



APS Commands

APS (Automatic Protection Switching) provides protection against signal failure. Use the following commands to configure and monitor APS operations.

aps clear

To clear an external APS switchover request or an APS lockout request, use the **aps clear** command.

aps clear *group-name*

Syntax Description	group-name	Specifies the name of the associated pair of interfaces.
---------------------------	------------	--

Defaults	None
-----------------	------

Command Modes	Privileged EXEC
----------------------	-----------------

Command History	This table includes the following release-specific history entries:
------------------------	---

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

The Cisco ONS 15540 ESP supports external APS switchover requests from the CLI (command-line interface). These requests have priorities depending on the condition of the working and protection signal, and whether another switchover or lockout request is in effect. There are three types of requests:

- Lockout requests—Have the highest priority and take effect regardless of the condition of the protection signal. A lockout prevents the signal from switching over from the working channel to the protection channel.
- Forced switchover requests—Have the next highest priority and are only prevented if there is an existing lockout on the protection interface, or the protection signal has failed.

- Manual switchover requests—Have the lowest priority and only occur if there is no existing lockout on the protection path, forced switchover request, or signal failure or degradation.

The **aps clear** command clears the external requests on the APS group and returns the interfaces to the initial default state, with the working channel active and no active requests in effect. However, if the working channel is defective, the protection channel could become the active channel after the working channel fails and another switchover occurs.

The **aps clear** command differs from y-cable revertive switching behavior. Where the **aps clear** command returns the interfaces to the initial default state and clears the current external request, y-cable revertive switching behavior switches the active signal back to the working channel after the expiration of the wait-to-restore timer (if no external switchover request occur during that interval).

Examples

The following example shows how to clear an APS request on an associated interface pair named blue.

```
Switch# aps clear blue
```

The following example shows how to clear an APS request for an associated interface pair with the default group name.

```
Switch# aps clear Wavepatch2/0/0
```

Related Commands

Command	Description
aps lockout	Prevents switchovers to the protection path.
aps switch	Requests an APS switchover.
show aps	Displays APS configuration information and status.

aps direction

To specify unidirectional or bidirectional path switching, use the **aps direction** command. To revert to the default behavior, use the **no** form of this command.

aps direction {**unidirectional** | **bidirectional**}

no aps direction

Syntax Description	unidirectional	Specifies unidirectional path switching.
	bidirectional	Specifies bidirectional path switching.

Defaults Unidirectional

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

In unidirectional path switching, only the node that detects a signal failure switches over. The other node continues to receive its signal on the original path. In bidirectional path switching, when a node detects a signal failure it sends a message to the other node about the failure causing that node switches over. Both nodes then use the same path through the network.

Use the **aps direction** command only with splitter and y-cable line card protection configurations. Client line card protection handles switchovers in the client equipment, not in the Cisco ONS 15540 ESP.

When using bidirectional path switching, always configure the nodes so that they communicate over the same working path and the same protection path. Also, configure both nodes that support the channel with the same APS features, such as y-cable support, revertive behavior, and path switching.

Before changing the type of path switching, disable the standby interface with the **shutdown** command. After changing the type of path switching, reenable the standby interface with the **no shutdown** command



Note Bidirectional path switching only operates on networks that support the OSC.



Note Configure bidirectional path switching on interfaces configured with Sysplex ETR or Sysplex CLO protocol encapsulation.

Examples

The following example shows how to configure bidirectional path switching for transparent interfaces in a y-cable protection configuration.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group alpha
Switch(config-red-aps)# working transparent 2/0/0
Switch(config-red-aps)# protection transparent 4/0/0
Switch(config-red-aps)# aps y-cable
Switch(config-red-aps)# aps direction bidirectional
Switch(config-red-aps)# aps enable
```

The following example shows how to configure bidirectional path switching in a splitter protection configuration.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group chicago
Switch(config-red-aps)# working wavepatch 10/2/0
Switch(config-red-aps)# protection wavepatch 10/2/1
Switch(config-red-aps)# aps direction bidirectional
Switch(config-red-aps)# aps enable
```

The following example shows how to change the path switching operation for a y-cable APS group from unidirectional to bidirectional.

```
Switch# show aps group alpha

APS Group alpha :

architecture.: 1+1, remote prov: 1+1
span.....: end-to-end (client side y-cable)
direction...: prov: uni, current: uni, remote prov: bi
revertive...: no
created.....: 14 hours, 53 minutes
aps state...: associated (enabled)
request timer: holddown: 5000 ms, max: 15000 ms, count 2
switched chan: 0
channel ( 0): Transparent4/3/0 (STANDBY - UP), Wave4/3 (UP)
              : channel request: no-request
              : transmit request: no-request
```

```

: receive request: no-request
channel ( 1): Transparent2/3/0 (ACTIVE - UP), Wave2/3 (UP)
: channel request: no-request
: switchover count: 0
: last switchover: never

Switch# configure terminal
Switch(config)# interface transparent 4/3/0
Switch(config-if)# shutdown
Switch(config-if)# exit
Switch(config)# redundancy
Switch(config-red)# associate group Denver
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps direction bidirectional
Switch(config-red-aps)# aps enable
Switch(config-red-aps)# exit
Switch(config-red)# exit
Switch(config)# interface transparent 4/3/0
Switch(config-if)# no shutdown
Switch(config-if)# end
Switch#

```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps far-end	Configures information about the other node that supports the channel.
aps revertive	Configures revertive APS for y-cable line card protection.
aps timer message holddown	Modifies the APS Channel Protocol message holddown timer interval and message count value.
aps timer message max-interval	Modifies the APS Channel Protocol maximum inactivity interval timer value.
aps timer search-for-up	Modifies the minimum and maximum timer intervals on an APS timer that the system must wait for a splitter protection connection to come up when both connections are down.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
aps timer wait-to-restore	Modifies the number of seconds an APS timer must wait before switching back to the preferred working signal.
aps working	Configures the working interface of an associated interface pair.
aps y-cable	Enables y-cable protection.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration information and status.

aps disable

To disable APS activity between an associated interface pair, use the **aps disable** command. To reenables APS activity, use the **aps enable** command.

aps disable

Syntax Description This command has no other arguments or keywords.

