Packets	20	45	65
Unicast	5	5	10
Multicast	5	15	20
Broadcast	10	25	35
Bytes	5658	2584	8242
Jumbos	0	0	0
Dropped	0	0	0
Filtered	0	0	0
Pause Frames	0	0	0
Errors	0	0	0
CRC/FCS	0	n/a	0
Collision	n/a	0	0
Runts	0	n/a	0
Giants	0	n/a	0



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show lacp aggregates (LAG)

```
show lacp aggregates [<LAG-NAME>] [vsx-peer]
```

Description

Displays all LACP aggregate information configured for all LAGs, or for a specific LAG.

Parameter	Description
<LAG-NAME>	Optional: Specifies a lag name.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Displaying LACP aggregate information configured for lag10:

```
switch# show lacp aggregates lag10

Aggregate-name       : lag10
Aggregated-interfaces : 1/1/1 1/1/2
Heartbeat rate      : slow
Hash                 : 13-src-dst
Aggregate mode       : active
```

Displaying LACP aggregates:

```
switch# show lacp aggregates

Aggregate-name       : lag1
Aggregated-interfaces : 1/1/27 1/1/28 1/1/29
Heartbeat rate      : slow
Hash                 : 13-src-dst
Aggregate mode       : active

Aggregate-name       : lag2
Aggregated-interfaces : 1/1/48
Heartbeat rate      : slow
Hash                 : 12-src-dst
Aggregate mode       : passive
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show lacp configuration

show lacp configuration [vsx-peer]

Description

Displays global LACP configuration.

Parameter	Description
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

Displaying global LACP configuration (output is applicable for 8400 series switches):

```
switch# show lacp configuration
System-id       : 70:72:cf:ef:fc:d9
System-priority : 65534
Hash            : 13-src-dst
```

Displaying global LACP configuration:

```
switch# show lacp configuration
System-id       : 98:f2:b3:68:40:a0
System-priority : 65534
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show lacp interfaces

```
show lacp interfaces [<IFNAME>] [vsx-peer]
```

Description

Displays an LACP configuration of the physical interfaces, including VSXs. If an interface name is passed as argument, it only displays an LACP configuration of a specified interface.

Parameter	Description
<IFNAME>	Optional: Specifies an interface name.
vsx-peer	Shows the output from the VSX peer switch. If the switches do not have the VSX configuration or the ISL is down, the output from the VSX peer switch is not displayed. This parameter is available on switches that support VSX.

Examples

This example displays an LACP configuration of the physical interfaces. One of the interfaces has the **lacp-block** forwarding state. If a VSX switch has loop protect enabled on an interface and a loop occurs, VSX blocks the interface to stop the loop. The forwarding state of the blocked interface is set to **lacp-block**.

```
switch# show lacp interfaces
State abbreviations :
A - Active          P - Passive          F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync      O - OutofSync
C - Collecting     D - Distributing
X - State m/c expired      E - Default neighbor state

Actor details of all interfaces:
-----
--
Intf   Aggr   Port   Port   State   System-id           System   Aggr   Forwarding
      name  id     Pri    State   System-id           Pri     Key   State
-----
--
1/1/1  lag10  17     1      ALFOE   70:72:cf:37:a3:5c  20      10    lacp-block
1/1/2  lag128 69     1      ALFNCD  70:72:cf:37:a3:5c  20      128   up
1/1/3  lag128 14     1      ALFNCD  70:72:cf:37:a3:5c  20      128   up
1/1/4  lag128                down
1/1/5  lag20                up

Partner details of all interfaces:
-----
Intf   Aggr   Partner Port   State   System-id           System   Aggr
      name  Port-id Pri    State   System-id           Priority Key
-----
1/1/1  lag10  0      65534  PLFOEX  00:00:00:00:00:00  65534   0
1/1/2  lag128 69     1      PLFNCD  70:72:cf:8c:60:a7  65534   128
```

```

1/1/3 lag128 14 1 PLFNCD 70:72:cf:8c:60:a7 65534 128
1/1/4 lag128
1/1/5 lag20

```

Displaying static LAG:



lACP fallback-static cannot be configured on static lag. Attempts to configure **lACP fallback-static** on a static LAG results in the following message:

Cannot enable LACP-fallback static on static LAG.

```

switch# show lacp interfaces
State abbreviations :
A - Active          P - Passive          F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync      O - OutofSync
C - Collecting     D - Distributing
X - State m/c expired      E - Default neighbor state

Actor details of all interfaces:
-----
Intf  Aggr  Port  Port  State  System-id          System  Aggr  Forwarding
     Name Id   Pri   State System-id          Pri    Key   State
-----
1/1/1 lag10                up
1/1/2 lag10                up

Partner details of all interfaces:
-----
Intf  Aggr  Port  Port  State  System-id          System  Aggr
     Name Id   Pri   State System-id          Pri    Key
-----
1/1/1 lag10
1/1/2 lag10

```

Displaying an LACP configuration of the 1/1/1 interface:

```

switch# show lacp interfaces 1/1/1

State abbreviations :
A - Active          P - Passive          F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync      O - OutofSync
C - Collecting     D - Distributing
X - State m/c expired      E - Default neighbor state

Aggregate-name : lag1
-----
                Actor                Partner
-----
Port-id          | 28                | 31
Port-priority    | 1                 | 1
Key              | 1                 | 1
State            | ALFNCD            | ALFNCD
System-id        | 98:f2:b3:68:40:a0 | 98:f2:b3:68:60:a6
System-priority  | 65534             | 65534

```

Displaying an LACP configuration after loop-protect is enabled on the primary VSX switch:

```

switch# show lacp interfaces

State abbreviations :
A - Active           P - Passive           F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync       O - OutofSync
C - Collecting      D - Distributing
X - State m/c expired           E - Default neighbor state

Actor details of all interfaces:
-----
Intf    Aggr      Port  Port  State  System-ID          System Aggr Forwarding
      Name    Id   Pri   State  System-ID          Pri   Key   State
-----
1/4/14 lag1(mc)  206   1     ALFNCD f8:60:f0:06:49:00 65534 1     up
1/5/15 lag2(mc)                down

Partner details of all interfaces:
-----
Intf    Aggr      Port  Port  State  System-ID          System Aggr
      Name    Id   Pri   State  System-ID          Pri   Key
-----
1/4/14 lag1(mc)  130   1     ALFNCD f8:60:f0:06:87:00 65534 1
1/5/15 lag2(mc)

