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 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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 15530 supports APS signal switchover requests from the CLI (command-line interface). These requests have priorities based on the condition of the protection signal and the existence of another switchover or lockout request. Three types of requests exist:

- 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 interface to the protection interface.
- Forced switchover requests—Have the next highest priority and are only prevented when 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 protection path lockout, a forced switchover, or the signal has failed or degraded.

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

Usage Guidelines   In unidirectional path switching, only the node that detects a signal failure switches over to the standby signal. 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 15530.

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 (Optical Supervisory Channel).

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 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 10/0/0
Switch(config-red-aps)# protection wavepatch 10/0/1
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: uni
  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): Transparent4/0/0 (STANDBY - UP), Wave4/0 (UP)
               : channel  request: no-request
               : transmit request: no-request
               : receive  request: no-request
  channel  ( 1): Transparent2/0/0 (ACTIVE - UP), Wave2/0 (UP)
               : channel  request: no-request
               : switchover count: 0
               : last  switchover: never

Switch# configure terminal
Switch(config)# interface transparent 4/0/0
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 4/0/0
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 direction

Command	Description
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. 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 reenable 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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.

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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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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
Switch(config-red-aps)# aps protect
ion 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 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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.

A lockout 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 CPU switch module 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 for the Cisco ONS 15530 to send APS channel protocol messages, 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 *name*	Specifies the APS group name for the channel at the remote node.
inband dcc	Specifies APS to use the in-band message channel ethernetdcc interface or sdcc interface 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. Use this option for APS groups that terminate on a shelf in a multiple shelf node that does not support the OSC or in-band message channel.
ip-address *ip-address*	Specifies the IP address of the remote node used to send the APS channel protocol messages.
osc	APS messages are sent on the OSC.

Defaults

auto-select with no APS group name

Command Modes

APS configuration

Command History

This table includes the following release-specific history entries:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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 APS channel protocol communicates between nodes over the OSC or over the in-band message channel ethernetdcc interface.

The **auto-select** option automatically selects the transport channel to send the APS protocol messages attempting to use the in-band message channel first and then the OSC if the in-band message channel is not available. If neither the in-band message channel nor the OSC is available for the APS group, you must configure the message channel using the **ip** option.

> **Note** We recommend that you configure the name for the APS group on the remote node. The APS channel protocol lookup process functions more efficiently when the group name is provided. For trunk fiber based protection, the far-end group name is required