Defaults None

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines Before changing the APS configuration of an associated interface pair, use this command to disable APS activity between the interfaces. When an interface pair is initially associated, APS activity is disabled.

Examples The following example shows how to disable APS activity between associated transparent interfaces.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group newyork
Switch(config-red-aps)# aps disable
```

Related Commands	Command	Description
	aps enable	Enables APS activity between associated interfaces.
	associate group	Creates an APS group and enters APS configuration mode.

aps enable

To enable APS activity between an associated interface pair, use the **aps enable** command. To disable APS activity, use the **aps disable** command.

aps enable

Syntax Description This command has no other arguments or keywords.

Defaults None

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines After changing the APS configuration of an associated interface pair, use this command to enable APS activity between the interfaces.

Examples The following example shows how to enable APS activity between associated transparent interfaces.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group london
Switch(config-red-aps)# aps working transparent 2/0/0
```

■ **aps enable**

```
Switch(config-red-aps)# aps protection transparent 4/0/0  
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
associate group	Creates an APS group and enters APS configuration mode.

aps far-end

To configure the remote node APS group name and IP address for a line card protected channel supported on a dual shelf node, use the **aps far-end** command. To remove remote node group name and IP address information, use the **no** form of this command.

aps far-end [**group** *group-name*] [**ip-address** *address*]

no aps far-end [**group**] [**ip-address**]

Syntax Description		
group <i>group-name</i>		The name of the APS group at the other node that supports the channel. The group name can differ from the name on the local node.
ip-address <i>address</i>		The IP address of the other node that supports the channel.

Defaults None

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines Use this command to configure APS for line card protected channels supported on a dual shelf node.

The APS Channel Protocol uses the OSC to communicate between nodes. When a channel is supported on a dual shelf node, the other nodes in the topology do not have full OSC access in both the east and west directions. Without full OSC access to the channel, APS will no function correctly. To compensate for this, you must provide the APS group name and IP address of the other node that supports the channel.

Configure both shelves in the network that support the channel.

Examples

The following example shows how to configure the information for the remote node that supports the channel.

```
Switch(config)# redundancy
Switch(config-red)# associate group tokyo
Switch(config-red-aps)# aps working transparent 3/0/0
Switch(config-red-aps)# aps protection transparent 5/0/0
Switch(config-red-aps)# aps far-end group blue ip-addr 10.1.1.2
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps direction	Modifies path switching behavior.
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
associate group	Creates an APS group and enters APS configuration mode.
show aps	Displays APS configuration and operation information.

aps lockout

To lock out an APS switchover to the protection path, thus preventing any further APS switchovers for any reason, including manual or forced switchovers and signal failures, use the **aps lockout** command. To remove an APS lockout request, use the **aps clear** command.

aps lockout *group-name*

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled

Command Modes

Privileged EXEC

Command History

This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

Use this command to configure APS signal switchover lockout on the protection path. This is useful when you want to prevent a switchover during shelf maintenance, or when the protection signal has degraded or failed.

You can only lock out switchovers to the protection path, not the working path. A lockout request only succeeds when the protection path interface is also acting as the standby interface. If the protection path interface is the active interface, use the **aps switch** command to switch the active interface role back to the working interface.

**Note**

The APS lockout does not persist across system reloads or processor card switchovers.

Examples

The following example shows how to lock out switchover to the protection path on an associated group named group1.

```
Switch# aps lockout group1
```

Related Commands

Command	Description
aps clear	Clears the APS switchover or lockout.
aps switch	Requests an APS switchover.
aps working	Configures the working interface of an associated interface pair.
show aps	Displays APS configuration information and status.

aps message-channel

To configure message channel to send APS channel protocol messages for the Cisco ONS 15540 ESP, use the **aps message-channel** command. To revert to the default behavior, use the **no** form of this command.

```
aps message-channel { auto-select [far-end group-name name] |
  inband dcc [far-end group-name name] | ip far-end group-name name ip-address ip-address
  | osc [far-end group-name name]}
```

```
no aps message-channel
```

Syntax Description		
auto-select		APS automatically selects a transport mechanism to send APS messages.
far-end group-name <i>name</i>		Specifies the APS group name for the channel at the remote node.
inband dcc		Specifies APS to use the in-band message channel for sending APS messages.
ip		Specifies APS messages are sent over IP. APS addresses the messages to a specified group name on the remote node identified by this ip address.
ip-address <i>ip-address</i>		Specifies the IP address to use to send the APS channel protocol messages.
osc		APS messages are sent on the OSC.

Defaults	
auto-select	

Command Modes	
APS configuration	

Command History	
This table includes the following release-specific history entries:	

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.

SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

Using OSC provided hop-by-hop support and easier fault isolation. The in-band message channel provides channel-based support without the overhead of the OSC. Using IP sends the message outside the optical network.