```

Displaying an LACP configuration after loop-protect is enabled on the secondary VSX switch:

```

switch# show lacp interfaces

State abbreviations :
A - Active           P - Passive           F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync       O - OutofSync
C - Collecting      D - Distributing
X - State m/c expired           E - Default neighbor state

Actor details of all interfaces:
-----
Intf    Aggr      Port  Port  State  System-ID          System Aggr Forwarding
      Name    Id   Pri   State  System-ID          Pri   Key   State
-----
1/3/2   lag1(mc)  1130  1     ALFNCD f8:60:f0:06:49:00 65534 1     up
1/9/3   lag2(mc)                down

Partner details of all interfaces:
-----
Intf    Aggr      Port  Port  State  System-ID          System Aggr
      Name    Id   Pri   State  System-ID          Pri   Key
-----
1/3/2   lag1(mc)  131   1     ALFNCD f8:60:f0:06:87:00 65534 1
1/9/3   lag2(mc)

```

Displaying an LACP configuration with LACP fallback:

```

switch# show lacp interfaces

State abbreviations :
A - Active           P - Passive           F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync       O - OutofSync

```

C - Collecting D - Distributing
 X - State m/c expired E - Default neighbor state
 Actor details of all interfaces:

Intf	Aggr Name	Port Id	Port Pri	State	System-ID	System Pri	Aggr Key	Forwarding State
1/1/4	lag10	5	1	IE	ec:eb:b8:e4:29:00	65534	10	up
1/1/5	lag10	6	1	IE	ec:eb:b8:e4:29:00	65534	10	lacp-block
1/1/6	lag10	7	1	IE	ec:eb:b8:e4:29:00	65534	10	lacp-block
1/3/27	lag10	156	1	IE	ec:eb:b8:e4:29:00	65534	10	lacp-block
1/1/9	lag20(mc)	9	1	IE	ec:eb:b8:e4:29:00	65534	10	up

Partner details of all interfaces:

Intf	Aggr Name	Port Id	Port Pri	State	System-ID	System Pri	Aggr Key
1/1/4	lag10	0	0	IE	00:00:00:00:00:00	0	0
1/1/5	lag10	0	0	IE	00:00:00:00:00:00	0	0
1/1/6	lag10	0	0	IE	00:00:00:00:00:00	0	0
1/3/27	lag10	0	0	IE	00:00:00:00:00:00	0	0
1/1/9	lag20(mc)	0	0	IE	00:00:00:00:00:00	0	0



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.11	LACP fallback-static added.
10.11	LACP fallback added on VSX-supported platforms.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show lag

show lag <LAG-ID>

Description

Displays the lag.

Parameter	Description
<LAG-ID>	Specifies the lag ID.

Examples

Displaying the lag.

```
switch# show lag

System-ID      : f4:03:43:80:4a:00
System-priority : 65534
Hash           : 13-src-dst
Aggregate lag1 is down
  Admin state is down
  Description :
  Type        : normal
  LACP Fallback : n/a
  MAC Address  : f4:03:43:80:4a:00
  Aggregated-interfaces :
  Aggregation-key : 1
  Aggregate mode : static
  LACP rate      : n/a
  Speed         : 0 Mb/s
  Mode          : routed

Aggregate lag128 is down
  Admin state is down
  Description :
  Type        : normal
  LACP Fallback : n/a
  MAC Address  : f4:03:43:80:4a:00
-- MORE --, next page: Space, next line: Enter, quit: q
```

Displaying the lag when lacp fallback-static is enabled.

```
switch# show lag

System-ID      : 90:20:c2:24:60:00
System-priority : 65534

Aggregate lag1 is up
  Admin state is up
  Description :
  Type        : normal
  LACP Fallback : Enabled
  MAC Address  : 90:20:c2:24:60:00
  Aggregated-interfaces : 1/1/1 1/1/2 1/1/3 1/1/46 1/1/47 1/1/48
  Aggregation-key : 1
  Aggregate mode : active
  Hash         : 13-src-dst
  LACP rate    : slow
  Speed       : 1000 Mb/s
  Mode        : trunk
```

Release	Modification
10.11	LACP fallback-static added.
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config interface lag

```
show running-config interface lag
```

Description

Displays the running configuration for interface lag.

Examples

Displaying the running configuration for interface lag.

```
switch# show running-config interface lag
interface lag 10 multi-chassis
  no shutdown
  no routing
  vlan trunk native 1
  vlan trunk allowed 10-12
  lacp mode active
  exit
interface lag 11 multi-chassis
  no shutdown
  no routing
  vlan trunk native 1
  vlan trunk allowed 10-12,2001
  lacp mode active
  exit
interface lag 256
  description VSX_ISL
  no shutdown
  no routing
  vlan trunk native 1 tag
  vlan trunk allowed all
  lacp mode active
  exit
```

Displaying the running configuration for interface lag with **lacp fallback-static** configured.

```
switch# show running-config interface lag
interface lag 1
  no shutdown
  no routing
  vlan trunk native 1
  vlan trunk allowed all
  lacp mode active
  lacp fallback-static
```

shutdown (interface lag)

```
shutdown
no shutdown
```

Description

Sets every interface in the LAG operationally down.

The **no** form of this command sets every interface operationally up.