Examples

The following example shows how to create an APS group and configure the message channel:

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group aps_group1
Switch(config-red-aps)# aps message-channel osc
```

Related Commands

Command	Description
aps lockout	Prevents switchover to the protection path.
aps working	Configures the working interface for an APS interface pair.
aps y-cable	Enables y-cable protection.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps protection

To configure the protection path interface of an APS group, use the **aps protection** command. To remove to the protection path interface, use the **no** form of this command.

aps protection { **transparent** *slot/subcard/port* | **wavepatch** *slot/subcard/port* }

no aps protection { **transparent** *slot/subcard/port* | **wavepatch** *slot/subcard/port* }

Syntax Description		
transparent <i>slot/subcard/port</i>		Specifies the transparent interface to use as the protection path in y-cable line card protection.
wavepatch <i>slot/subcard/port</i>		Specifies the wavepatch interface to use as the protection path in splitter protection.

Defaults None

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

Each interface in an associated pair has a configured role to perform: one is the *working* interface and the other is the *protection* interface. However, at any given instant, the interfaces also have a current mode of operation: *active* and *standby*. The interface that is in active mode and receives the signal may or may not be the working interface. The working interface is the *preferred* interface to receive the active signal. The protection interface is the *preferred* interface for the standby signal.

When a pair of interfaces is associated for APS protection using the **associate interface** command, the interface with the higher interface number is the protection interface by default. To override this default configuration, use the **aps protection** command.

Examples

The following example shows how to create an APS group and configure an APS protection interface:

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group denver
Switch(config-red-aps)# aps working transparent 2/0/0
Switch(config-red-aps)# aps protection transparent 4/0/0
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps lockout	Prevents switchover to the protection path.
aps working	Configures the working interface for an APS interface pair.
aps y-cable	Enables y-cable protection.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps revertive

To configure revertive APS for y-cable line card protection, use the **aps revertive** command. To disable revertive APS, use the **no** form of this command.

aps revertive

no aps revertive

Syntax Description This command has no other arguments or keywords.

Defaults Disabled

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines When revertive APS is configured and a switchover to the protection signal has occurred, the system automatically switches back to the preferred working signal when it becomes operational. Use the **aps timer wait-to-restore** command to control how quickly the signal reverts back to the working path.



Note

Revertive APS is only supported with y-cable line card protection.

Examples

The following example shows how to configure revertive APS on an associated transparent interface pair.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group dallas
Switch(config-red-aps)# aps working transparent 2/0/0
Switch(config-red-aps)# aps protection transparent 4/0/0
Switch(config-red-aps)# aps revertive
Switch(config-red-aps)# aps y-cable
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
aps timer wait-to-restore	Modifies the wait-to-restore timer interval.
associate group	Creates an APS group and enters APS configuration mode.
show aps	Displays APS configuration and operation information.

aps switch

To request an APS switchover from the working path to the protection path, or from the protection path to the working path, use the **aps switch** command. To clear an APS switchover request, use the **aps clear** command.

aps switch *group-name* { **force** | **manual** } { **protection-to-working** | **working-to-protection** }

Syntax Description		
	group-name	Specifies the name of the associated pair of interfaces.
	force	Causes a switchover if no lockout is in effect regardless of the status of the signal.
	manual	Causes a switchover if the signal is good and no lockout is in effect.
	protection-to-working	Causes a manual switchover of the active signal from the protection path to the working path.
	working-to-protection	Causes a manual switchover of the active signal from the working path to the protection path.

Defaults None

Command Modes Privileged EXEC

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

The Cisco ONS 15540 ESP supports APS switchover requests from the CLI (command-line interface). These requests have priorities depending on the condition of the protection signal and the existence of other switchover requests. There are three types of requests:

- Lockout requests—Have the highest priority and take effect regardless of the condition of the protection signal. A lockout prevents the signal from switching over from the working channel to the protection channel.
- Forced switchover requests—Have the next highest priority and are only prevented if there is an existing lockout on the protection interface, or the protection signal has failed.
- Manual switchover requests—Have the lowest priority and only occur if there is no existing lockout on the protection path, forced switchover request, or signal failure or degradation.

For y-cable protected configurations, the transponder modules monitor both the active and standby interfaces.

The APS priority scheme for y-cable protected configurations is the following:

1. Lockout
2. Signal failure on the protection path
3. Forced switchover on the protection path (**aps switch force protection-to-working** command)
4. Forced switchover on the working path (**aps switch force working-to-protection** command)
5. Signal failure on the working path
6. Signal degrade on the protection path
7. Signal degrade on the working path
8. Manual switchover on the protection path (**aps switch manual protection-to-working** command)
9. Manual switchover on the working path (**aps switch manual working-to-protection** command)

For splitter protected configurations, the transponder module cannot monitor the signal on the standby interface. Only the active signal is monitored. This limitation prevents APS switchovers due to signal degrade or signal failure when error thresholds are exceeded. Signal failure switchovers are only triggered by loss of light. Therefore, the APS priority scheme for splitter protected configurations differs slightly from y-cable protected configurations:

1. Lockout
2. Signal failure based on loss of light on the protection path
3. Signal failure based on loss of light on the working path
4. Forced switchover on the protection path (**aps switch force protection-to-working** command)
5. Forced switchover on the working path (**aps switch force working-to-protection** command)
6. Manual switchover on the protection path (**aps switch manual protection-to-working** command)
7. Manual switchover on the working path (**aps switch manual working-to-protection** command)

**Note**

The associated group names are case sensitive and must be entered exactly as they are shown in the **show aps** command output.

Examples

The following example shows how to make a manual switchover request from the working path to the protection path for an associated interface pair named blue.

```
Switch# aps switch blue manual working-to-protection
```

The following example shows how to make a force switchover request from the working to the protection path for an associated interface pair with the default group name.

```
Switch# aps switch Wavepatch2/0/0 force protection-to-working
```

Related Commands

Command	Description
aps clear	Clears APS switchover or lockout.
aps lockout	Prevents switchover to the protection interface.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps timer message holddown

To modify the APS Channel Protocol holddown timer, use the **aps timer message holddown** command. To revert to the default values, use the **no** form of this command.

aps timer message holddown *milliseconds* [*count number*]

no aps timer message holddown

Syntax Description

<i>milliseconds</i>	Specifies the number of seconds to wait before sending an APS Channel Protocol message. The range is 100 to 10,000 milliseconds. The default timer interval is 5000 milliseconds (5 seconds).
count <i>number</i>	Specifies the number of messages to send to the destination node before starting the hold-down timer. The range is 2 to 10. The default message count is 2.

Defaults

See the “Syntax Description” section.

Command Modes

APS configuration

Command History

This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

The holddown timer prevents APS Channel Protocol message flooding over the OSC. The holddown message count allows a specified number of messages to exchange between the nodes before the holddown timer starts. For example, if the holddown message count is set to 2, the node sends and receives two messages before the timer starts. This allows the protocol to operate efficiently without affecting system performance.

**Note**

The default values for the holddown timer and message count are sufficient for most network configurations.

Examples

The following example shows how to modify the holddown timer and count values.

```
Switch(config)# redundancy
Switch(config-red)# associate group denver
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps timer message holddown 4000 count 4
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps timer message max-interval	Modifies the APS Channel Protocol maximum interval timer value.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps timer message max-interval

To modify the maximum interval for the APS Channel Protocol inactivity timer, use the **aps timer message max-interval** command. To revert to the default value, use the **no** form of this command.

aps timer message max-interval *seconds*

no aps timer message max-interval

Syntax Description	seconds	Specifies the maximum number of seconds to wait before sending an APS Channel Protocol inactivity message. The range is 1 to 120 seconds.
---------------------------	---------	---

Defaults	15 seconds
-----------------	------------

Command Modes	APS configuration
----------------------	-------------------

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines To ensure that the APS Channel Protocol is still functioning between the nodes, periodic messages are sent during periods of inactivity. The maximum interval of the inactivity timer determines how often to send the inactivity messages.



Note The default value for the inactivity timer maximum interval is sufficient for most network configurations.

Examples

The following example shows how to modify the maximum interval for the inactivity timer.

```
Switch(config)# redundancy
Switch(config-red)# associate group dallas
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps timer message max-interval 30
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps timer message holddown	Modifies the APS Channel Protocol holddown timer and message count values.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps timer search-for-up

To modify the minimum and maximum timer intervals on an APS timer for the length of time the system waits for a splitter protected connection to come up when both connections are down, use the **aps timer search-for-up** command. To revert to the default values, use the **no** form of this command.

aps timer search-for-up *min-interval max-interval*

no aps timer search-for-up

Syntax Description

min-interval	Specifies the minimum time interval to wait for a splitter protection connection to come up before checking the other signal. The range is 1 to 120 seconds.
max-interval	Specifies the maximum timer interval to wait for a splitter protection connection to come up before checking the other signal. The range is 1 to 120 seconds.

Defaults

Minimum interval: 2 seconds
Maximum interval: 32 seconds

Command Modes

APS configuration

Command History

This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

Use this command to modify the minimum and maximum timer intervals on an APS timer that causes the system to wait for a splitter protection connection to come up before checking the other splitter protection connection.

When both members of a splitter pair are down, the system first checks one signal for the minimum time interval. If the splitter protection connection does not come up, the system checks the other connection and doubles the time interval. This process repeats until the maximum timer interval is reached or exceeded. Checking continues at the maximum timer interval until one of the splitter protection connections becomes active.

**Note**

The default values for the search-for-up timer are sufficient for most network configurations.

Examples

The following example shows how to modify the minimum and maximum timer intervals for how often the system switches to check the other splitter protection connection.

```
Switch(config)# redundancy
Switch(config-red)# associate group newyork
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps timer search-for-up 4 16
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps timer switchover-enable min-interval

To modify the minimum time interval between successive APS switchovers in a splitter protected configuration, use the **aps timer switchover-enable min-interval** command. To revert to the default value, use the **no** form of this command.

aps timer switchover-enable min-interval *seconds*

no aps timer switchover-enable min-interval

Syntax Description	seconds	Specifies the minimum number of seconds between successive switchovers. The range is 1 to 120 seconds.
---------------------------	---------	--

Defaults	3 seconds
-----------------	-----------

Command Modes	APS configuration
----------------------	-------------------

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
12.1(12c)EV2	Default value was changed from 2 seconds to 3 seconds.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines Use this command to modify the minimum time interval between successive APS switchovers. This prevents data loss from excessive switchovers caused by active interface failures.



Note This switchover timer is not supported for y-cable protected configurations.



Note The default value for the switchover timer is sufficient for most network configurations.