Examples

Setting every interface in the LAG to shutdown:

```
switch(config)# interface lag 1  
switch(config-lag-if)# shutdown
```

Resetting every interface in the LAG to the default (up):

```
switch(config)# interface lag 1  
switch(config-lag-if)# no shutdown
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-lag-if	Administrators or local user group members with execution rights for this command.

vlan trunk native (LAG)

```
vlan trunk native <VLAN-ID>  
no vlan trunk native [<VLAN-ID>]
```

Description

Assigns a native VLAN ID to a LAG interface.

The **no** form of this command removes a native VLAN from a LAG interface and assigns VLAN ID 1 as its native VLAN.

Parameter	Description
<VLAN-ID>	Specifies the number of the VLAN ID to assign. The VLAN ID must exist. Maximum number of VLANs supported: 512 (4100i) Maximum number of VLANs supported: 512 (6000 and 6100) Maximum number of VLANs supported: 2048 (6200) Maximum number of VLANs supported: 4096 (6300, 6400) Maximum number of VLANs supported: 4096 (8320)

Parameter	Description
	Maximum number of VLANs supported: 4096 (8325)
	Maximum number of VLANs supported: 4096 (10000)
	Maximum number of VLANs supported: 4096 (9300)
	Maximum number of VLANs supported: 4096 (8360)
	Maximum number of VLANs supported: 1024 (8100)
	Maximum number of VLANs supported: 4096 (8400)
	VLAN ID range: 2 to 4094.

Usage

By default, VLAN ID 1 is assigned as the LAG VLAN ID for all LAG interfaces. VLANs can only be assigned to a nonrouted (layer 2) interface or LAG interface.

Only one VLAN ID can be assigned as the native VLAN. For the interface to forward the native VLAN traffic, the interface has to be allowed explicitly by entering **vlan trunk allowed <ID>** where the ID is the native VLAN ID. This setting is also applicable to the physical interface.

Examples

Configuring a layer 2 dynamic aggregation group with native VLAN ID **1** assigned to LAG **1**:

For 6000, 6100, and 6200 switch series:

```
switch(config)# interface lag 1
switch(config-lag-if)# no shutdown
switch(config-lag-if)# lacp mode active
switch(config-lag-if)# vlan trunk native 1
switch(config-lag-if)# vlan trunk allowed 1
```

For 6300, 6400, 8100, 8320, 8325, 8360, 8400, 9300, and 10000 switch series:

```
switch(config)# interface lag 1
switch(config-lag-if)# no shutdown
switch(config-lag-if)# no routing
switch(config-lag-if)# lacp mode active
switch(config-lag-if)# vlan trunk native 1
switch(config-lag-if)# vlan trunk allowed 1
```

Configuring a layer 2 dynamic aggregation group with native VLAN ID **20** assigned to LAG **1**:

For 6000, 6100, and 6200 switch series:

```
switch(config)# interface lag 1
switch(config-lag-if)# no shutdown
switch(config-lag-if)# lacp mode active
switch(config-lag-if)# vlan trunk native 20
switch(config-lag-if)# vlan trunk allowed 20
```

For 6300, 6400, 8100, 8320, 8325, 8360, 8400, 9300, and 10000 switch series:

```
switch(config)# interface lag 1
switch(config-lag-if)# no shutdown
switch(config-lag-if)# no routing
switch(config-lag-if)# lacp mode active
```

```
switch(config-lag-if)# vlan trunk native 20  
switch(config-lag-if)# vlan trunk allowed 20
```

Removing a native VLAN from LAG 1:

```
switch(config)# interface lag 1  
switch(config-lag-if)# no vlan trunk native
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
All platforms	config-if config-lag-if	Administrators or local user group members with execution rights for this command.

Smartlink provides simple and fast-converging link redundancy in network topologies with dual uplink between different layers of the network. It requires an active (primary) and backup (secondary) link. The active link carries the traffic. If the active link fails, a switchover is triggered and the traffic is directed to the backup link.

The active interface forwards traffic for a group of VLANs (referred to as protected VLAN group). The secondary interface is in backup mode for this protected group. If the active port goes down, the backup port starts forwarding traffic for the protected VLAN group. If the active port recovers, it switches to backup mode and does not forward traffic. Secondary port continues forwarding traffic.

If preemption is enabled, a failed active port (that has recovered) becomes active after the configured "preemption-delay" time has elapsed.

Smartlink is supported by the following switch platforms:

- 6000 Switch Series
- 6100 Switch Series
- 6200 Switch Series
- 6300 Switch Series
- 6400 Switch Series
- 8100 Switch Series
- 8360 Switch Series

Starting from AOS-CX 10.13.1030, SmartLink is supported on 4100 Switch Series.

Benefits

Smartlink provides faster failover compared to STP. If an active link fails, a Smartlink group contains configuration information that determines which port should be forwarding for a protected VLAN group.

Guidelines and limitations

- For faster convergence of routed traffic over Smartlink ports, ip neighbor-flood must be enabled on respective SVI interfaces.
- Smartlink uses ERPS copp class for flush packets.
- The Aruba 6000 and 6100 Switch Series use separate Smartlink coPP policies as ERPS is not supported in matrix platforms.

Limitations:

- VSX, ISL and MCLAGs cannot be included in Smartlink groups.
- Switches with both Smartlink and STP enabled exclude Smartlink ports from STP.
- On switches with both Smartlink and STP enabled, loops involving Smartlink and STP are not detected.

- On switches with both Smartlink and ERPS enabled, loops involving Smartlink and ERPS are not detected.
- ERPS and Smartlink cannot be enabled on the same port.
- Dynamic VLANs (MVRP) and Smartlink cannot be enabled on the same port.
- Loop Protect and Smartlink cannot be enabled on the same port.
- Multicast fast convergence is not supported.
- Uplink Failure Detection (UFD) is not supported.
- MIB and WebUI are not supported.



- VLANs that include Smartlink ports must be included in the protected VLAN list of at least one Smartlink group. If a VLAN includes Smartlink ports and is not included in the protected VLAN list, the VLAN-port combination will not be managed by Smartlink or STP, resulting in an undefined port state for the VLAN, which will cause a loop in the network.
- When using UDLD with Smartlinks, redundancy switchover is not hitless and will result in traffic loss.

Smartlink commands

Configuration commands

smartlink group

```
smartlink group <GROUP-ID>
no smartlink group <GROUP-ID>
```

Description

Creates a Smartlink group with specified ID.

The **no** form of this command removes the Smartlink group and all associated configurations for a specified ID.

Parameter	Description
<GROUP-ID>	Specifies ID for the Smartlink group.

Usage

The maximum number of Smartlink groups is 24.