Examples

The following example shows how to modify the minimum interval between successive signal switchovers.

```
Switch(config)# redundancy
Switch(config-red)# associate group sanfrancisco
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps timer switchover-enable min-interval 4
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps timer wait-to-restore	Modifies the wait-to-restore timer interval.
associate group	Creates an APS group and enters APS configuration mode.
show aps	Displays APS configuration and operation information.

aps timer wait-to-restore

To modify the number of seconds on the APS wait-to-restore timer before reverting to the preferred working signal in a y-cable protection configuration, use the **aps timer wait-to-restore** command. To return to the default value, use the **no** form of this command.

aps timer wait-to-restore *seconds*

no aps timer wait-to-restore

Syntax Description	seconds	Specifies the number of seconds the system must wait before switching to the preferred working signal. The range is 0 to 720 seconds.
---------------------------	---------	---

Defaults	300 seconds
-----------------	-------------

Command Modes	APS configuration
----------------------	-------------------

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines	This command prevents oscillations when revertive switching is configured for y-cable line card protection configurations. If the preferred working signal in a y-cable line card protection configuration is unstable, the wait-to-restore timer prevents possible data loss that could result from frequent switchovers.
-------------------------	--

**Caution**

Setting the wait-to-restore timer interval to 0 seconds disables the timer.

**Note**

The wait-to-restore timer is only supported in y-cable line card protection configurations.

**Note**

The default value for the wait-to-restore timer is sufficient for most network configurations.

Examples

The following example shows how to modify the APS wait-to-restore timer.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group newyork
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps timer wait-to-restore 180
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps revertive	Enables revertive behavior for line card protection.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
associate group	Creates an APS group and enters APS configuration mode.
show aps	Displays APS configuration and operation information.

aps working

To configure the working interface of an APS group, use the **aps working** command. To remove the working interface, use the **no** form of this command.

aps working { **transparent** *slot/subcard/port* | **wavepatch** *slot/subcard/port* }

no aps working { **transparent** *slot/subcard/port* | **wavepatch** *slot/subcard/port* }

Syntax Description		
transparent <i>slot/subcard/port</i>	Specifies the transparent interface to use as the working interface in y-cable line card protection.	
wavepatch <i>slot/subcard/port</i>	Specifies the wavepatch interface to use as the working interface in splitter protection.	

Defaults None

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

Each interface in an associated pair has a configured role to perform: one is the *working* interface and the other is the *protection* interface. However, at any given instant, the interfaces also have a current mode of operation: *active* and *standby*. The interface that is in active mode, and is receiving the signal, may or may not be the working interface. The working interface is the *preferred* interface to receive the active signal. The protection interface is the *preferred* interface for the standby signal.

This command persists across system reloads.

When a pair of interfaces is associated for APS protection, the interface with the lower interface number is the working interface by default. To override this default configuration, use the **aps working** command. If there is an **aps lockout** command in effect on the protection interface, it cannot become the working interface.

Examples

The following example shows how to configure a working interface on an existing APS group:

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate group denver
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps working transparent 4/0/0
Switch(config-red-aps)# aps protection transparent 2/0/0
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps lockout	Prevents switchover to the protection interface.
aps y-cable	Enables y-cable protection.
associate group	Creates an APS group and enters APS configuration mode.
associate interface	Associates multiple wavepatch interface pairs for APS protection.
show aps	Displays APS configuration and operation information.

aps y-cable

To configure y-cable line card protection, use the **aps y-cable** command. To disable y-cable line card protection, use the **no** form of this command.

aps y-cable

no aps y-cable

Syntax Description This command has no other arguments or keywords.

Defaults Disabled

Command Modes APS configuration

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines Use this command to ensure that only one interface of an associated transparent interface pair transmits to the client. Signal corruption occurs when both interfaces in the pair transmit to the client over the y-cable.



Caution

Do not configure y-cable protection with Sysplex CLO, Sysplex ETR, or ISC compatibility protocol encapsulation, or with the OFC safety protocol.

Examples

The following example shows how to configure y-cable line card protection.

```
Switch(config)# redundancy
Switch(config-red)# associate group seattle
Switch(config-red-aps)# aps disable
Switch(config-red-aps)# aps y-cable
Switch(config-red-aps)# aps enable
```

Related Commands

Command	Description
aps direction	Modifies path switching behavior.
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps revertive	Enables revertive behavior for line card protection.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
aps timer wait-to-restore	Modifies the wait-to-restore timer interval.
associate group	Creates or specifies an APS interface group and enters APS configuration mode.
show aps	Displays APS configuration and operation information.

associate group

To enter APS configuration subcommand mode and to associate interfaces for APS protection, or to modify the attributes of an existing APS group, use the **associate group** command. To remove the group, use the **no** form of this command.

aps group *group-name*

no aps group *group-name*

Syntax Description	group-name	Specifies a group name for the interface pair. Group names are case sensitive and cannot have embedded blanks.
---------------------------	------------	--

Defaults	None
-----------------	------

Command Modes	Redundancy configuration
----------------------	--------------------------

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines Use this command to create an APS group, or specify an existing group, and enter APS configuration mode. You can specify group names created with this command or with the **associate interface** command.

Examples

The following example shows how to select an APS group and enter APS configuration mode.