Examples

Configuring a Smartlink group:

```
switch(config)# smartlink group 2
switch(config-smartlink-2)#
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	config	Administrators or local user group members with execution rights for this command.

smartlink recv-control-vlan

```
smartlink recv-control-vlan <VID-LIST>  
no smartlink recv-control-vlan <VID-LIST>
```

Description

Configures control VLANs to receive flush messages.

The **no** form of this command disables VLANs from receiving flush messages.

Parameter	Description
<VID-LIST>	Specifies VLAN ID.

Usage

- Configure this command on uplink devices where MAC flush is required.
- A flush message clears stale MAC and ARP entries enabling fast traffic convergence.

Examples

Configuring control VLAN to receive flush messages:

```
switch(config)# smartlink recv-control-vlan 2,3
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	config	Administrators or local user group members with execution rights for this command.

Group context commands

description (smartlink group)

```
description <DESC>
no description
```

Description

Adds description to a Smartlink group.

The **no** form of this command removes a description from a Smartlink group.

Parameter	Description
<DESC>	Specifies description for a Smartlink group. 1 to 64 printable ASCII characters are allowed.

Examples

Adding a description to a Smartlink group:

```
switch(config)# smartlink group 3
switch(config-smartlink-3)# Description for group 3
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400	config-smartlink-<GROUP>	Administrators or local user group members with execution rights for this command.

8100
8360

diag-dump smartlink basic

diag-dump smartlink basic

Description

Dumps the Smartlink configuration, state and statistics.

Examples

Dump of Smartlink configuration, state, and statistics:

```
switch# diag-dump smartlink basic
=====
[Start] Feature smartlink Time : Tue Jul  7 10:08:31 2020
=====
-----
[Start] Daemon smartlinkd
-----
SL Group 1: Primary port 1/1/1 Secondary port 1/1/2 Control VLAN 4,
            Preemption disabled, Preemption-delay 1 Preemption Timer OFF,
            State primary_with_backup, Active port PRIMARY, Backup port SECONDARY
Port 1/1/1: member_groups 1 SL Groups ids: 1, 0
Port 1/1/2: member_groups 1 SL Groups ids: 1, 0

or

SL Group 1: Primary port lag1 (mclag: local_up_remote_up)
            Secondary port lag2 (mclag: local_down_remote_up), Control VLAN 4,
            Preemption disabled, Preemption-delay 1 Preemption Timer OFF,
            State primary_with_backup, Active port PRIMARY, Backup port SECONDARY
Port lag1: member_groups 1 SL Groups ids: 1, 0
Port lag2: member_groups 1 SL Groups ids: 1, 0
VSX Oper Status: Primary/Secondary/NA

-----
[End] Daemon smartlinkd
-----
-----
[Start] Daemon ops-switchd
-----
Group-ID | Port Name | Port Status | Vlan-ID | HW-Port-State | Vlan-Type
-----
1        | 1/1/1     | Active      | 4        | Forwarding     | Control
1        | 1/1/1     | Active      | 3        | Forwarding     | Protected
1        | 1/1/1     | Active      | 2        | Forwarding     | Protected
1        | 1/1/1     | Active      | 1        | Forwarding     | Protected
1        | 1/1/2     | Backup      | 4        | Blocking       | Control
1        | 1/1/2     | Backup      | 3        | Blocking       | Protected
1        | 1/1/2     | Backup      | 2        | Blocking       | Protected
1        | 1/1/2     | Backup      | 1        | Blocking       | Protected
-----
[End] Daemon ops-switchd
-----
=====
[End] Feature smartlink
=====
```



```
=====
Diagnostic-dump captured for feature smartlink
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

primary-port

```
primary-port <INTERFACE-NAME>
no primary-port
```

Description

Configures primary port for a Smartlink group.

The **no** form of this command removes primary port from a Smartlink group.

Parameter	Description
<INTERFACE-NAME>	Specifies interface for primary port.

Examples

Configuring primary port for a Smartlink group:

```
switch(config)# smartlink group 3
switch(config-smartlink-3)# primary-port 1/1/1
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	config-smartlink-<GROUP>	Administrators or local user group members with execution rights for this command.

smartlink group secondary-port

```
secondary-port <INTERFACE-NAME>
no secondary-port
```

Description

Configures secondary port for a Smartlink group.

The **no** form of this command removes secondary port from a Smartlink group.

Parameter	Description
<INTERFACE-NAME>	Specifies interface for secondary port.

Examples

Configuring secondary port for a Smartlink group:

```
switch(config)# smartlink group 3
switch(config-smartlink-3)# secondary-port 1/1/2
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000	config-smartlink-<GROUP>	Administrators or local user group members with

Platforms	Command context	Authority
6100 6200 6300 6400 8100 8360		execution rights for this command.

control-vlan

```
control-vlan <VLAN-ID>
no control-vlan <VLAN-ID>
```

Description

Configures control VLAN in a Smartlink group.

The **no** form of this command removes control VLAN from a Smartlink group.

Parameter	Description
<VLAN-ID>	Specifies VLAN ID for a Smartlink group.

Usage

- In a Smartlink group, the control VLAN is used to send flush messages.
- Control VLAN is configured on the device intended to send flush messages.
- Each Smartlink group must use a unique control VLAN.
- Control VLAN is protected in the Smartlink group to avoid loops.

Examples

Configuring control VLAN in a Smartlink group:

```
switch(config)# smartlink group 3
switch(config-smartlink-3)# control-vlan 10
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000	config-smartlink-<GROUP>	Administrators or local user group members with

Platforms	Command context	Authority
6100 6200 6300 6400 8100 8360		execution rights for this command.

protected-vlans

```
protected-vlans <VLAN-ID-LIST>
no protected-vlans <VLAN-ID-LIST>
```

Description

Specifies VLANs protected by a Smartlink group.

The **no** form of this command removes VLANs protected by a Smartlink group.

Parameter	Description
<VLAN-ID-LIST>	Specifies list of VLAN IDs. Range is 1 to 4094.

Examples

Configuring protected VLANs for a Smartlink group.:

```
switch(config) # smartlink group 3
switch(config-smartlink-3) # protected-vlans 1, 10-50
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	config-smartlink-<GROUP>	Administrators or local user group members with execution rights for this command.

preemption

```
preemption
```

no preemption

Description

Configures preemption in a Smartlink group.

The **no** form of this command disables preemption in a Smartlink group.

Usage

- If preemption is enabled, a recovered primary port preempts the active interface after the configured preemption delay.
- If preemption is disabled, a recovered primary port serves as a backup interface and does not forward traffic.

Examples

Configuring preemption in a Smartlink group:

```
switch(config)# smartlink group 3
switch(config-smartlink-3)# preemption
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	config-smartlink-<GROUP>	Administrators or local user group members with execution rights for this command.

preemption-delay

```
preemption-delay <SECONDS>
no preemption-delay
```

Description

Specifies preemption delay for a Smartlink group.

The **no** form of this command removes previously configured preemption delay from a Smartlink group and sets it to the default of 1 second.

Parameter	Description
<SECONDS>	Specifies preemption delay in seconds. Range is 0 to 300 seconds.

Usage

When preemption is enabled, a recovered primary port always preempts the active interface after the configured preemption delay.

Examples

Configuring preemption delay on a Smartlink group:

```
switch(config)# smartlink group 3
switch(config-smartlink-3)# preemption
switch(config-smartlink-3)# preemption-delay 10
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	config-smartlink-<GROUP>	Administrators or local user group members with execution rights for this command.

Display commands

show smartlink group

```
show smartlink group <GROUP-ID>
```

Description

Shows information for a specific Smartlink group.

Parameter	Description
<GROUP-ID>	Specifies Smartlink group ID.

Examples

Showing Smartlink group information:

```
switch# show smartlink group 1
Smartlink Group 1 Information:
=====
Group description       : Uplink1
Protected VLANs        : 20-30
Control VLAN           : 10
Preemption              : ON
Preemption Delay        : 10
Ports  Role            State   Flush Count  Last Flush Time
-----
1/1/1  Primary  Active   2            Sat Oct 17 19:09:10 2020
1/1/2  Secondary Backup   0
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.
6100		
6200		
6300		
6400		
8100		
8360		

show smartlink group all

```
show smartlink group all
```

Description

Shows information for all configured Smartlink groups.

Examples

Showing information for all configured Smartlink groups:

```
switch# show smartlink group all
Smartlink Group Information:
=====
      Primary Secondary Active Backup Ctrl Preemption Preemption
Grp  Port   Port   Port   Port   Vlan      Delay
-----
-----
```

1	1/1/1	1/1/2	1/1/1	1/1/2	10	OFF	1
2	1/1/5	1/1/6	1/1/5	1/1/6	11	OFF	1



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show smartlink group detail

show smartlink group detail

Description

Shows detailed information for all configured Smartlink groups.

Examples

Showing detailed information for all configured Smartlink groups:

```
switch# show smartlink group detail
Smartlink Group 1 Information:
=====
Protected VLAN           : 1-3
Control VLAN             : 1
Preemption                : OFF
Preemption Delay         : 1
Ports    Role            State    Flush Count  Last Flush Time
-----
1/3/1    Primary              Backup    0
1/3/2    Secondary             Active    0

Smartlink Group 2 Information:
=====
Protected VLAN           : 4-6
Control VLAN             : 4
Preemption                : OFF
Preemption Delay         : 1
Ports    Role            State    Flush Count  Last Flush Time
```



```

-----
1/3/2   Primary   Active   0
1/3/1   Secondary  Backup   0

```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show smartlink flush-statistics

```
show smartlink flush-statistics
```

Description

Shows information for received flush messages.

Usage

This command must be executed on an uplink or peer device configured with **recv-control-vlan**.

Examples

Showing information for received flush messages:

```

switch# show smartlink flush-statistics
Last Flush Packet Detail:
=====

Flush Packets Received           : 2
Last Flush Packet Received On Interface : 1/1/1
Last Flush Packet Received On    : Sat Oct 17 19:09:10 2020
Device Id Of Last Flush Packet Received : 5065f3-127080
Control VLAN Of Last Flush Packet Received : 10

```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

clear smartlink group statistics

```
clear smartlink group [<GROUP-ID>] statistics
```

Description

Clears Smartlink statistics for the specified Smartlink group or all Smartlink groups.

Parameter	Description
<GROUP-ID>	Specifies Smartlink group.

Examples

Clearing Smartlink statistics for a specified Smartlink group:

```
switch# clear smartlink group 1 statistics
```

Clearing all Smartlink statistics for all Smartlink groups:

```
switch(config)# clear smartlink group statistics
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

clear smartlink flush-statistics

```
clear smartlink flush-statistics
```

Description

Clears Smartlink flush statistics.

Usage

This command must be executed on the uplink device configured with **recv-control-vlan**.

Examples

Clearing Smartlink flush statistics:

```
switch# clear smartlink flush-statistics
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000 6100 6200 6300 6400 8100 8360	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config

```
show running-config
```

Description

Shows current running configuration.

Examples

Showing currently running configuration:

```
switch# configure terminal
switch(config)# smartlink group 1
switch(config-smartlink-1)# description Uplink1
switch(config-smartlink-1)# primary-port 1/1/1
switch(config-smartlink-1)# secondary-port 1/1/2
switch(config-smartlink-1)# control-vlan 10
switch(config-smartlink-1)# protected-vlans 20-30
switch(config-smartlink-1)# preemption
switch(config-smartlink-1)# preemption-delay 10
switch(config)# smartlink group 2
switch(config-smartlink-2)# primary-port 1/1/8
switch(config-smartlink-2)# secondary-port 1/1/9
switch(config-smartlink-2)# control-vlan 11
switch(config-smartlink-2)# protected-vlans 20-30
switch# show running-config
Current configuration:
!
!
!
smart-link group 1
  primary-port 1/1/1
  secondary-port 1/1/2
  control-vlan 10
  protected-vlans 20-30
  preemption
  preemption-delay 10
  exit
smart-link group 2
  primary-port 1/1/8
  secondary-port 1/1/9
  control-vlan 11
  protected-vlans 20-30
  exit
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
6000	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.
6100		
6200		
6300		
6400		
8100		
8360		

Supportability commands

show capacities smartlink

show capacities smartlink | show capacities-status smartlink

Description

Shows Smartlink capacities or Smartlink capacities and status.