```
Switch# configure terminal
Switch#(config)# redundancy
Switch#(config-red)# associate group blue
Switch#(config-red-aps)#
```

Related Commands

Command	Description
aps clear	Clears APS switchover or lockout.
aps direction	Modifies path switching behavior.
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps lockout	Prevents switchover to the protection interface.
aps revertive	Enables revertive behavior for line card protection.
aps switch	Requests an APS switchover.
aps timer message holddown	Modifies the hold-down timer for APS Channel Protocol messages.
aps timer message max-interval	Modifies the maximum interval timer for APS Channel Protocol messages.
aps timer search-for-up	Modifies the search-for-up timer interval.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
aps timer wait-to-restore	Modifies the wait-to-restore timer interval.
aps working	Configures the working interface of an associated interface pair.
aps y-cable	Enables y-cable protection.
associate interface	Associates wavepatch interfaces for APS splitter protection.
debug aps	Enables debugging of APS and APS Channel Protocol.
show aps	Displays APS configuration and operation information.
show aps trace	Displays APS and APS Channel Protocol activity information.
snmp-server enable traps aps	Enables SNMP trap notifications for APS.

associate interface

To associate the wavepatch interface pairs in a slot, or in the entire shelf, for APS splitter protection using one command, use the **associate interface** command. To disable APS protection for the interfaces, use the **no** form of this command.

associate interface wavepatch */*/working-port wavepatch */*/protection-port [enable | disable]

associate interface wavepatch slot*/working-port wavepatch slot*/protection-port [enable | disable]

no associate interface wavepatch */*/working-port wavepatch */*/protection-port

no associate interface wavepatch slot*/working-port wavepatch slot*/protection-port

Syntax Description

<code>wavepatch */*/working-port</code>	Specifies all wavepatch interfaces on the shelf to configure as working interfaces.
<code>wavepatch */*/protection-port</code>	Specifies all wavepatch interfaces in the shelf to configure as protection interfaces.
<code>enable</code>	Enables activity on the associated interface pairs. (Optional)
<code>disable</code>	Disables activity on the associated interface pairs. This is the default state. (Optional)
<code>wavepatch slot*/working-port</code>	Specifies all wavepatch interfaces in a slot to configure as working interfaces.
<code>wavepatch slot*/protection-port</code>	Specifies all wavepatch interfaces in a slot to configure as protection interfaces.

Defaults

The default working interface for each of the interface pairs is the first interface in the command. APS activity between the interfaces is disabled when the interface pairs are first associated. The default group name for each of the interface pairs is the lower interface number.

Command Modes

Redundancy configuration

Command History

This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.

E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

Use this command to associate the interfaces for APS protection, and then enter APS configuration mode, or to change the configuration of associated pairs. Also use this command to change the association of one interface to another interface.

When associating wavepatch interfaces with wildcards, the command mode does not enter APS configuration mode as it does when associating a pair of interfaces. Changes to the default APS attribute values must be entered for interface pairs individually. See the “[Examples](#)” section.

Associating wavepatch interfaces with wildcards does not overwrite attributes configured for a specific interface pair. For example, if you configure attributes for interface pair wavepatch 3/0/0 and wavepatch 3/0/1 with the **associate group** command, a subsequent **associate interface wavepatch 3/*/0 wavepatch 3/*/1** command does not change the attributes for the specific interface pair.

When a pair of interfaces is associated for APS protection with the **associate interface** command, the interface entered first in the command is the working interface by default.

Interfaces can be associated without being physically present in the shelf.

Examples

The following example shows how to associate all the wavepatch interfaces in the shelf for splitter protection while leaving APS activity between the interfaces disabled.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate interface wavepatch */*/0 wavepatch */*/1
Switch(config-red)#
```

The following example shows how to associate all the wavepatch interfaces in slot 2 for splitter protection, while enabling APS activity between the interfaces.

```
Switch# configure terminal
Switch(config)# redundancy
Switch(config-red)# associate interface wavepatch 2/*/0 wavepatch 2/*/1 enable
Switch(config-red)#
```

Related Commands

Command	Description
aps clear	Clears APS switchover or lockout.
aps direction	Modifies path switching behavior.
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps lockout	Prevents switchover to the protection interface.

Command	Description
aps switch	Requests an APS switchover.
aps timer message holddown	Modifies the hold-down timer for APS Channel Protocol messages.
aps timer message max-interval	Modifies the maximum interval timer for APS Channel Protocol messages.
aps timer search-for-up	Modifies the search-for-up timer interval.
aps working	Configures the working interface of an associated interface pair.
associate group	Creates or specifies an APS interface group and enters APS configuration mode.
debug aps	Enables debugging of APS and APS Channel Protocol.
show aps	Displays APS configuration and operation information.
show aps trace	Displays APS and APS Channel Protocol activity information.
snmp-server enable traps aps	Enables SNMP trap notifications for APS.

show aps

To display APS configuration and status information for the system, use the **show aps** command.

show aps [detail | group *name* | interface *interface*]

Syntax Description		
detail	Displays detailed APS information for all APS groups.	
interface <i>interface</i>	Displays detailed APS information for an interface.	
group <i>name</i>	Displays detailed APS information for an APS group.	

Defaults Displays summary APS information

Command Modes EXEC and privileged EXEC

Command History This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines Use this command to display APS information for an interface, an APS group, or the entire shelf.

At least one interface in an associated pair must be present on the system to use the **show aps interface** command. Otherwise, use the **show aps detail** command or the **show aps group** command to display APS information for the associated interface pair.



Note

The associated group names are case sensitive. To see all the group names, use the **show aps** command.