Examples

Showing Smartlink capacities:

```
switch# show capacities smartlink

System Capacities: Filter SMARTLINK
Capacities Name
Value
-----
--
Maximum number of SMARTLINK GROUPS configurable in a system
24
```

Showing Smartlink capacities and status:

```
switch# show capacities-status smartlink

System Capacities Status: Filter SMARTLINK
Capacities Status Name                               Value
-----
--
Number of SMARTLINK GROUPS currently configured      1
24
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.07 or earlier	--

Command Information

Platforms	Command context	Authority
4100i 6000 6100 6200 6300	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

Platforms	Command context	Authority
6400		
8100		
8360		

UFD (Uplink Failure Detection)

Uplink Failure Detection (UFD) is used to help achieve network path redundancy. UFD monitors (tracks the forwarding state of) the interfaces/LAGs configured as Links-to-Monitor (LtM) and when **all LtM links go down**, UFD disables the interfaces/LAGs configured as Links-to-Disable (LtD). If **any of the LtM links come back up**, then all the LtD links are brought back up.

This process triggers the re-convergence of the traffic to the redundant path that is typically set up using another switch or network. A common example is the teaming NIC software in servers that is used to fail over from the primary NIC to the secondary NIC upon primary NIC failure.

To avoid unnecessary switching in the downlink redundant path during a frequent network flap in the uplink ports, delays can be configured. For example, if all the monitored uplinks are still down after the configured **down** delay, all the links to disable interfaces/LAGs are brought down. Similarly, if any of the monitored uplinks are still up after the configured **up** delay, all the disabled interfaces/LAGs are brought back up.

In this simplistic topology, switch sw2 uses UFD to monitor the links (LtM) to switch sw1, disabling the links (LtD) to switch sw3 upon failure of the links from switch sw2 to switch sw1. When sw3 detects that the links from switch sw2 have gone down, it then switches to its redundant path.



Although UFD can be used alone, consider using it with Smartlink which automates fail over from links that have gone down to redundant links. Smartlink is available on the 6200, 6300, 6400, 8100, and 8360 Switch Series.

Guidelines and limitations

- UFD is supported only on L2 interfaces and LAGs. It is not supported on ROP and SVI.
- UFD is not supported with VSX, meaning that ISL and MCLAGs are not supported.

Basic UFD configuration

To help understand how to configure UFD, a basic configuration is presented, followed by detailed descriptions of the available commands under [UFD \(Uplink Failure Detection\) commands](#).

Enabling UFD:

```
switch(config)# ufd enable
```

Creating UFD session 1 and then entering its context:

```
switch(config)# ufd session-id 1  
switch(config-ufd-1)#
```

Configuring two links to be monitored and two links to disable:

```
switch(config-ufd-1)# links-to-monitor 1/1/1,1/1/2  
switch(config-ufd-1)# links-to-disable 1/1/11,1/1/12
```

Setting the up and down delays to 10 seconds:

```
switch(config-ufd-1)# delay down 10  
switch(config-ufd-1)# delay up 10
```

Showing information for UFD session 1:

```
switch# show ufd session 1  
UFD session-id : 1  
UFD Links-to-Monitor status : Up  
Up Delay : 10 sec  
Down Delay : 10 sec  
Links-to-Monitor : 1/1/1,1/1/2  
Links-to-Disable : 1/1/11,1/1/12  
Last Links-to-Monitor Down Time : 2021-11-03 15:22:05:37
```

UFD (Uplink Failure Detection) commands

ufd enable

```
ufd enable  
no ufd enable
```

Description

Enables UFD (Uplink Failure Detection). UFD is disabled by default. This command must be issued before the configuration that is set with related UFD commands takes effect.

The no form of this command disables UFD.

Examples

Enabling UFD:

```
switch(config)# ufd enable  
switch(config)# ufd session-id 1  
switch(config-ufd-1)# links-to-monitor 1/1/1,1/1/2  
switch(config-ufd-1)# links-to-disable 1/1/11,1/1/12  
switch(config-ufd-1)# delay down 10  
switch(config-ufd-1)# delay up 10  
switch(config-ufd-1)# exit  
switch(config)#
```

Disabling UFD:


```
switch(config) # no ufd enable
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	config	Administrators or local user group members with execution rights for this command.

ufd session-id

```
ufd session-id <ID>  
no ufd session-id <ID>
```

Description

Creates the specified UFD (Uplink Failure Detection) session and then enters its context. If the specified session already exists, this command enters its context.

The no form of this command deletes the specified session configuration.

Parameter	Description
<ID>	Specifies the UFD session ID. Range: 1 to 128.

Examples

Creating UFD session 1 and then entering its context:

```
switch(config) # ufd enable  
switch(config) # ufd session-id 1  
switch(config-ufd-1) # links-to-monitor 1/1/1,1/1/2  
switch(config-ufd-1) # links-to-disable 1/1/11,1/1/12  
switch(config-ufd-1) # delay down 10  
switch(config-ufd-1) # delay up 10  
switch(config-ufd-1) # exit  
switch(config) #
```

Creating UFD session 2 and then entering its context:

```
switch(config) # ufd session-id 2  
switch(config-ufd-2) # links-to-monitor lag18-lag20
```

```
switch(config-ufd-2) # links-to-disable 1/1/3-1/1/5
switch(config-ufd-2) # exit
switch(config) #
```

Deleting UFD session 1:

```
switch(config) # no ufd session-id 1
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	config	Administrators or local user group members with execution rights for this command.

links-to-monitor