Examples

The following example shows how to display detailed APS information for all APS groups. (See [Table 1-1](#) for field descriptions.)

```
Switch# show aps detail

APS Group blue:

  architecture.: 1+1, remote prov: 1+1
  span.....: end-to-end (client side y-cable)
  direction...: prov: uni, current: uni, remote prov: uni
  revertive...: yes, wtr: 60 secs (not running)
  created.....: 4 minutes
  aps state...: associated (enabled)
  request timer: holddown: 5000 ms, max: 15000 secs, count 2
  switched chan: 0
  channel ( 0): Transparent5/0/0 (STANDBY - UP), Wave5/0 (UP)
                  : channel request: no-request
                  : transmit request: no-request
                  : receive request: no-request
  channel ( 1): Transparent3/0/0 (ACTIVE - UP), Wave3/0 (UP)
                  : channel request: no-request
                  : switchover count: 0
                  : last switchover: never
```

Table 1-1 *show aps group and show aps interface Field Descriptions*

Field	Description
architecture	Shows APS architecture. Only 1+1 is supported.
remote prov	Shows the architecture provisioning for the remote node that supports the same channel. Only 1+1 is supported.
span	Shows the APS span. Only end-to-end is supported. Also indicates if y-cable is configured.
direction	Shows signal switching behavior, either unidirectional or bidirectional.
prov	Shows the direction provisioning for the local node.
current	Shows the current direction status for the local node.
remote prov	Shows the direction provisioning for the remote node that supports the same channel.
revertive	Indicates whether the group is APS revertive. Only y-cable line card protection supports revertive behavior.
wtr:	Shows the wait-to-restore timer value and its current running status.
created	Shows how long ago the group was created.
aps state	Indicates whether the working and protection channels have been associated and if APS activity is enabled.
request timer	Shows attribute values for the APS Channel Protocol timers.
holddown	Shows the APS Channel Protocol message holddown timer value.
max	Shows the APS Channel Protocol maximum inactivity interval timer
count	Shows the APS Channel Protocol message count value.
switched chan	Shows the switched channel number.
channel (0)	Shows the configured protection channel in the group and its current status.

Table 1-1 *show aps group and show aps interface Field Descriptions (continued)*

Field	Description
channel request	Shows the current lockout or switchover request in effect, if any. Valid values are: <ul style="list-style-type: none"> no-request manual-switch forced-switch lockout-of-protection
transmit request	Shows the APS Channel Protocol message being transmitted to the remote node. Valid values are: <ul style="list-style-type: none"> no-request (No request pending) do-not-revert (Revertive behavior not enabled) reverse-request (Response to a do-not-revert or wait-to-restore request) wait-to-restore (Wait-to-restore timer active) sd-lp (Signal degrade) sf-lp (Signal failure)
receive request	Shows the APS Channel Protocol message being received from the remote node. Values are the same as the transmit request field.
channel (1)	Shows the configured working channel in the group and its current status.
switchover count	Shows the number of times a switchover has occurred for this pair of interfaces. Zero (0) indicates that no switchover has occurred since the system was booted.
last switchover	Shows the elapsed time since the last switchover occurred. "Never" means that no switchover has occurred since the system was booted.

The following example shows how to display APS information for an APS group with the default group name (the default working interface). (See [Table 1-1](#) for field descriptions.)

```
Switch# show aps group Wavepatch8/0/0

APS Group Wavepatch8/0/0 :

architecture.: 1+1, remote prov: 1+1
span.....: end-to-end (network side splitter)
direction...: prov: bi, current: bi, remote prov: bi
revertive....: no
created.....: 3 hours, 6 minutes
aps state...: associated (enabled)
request timer: holddown: 5000 ms, max: 15000 ms, count 2
search-up int: min: 2 secs, max: 32 secs
switched chan: 0
channel ( 0): Wavepatch8/0/1 (STANDBY - UP)
             : channel request: no-request
             : transmit request: no-request
             : receive request: no-request
channel ( 1): Wavepatch8/0/0 (ACTIVE - UP)
             : channel request: no-request
             : switchover count: 1
             : last switchover: 1 hour, 0 minutes
```

The following example shows how to display APS information for a wavepatch interface. (See [Table 1-1](#) for field descriptions.)

```
Switch# show aps interface transparent 8/0/0

APS Group blue :

  architecture.: 1+1, remote prov: 1+1
  span.....: end-to-end (client side y-cable)
  direction...: prov: uni, current: uni, remote prov: uni
  revertive...: no
  created.....: 1 minute
  aps state...: associated (enabled)
  request timer: holddown: 5000 ms, max: 15000 ms, count 2
  switched chan: 0
  channel ( 0): Transparent10/0/0 (STANDBY - UP)
                : external request: no-request
                : transmit request: no-request
                : receive request: no-request
  channel ( 1): Transparent8/0/0 (STANDBY - UP)
                : external request: no-request
                : switchover count: 0
                : last switchover.: never
```