```
links-to-monitor <IF/LAG-LIST>
no links-to-monitor <IF/LAG-LIST>
```

Description

Within the selected UFD (Uplink Failure Detection) session context, specifies the uplink interfaces or LAGs to monitor for UFD.

For proper UFD operation, **links-to-monitor** and **links-to-disable** must both be configured. Use command **links-to-disable** to specify a corresponding list of interfaces/LAGs to disable if the monitored uplinks go down.

The no form of this command deletes the specified links to monitor list within the selected UFD session context.



A LAG member interface cannot be added as a link to monitor. A interface configured as a link to monitor cannot be added as a LAG member interface.

Parameter	Description
<IF/LAG-LIST>	List of L2 interfaces or LAGs. Separate interfaces/LAGs with commas (for individual interfaces/LAGs) or hyphens (for a consecutive range of interfaces/LAGs).

Examples

Configuring two uplinks to monitor for UFD session 1:

```
switch(config)# ufd enable
switch(config)# ufd session-id 1
switch(config-ufd-1)# links-to-monitor 1/1/1,1/1/2
switch(config-ufd-1)# links-to-disable 1/1/11,1/1/12
switch(config-ufd-1)# delay down 10
switch(config-ufd-1)# delay up 10
switch(config-ufd-1)# exit
switch(config)#
```

Configuring a range of uplink LAGs to monitor for UFD session 2:

```
switch(config)# ufd session-id 2
switch(config-ufd-2)# links-to-monitor lag18-lag20
switch(config-ufd-2)# links-to-disable 1/1/3-1/1/5
switch(config-ufd-2)# exit
switch(config)#
```

Deleting both links to monitor for UFD session 1:

```
switch(config-ufd-1)# no links-to-monitor 1/1/1,1/1/2
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	config-ufd-<ID>	Administrators or local user group members with execution rights for this command.

links-to-disable

```
links-to-disable <IF/LAG-LIST>
no links-to-disable <IF/LAG-LIST>
```

Description

Within the selected UFD (Uplink Failure Detection) session context, specifies the interfaces or LAGs to disable when the monitored uplink interfaces go down.

For proper UFD operation, **links-to-disable** and **links-to-monitor** must both be configured. Use command **links-to-monitor** to specify a corresponding list of interfaces/LAGs to monitor.

The no form of this command deletes the specified links to disable list within the selected UFD session context.



A LAG member interface cannot be added as a link to disable. A interface configured as a link to disable cannot be added as a LAG member interface.

Parameter	Description
<code><IF/LAG-LIST></code>	List of L2 interfaces or LAGs. Separate interfaces/LAGs with commas (for individual interfaces/LAGs) or hyphens (for a consecutive range of interfaces/LAGs).

Examples

Configuring two links to be disabled:

```
switch(config)# ufd enable
switch(config)# ufd session-id 1
switch(config-ufd-1)# links-to-monitor 1/1/1,1/1/2
switch(config-ufd-1)# links-to-disable 1/1/11,1/1/12
switch(config-ufd-1)# delay down 10
switch(config-ufd-1)# delay up 10
switch(config-ufd-1)# exit
switch(config)#
```

Configuring a range of interfaces to disable:

```
switch(config)# ufd session-id 2
switch(config-ufd-2)# links-to-monitor lag18-lag20
switch(config-ufd-2)# links-to-disable 1/1/3-1/1/5
switch(config-ufd-2)# exit
switch(config)#
```

Deleting the links to disable for two interfaces:

```
switch(config-ufd-1)# no links-to-disable 1/1/11,1/1/12
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	<code>config-ufd-<ID></code>	Administrators or local user group members with execution rights for this command.

delay

```
delay {down | up} <DELAY>  
no delay {down | up} <DELAY>
```

Description

Within the selected UFD (Uplink Failure Detection) session context, specifies the amount of time (in seconds) to delay before bringing up or down the configured Links to Disable (LtD) after the corresponding Links to Monitor (LtM) come back up or go down.

For example, with **delay down 10**, when **all LtM links go down** and remain down after 10 seconds, UFD disables the interfaces/LAGs configured as Links-to-Disable (LtD). Similarly, with **delay up 10**, if **any of the LtM links come back up** and remain up after 10 seconds, then all the LtD links are brought back up.



In addition to any configured delay there is an additional delay of 3 to 5 seconds before bringing any Links-to-Disable (LtD) down or back up. So with the default delay of 0 seconds, a delay of 3 to 5 seconds does occur.

The no form of this command restores the delay to its default of 0 seconds.

Parameter	Description
<DELAY>	Species the delay in seconds. Range 0 to 180 seconds. Default: 0 seconds.

Examples

Setting the up and down delays to 10 seconds:

```
switch(config)# ufd enable  
switch(config)# ufd session-id 1  
switch(config-ufd-1)# links-to-monitor 1/1/1,1/1/2  
switch(config-ufd-1)# links-to-disable 1/1/11,1/1/12  
switch(config-ufd-1)# delay down 10  
switch(config-ufd-1)# delay up 10  
switch(config-ufd-1)# exit  
switch(config)#
```

Resetting the up and down delays to their default of 0:

```
switch(config-ufd-1)# no delay down 10  
switch(config-ufd-1)# no delay up 10
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	config-ufd-<ID>	Administrators or local user group members with execution rights for this command.

show ufd

```
show ufd [session-id <ID>]
```

Description

Shows information on all UFD sessions or the specified UFD session.

Parameter	Description
<ID>	Specifies an existing UFD session ID. Range: 1 to 128.

Example

Showing information on all configured UFD sessions:

```
switch# show ufd
Global UFD Status : Enabled

UFD session-id           : 1
UFD Links-to-Monitor status : Up
Up Delay                  : 10 sec
Down Delay                : 10 sec
Links-to-Monitor         : 1/1/1,1/1/2
Links-to-Disable         : 1/1/11,1/1/12
Last Links-to-Monitor Down Time : 2021-11-03 15:22:05:37

UFD session-id           : 2
UFD Links-to-Monitor status : Up
Up Delay                  : 5 sec
Down Delay                : 5 sec
Links-to-Monitor         : lag18-lag20
Links-to-Disable         : 1/1/3-1/1/5
Last Links-to-Monitor Down Time : 2021-11-01 12:14:42:56
```