The following example shows how to display APS summary information. (See [Table 1-2](#) for field descriptions.)

```
Switch# show aps

AR :APS Role, Wk:Working, Pr:Protection
AS :APS State, Ac:Active, St:Standby
IS :Interface State, Up:Up, Dn:Down
MPL:Minimum Protection Level, SD:Signal Degrade, SF:Signal Failure
    LOL:Loss of Light, - not currently protected

Interface      AR AS IS MPL Redundant Intf      Group Name
~~~~~
Wavepatch3/1/0  Wk Ac Up  LOL Wavepatch3/1/1  Wavepatch3/1/0
Wavepatch3/1/1  Pr St Up  LOL Wavepatch3/1/0  Wavepatch3/1/0
```

Table 1-2 *show aps summary Field Descriptions*

Field	Description
Interface	Shows the name of the interface.
AR (APS Role)	Shows the configured role for the interface, either Wk (working) or Pr (protection). Working and protection are preferred roles configured by the associate interface command and the associate group command.
AS (APS State)	Shows the APS state, either Ac (active) or St (standby). The interface currently chosen by the system to receive the channel signal is the active interface; the other interface in the associated pair is the standby.
IS (Interface State)	Shows the interface state, either Up (up) or Dn (down).

Table 1-2 *show aps summary Field Descriptions (continued)*

Field	Description
MPL (Minimum Protection Level)	Shows the minimum protection level for signal switchover. Valid values are: <ul style="list-style-type: none"> • SD (signal degrade) • SF (signal failure) • LOL (Loss of Light) • - (not currently protected)
Redundant Intf (Interface)	Shows the other interface in the APS group.
Group Name	Shows the APS group name for the interface.

Related Commands

Command	Description
aps direction	Specifies unidirectional or bidirectional path switching.
aps disable	Disables APS activity between associated interfaces.
aps enable	Enables APS activity between associated interfaces.
aps lockout	Configures APS lockout on a protection interface.
aps revertive	Configures revertive APS for y-cable line card protection.
aps switch	Causes a manual switchover from the working interface to the protection interface or vice versa.
aps timer message holddown	Modifies the APS Channel Protocol message holddown timer interval and message count value.
aps timer message max-interval	Modifies the APS Channel Protocol maximum inactivity interval timer value.
aps timer search-for-up	Modifies the minimum and maximum timer intervals on an APS timer that the system must wait for a splitter protection connection to come up when both connections are down.
aps timer switchover-enable min-interval	Modifies the minimum timer interval before reenabling APS switchover.
aps timer wait-to-restore	Modifies the number of seconds an APS timer must wait before switching back to the preferred working signal.
aps working	Explicitly configures the working interface of an associated interface pair.
aps y-cable	Configures y-cable line card protection.
associate group	Creates or specifies an APS interface group and enters APS configuration mode.
associate interface	Associates wavepatch interfaces for APS splitter protection.
show aps trace	Shows APS and APS Channel Protocol activity information.

show aps trace

To display APS and APS Channel Protocol activity information in the system memory, use the **show aps trace** command.

```
show aps trace [clear | stop | resume]
```

Syntax Description

clear	Clears the APS activity trace table in memory.
stop	Stops the collection of APS activity information.
resume	Resumes the collection of APS activity information.

Defaults

Displays APS and APS Channel Protocol activity information.
Trace is active.

Command Modes

EXEC and privileged EXEC

Command History

This table includes the following release-specific history entries:

- EY-Release
- E-Release
- EV-Release
- SV-Release
- S-Release

EY-Release	Modification
12.1(7a)EY2	This command was introduced.
E-Release	Modification
12.1(11b)E	This command was integrated in this release.
EV-Release	Modification
12.1(10)EV	This command was integrated in this release.
SV-Release	Modification
12.2(18)SV	This command was integrated in this release.
S-Release	Modification
12.2(22)S	This command was integrated in this release from release 12.2(22)SV.

Usage Guidelines

APS trace information is similar to **show aps** command output except that it is stored in processor memory. The trace buffer contains activity information for APS and for the APS Channel Protocol.

The trace collection status and information are not saved across system or processor card reloads. After the reload, the trace status returns to the default active state and the trace buffer in memory is cleared.

Examples

The following example shows how to clear the APS trace buffer:

```
Switch# show aps trace clear
```

The following example shows how to stop the APS trace activity information collection:

```
Switch# show aps trace stop
```

The following example shows how to resume the APS trace activity information collection:

```
Switch# show aps trace resume
```

The following example shows how to display detailed APS information for all APS groups. (See [Table 1-3](#) for field descriptions.)

```
Switch# show aps trace
APS: Wavepatch10/0/0: searchup timer expired
APS: Wave10/0: wave state WAVE_DOWN
APS: wp event SEARCHUP_EXP: wv state WAVE_DOWN
APS: switch optk swpos to 1
APS: restart searchup timer: check after 32 sec
ACP: Wavepatch10/0/0: service request timer
ACP: Wavepatch10/0/0: xmit request failed: protection oscp idb missing
ACP: Transparent10/0/0: service request timer
ACP: Transparent10/0/0: xmit request failed: neither y-cable nor splitter
ACP: Wavepatch10/0/0: service request timer
ACP: Wavepatch10/0/0: xmit request failed: protection oscp idb missing
ACP: Transparent10/0/0: service request timer
ACP: Transparent10/0/0: xmit request failed: neither y-cable nor splitter
APS: Wavepatch10/0/0: searchup timer expired
APS: Wave10/0: wave state WAVE_DOWN
APS: wp event SEARCHUP_EXP: wv state WAVE_DOWN
APS: switch optk swpos to 0
APS: restart searchup timer: check after 32 sec
ACP: Transparent10/0/0: service request timer
ACP: Transparent10/0/0: xmit request failed: neither y-cable nor splitter
```

Table 1-3 *show aps trace Field Descriptions*

Field	Description
APS	Specifies APS activity.
ACP	Specifies APS Channel Protocol activity.

Related Commands

Command	Description
associate interface	Associates two interfaces for APS protection.
debug aps	Enables debugging of APS and APS Channel Protocol.
show aps	Shows APS configuration and status information.

■ show aps trace