Showing information on UFD session 2:

```
switch# show ufd session 2

UFD session-id           : 2
UFD Links-to-Monitor status : Up
Up Delay                  : 5 sec
Down Delay                : 5 sec
Links-to-Monitor         : lag18-lag20
Links-to-Disable         : 1/1/3-1/1/5
Last Links-to-Monitor Down Time : 2021-11-01 12:14:42:56
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show capacities ufd

```
show capacities ufd
show capacities-status ufd
```

Description

Command **show capacities ufd** shows UFD session capacity. Command **show capacities-status ufd** shows UFD session capacity and the number of UFD sessions configured.

Example

Showing UFD session capacity:

```
switch# show capacities ufd

System Capacities: Filter UFD
Capacities Name                                     Value
-----
Maximum number of Uplink Failure Detection sessions configurable in a system 128
```

Showing UFD session capacity and the number of UFD sessions configured:

```
switch(config)# show capacities-status ufd

System Capacities Status: Filter UFD
Capacities Status Name                               Value
-----
Maximum
-----
Number of Uplink Failure Detection sessions currently configured      1    128
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show running-config ufd

```
show running-config ufd
```

Description

Shows the running configuration for UFD.

Example

Showing the UFD portion of running configuration information:

```
switch(config)# ufd enable
switch(config)# ufd session-id 1
switch(config-ufd-1)# links-to-monitor 1/1/1,1/1/2
switch(config-ufd-1)# links-to-disable 1/1/11,1/1/12
switch(config-ufd-1)# delay down 10
switch(config-ufd-1)# delay up 10
switch(config-ufd-1)# exit
switch(config)#

switch# show running-config ufd
Current configuration:
ufd enable

ufd session-id 1
  delay up 10
  delay down 10
  links-to-monitor 1/1/1,1/1/2
  links-to-disable 1/1/11,1/1/12
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

show-tech ufd

show-tech ufd

Description

Executes the **show ufd** command followed by the **show running-config ufd** command.

Example

Running the **show ufd** command followed by the **show running-config ufd** command:

```
switch# show tech ufd
=====
Show Tech executed on Tue Nov 23 11:32:08 2021
=====
[Begin] Feature ufd
=====

*****
Command : show ufd
*****
Global UFD Status : Enabled

UFD session-id           : 10
UFD Links-to-Monitor status : Up
Up Delay                  : 20 sec
Down Delay                : 10 sec
Links-to-Monitor         : None
Links-to-Disable         : None
Last Links-to-Monitor Down Time : None

UFD session-id           : 20
UFD Links-to-Monitor status : Up
Up Delay                  : 0 sec
Down Delay                : 0 sec
Links-to-Monitor         : None
Links-to-Disable         : None
Last Links-to-Monitor Down Time : None

*****
Command : show running-config ufd
*****
ufd enable
ufd session-id 10
  delay down 10
  delay up 20
  exit
ufd session-id 20
  exit
=====
[End] Feature ufd
=====
```

```
=====
Show Tech commands executed successfully
=====
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	Operator (>) or Manager (#)	Operators or Administrators or local user group members with execution rights for this command. Operators can execute this command from the operator context (>) only.

debug ufd all

```
debug ufd all
no debug ufd all
```

Description

Enables the UFD debug logs.

The no form of this command disables the UFD debug logs.

Examples

Enabling UFD debug logs:

```
switch(config)# debug ufd all
```

Disabling UFD debug logs:

```
switch(config)# no debug ufd all
```



For more information on features that use this command, refer to the Link Aggregation Guide for your switch model.

Command History

Release	Modification
10.09	Command introduced.

Command Information

Platforms	Command context	Authority
All platforms	<code>config</code>	Administrators or local user group members with execution rights for this command.

Accessing HPE Aruba Networking Support

HPE Aruba Networking Support Services	https://www.arubanetworks.com/support-services/
AOS-CX Switch Software Documentation Portal	https://www.arubanetworks.com/techdocs/AOS-CX/help_portal/Content/home.htm
HPE Aruba Networking Support Portal	https://networkingsupport.hpe.com/home
North America telephone	1-800-943-4526 (US & Canada Toll-Free Number) +1-408-754-1200 (Primary - Toll Number) +1-650-385-6582 (Backup - Toll Number - Use only when all other numbers are not working)
International telephone	https://www.arubanetworks.com/support-services/contact-support/

Be sure to collect the following information before contacting Support:

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Other useful sites

Other websites that can be used to find information:

HPE Aruba Networking Developer Hub	https://developer.arubanetworks.com/hpe-aruba-networking-aoscx/docs/about
Airheads social forums and Knowledge Base	https://community.arubanetworks.com/
AOS-CX Software Technical Update channel on	Videos on new features introduced in this release: https://www.youtube.com/playlist?list=PLsYGHuNuBZcbWPEjjHuVMqP-Q_UL3CskS

YouTube.	
HPE Aruba Networking Hardware Documentation and Translations Portal	https://www.arubanetworks.com/techdocs/hardware/DocumentationPortal/Content/home.htm
HPE Aruba Networking software	https://networkingsupport.hpe.com/downloads
Software licensing and Feature Packs	https://licensemanagement.hpe.com/
End-of-Life information	https://www.arubanetworks.com/support-services/end-of-life/

Accessing Updates

You can access updates from the Aruba Support Portal or the HPE My Networking Website.

Aruba Support Portal

<https://networkingsupport.hpe.com/downloads>

If you are unable to find your product in the Aruba Support Portal, you may need to search My Networking, where older networking products can be found:

My Networking

<https://www.hpe.com/networking/support>

To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

<https://support.hpe.com/portal/site/hpsc/aae/home/>

Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.

Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

To subscribe to eNewsletters and alerts:

<https://networkingsupport.hpe.com/notifications/subscriptions> (requires an active HPE Aruba Networking support account to manage subscriptions). Security notices are viewable without a networking support account.

Warranty Information

To view warranty information for your product, go to <https://www.arubanetworks.com/support-services/product-warranties/>.

Regulatory Information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at <https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts>

Additional regulatory information

Aruba is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements, environmental data (company programs, product recycling, energy efficiency), and safety information and compliance data, (RoHS and WEEE). For more information, see <https://www.arubanetworks.com/company/about-us/environmental-citizenship/>.

Documentation Feedback

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