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 far-end group-name aps-group1
```

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 the protection path interface, use the **no** form of this command.

>**aps protection** {**transparent** *slot/subcard/port* | **wavepatch** *slot/subcard/port* |
>   **waveethernetphy** *slot/subcard* | **tengigethernetphy** *slot/subcard* | **wdmsplit** *slot/subcard/port*
> | *gigabitphy slot/subcard/port* | *twogigabitphy slot/subcard/port*}

>**no aps protection** {**transparent** *slot/subcard/port* | **wavepatch** *slot/subcard/port* |
>   **waveethernetphy** *slot/subcard* | **tengigethernetphy** *slot/subcard* | **wdmsplit** *slot/subcard/port*
> | *gigabitphy slot/subcard/port* | *twogigabitphy slot/subcard/port*}

Syntax Description		
transparent *slot/subcard/port*	Specifies the transparent interface to use as the protection path in y-cable line card protection.
wavepatch *slot/subcard/port*	Specifies the wavepatch interface to use as the protection path in splitter protection.
waveethernetphy *slot/subcard*	Specifies the waveethernetphy interface to use as the protection path in switch fabric based protection.
tengigethernetphy *slot/subcard*	Specifies the tengigethernetphy interface to use as the protection path in switch fabric based protection.
wdmsplit *slot/subcard/port*	Specifies the wdmsplit interface to use as the protection path in trunk fiber based protection.
gigabitphy slot/subcard/port	Specifies the gigabitphy interface to use as the protection path in line card based protection.
twogigabitphy slot/subcard/port	Specifies the twogigabitphy interface to use as the protection path in line card based protection.

Defaults   None

Command Modes   APS configuration

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

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
12.1(12c)EV3	Added support for wdmsplit and gigabitphy interfaces.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.

12.2(23)SV	Added support for twogigabitphy interfaces.
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, 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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.

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.
manual	Causes a switchover if the signal is good and no lockout is in effect.
protection-to-working	Causes a manual signal switchover from the protection path to the working path if the protection path signal has not failed.
working-to-protection	Causes a manual signal switchover from the working path to the protection path whether the working path signal is active or not.

Defaults

None

Command Modes

Privileged EXEC

Command History

This table includes the following release-specific history entries:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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 15530 supports APS switchover requests from the CLI (command-line interface). These requests have priorities based on the condition of the protection signal and the existence of other switchover requests. Three types of requests exist:

- 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 interface to the protection interface.

- Forced switchover requests—Have the next highest priority and are only prevented when 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 protection interface lockout, a forced switchover, or the signal has failed or degraded.

In summary, the priority order is:

1. Lockout
2. Signal failure on the protection path
3. Forced signal switchover
4. Signal failure on the working path
5. Signal degrade on the working or protection path
6. Manual signal switchover

If a request or condition of a higher priority is in effect, a lower priority request is rejected.

> **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

milliseconds	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 *number*	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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.

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 protection 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.

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, use the **aps timer switchover 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
12.1(12c)EV2	Default value 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

Hardware-assisted automatic switchovers when the active signal fails are controlled by the software. An automatic switchover occurs when the system detects a signal failure or signal degradation. Automatic switchovers are disabled until the switchover timer expires. The switchover timer starts upon completion of the automatic switchover. When the timer expires, the system will allow automatic switchovers only under favorable conditions. Conditions that would prevent the system from enabling automatic switchovers include:

- Loss of Light on the protection signal
- Lockout request on the protection interface, either locally or on the remote system supporting the channel
- Forced protection-to-working request in effect, either locally or on the remote system supporting the channel

   • Poor quality of the protection signal

When the condition is resolved, hardware-assisted automatic switchovers are enabled.

The switchover timer prevents successive automatic switchovers from occurring too quickly and risk the loss of data.

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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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 protected and splitter protected configurations. If the preferred working signal 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 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* |
> **waveethernetphy** *slot*/*subcard* | **tengigethernetphy** *slot*/*subcard* | **wdmsplit** *slot*/*subcard*/*port*
> | *gigabitphy slot*/*subcard*/*port* | *twogigabitphy slot*/*subcard*/*port*}

> **no aps working** {**transparent** *slot*/*subcard*/*port* | **wavepatch** *slot*/*subcard*/*port* |
> **waveethernetphy** *slot*/*subcard* | **tengigethernetphy** *slot*/*subcard* | **wdmsplit** *slot*/*subcard*/*port*
> | *gigabitphy slot*/*subcard*/*port* | *twogigabitphy slot*/*subcard*/*port*}

Syntax Description		
transparent *slot*/*subcard*/*port*	Specifies the transparent interface to use as the working interface in y-cable line card protection.
wavepatch *slot*/*subcard*/*port*	Specifies the wavepatch interface to use as the working interface in splitter protection.
waveethernetphy *slot*/*subcard*	Specifies the waveethernetphy interface to use as the working path in switch fabric based protection.
tengigethernetphy *slot*/*subcard*	Specifies the tengigethernetphy interface to use as the working path in switch fabric based protection.
wdmsplit *slot*/*subcard*/*port*	Specifies the wdmsplit interface to use as the working path in trunk fiber based protection.
gigabitphy slot/subcard/port	Specifies the gigabitphy interface to use as the protection path in line card based protection.
twogigabitphy slot/subcard/port	Specifies the twogigabitphy interface to use as the protection path in line card based protection.

Defaults   None

Command Modes   APS configuration

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

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
12.1(12c)EV3	Added support for wdmsplit and gigabitphy interfaces.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.

12.2(23)SV	Added support for twogigabitphy interfaces.
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.

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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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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, gigabitphy, or twogigabitphy 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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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.
redundancy	Enters redundancy configuration mode.
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

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

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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.
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.

Command	Description
associate group	Creates or specifies an APS interface group and enters APS configuration mode.
debug aps	Enables debugging of APS and APS Channel Protocol.
redundancy	Enters redundancy configuration mode.
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 *interface*	Displays detailed APS information for an interface.
group *name*	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:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.

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 interface 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
prot. mode...: client side y-cable
direction....: prov: uni, current: uni, remote prov: uni
revertive....: no
aps state....: enabled (associated)
request timer: holddown: 5000 ms, max: 15000 ms, count 2
msg-channel..: auto (up on osc)
created......: 5 minutes
auto-failover: disabled
transmit k1k2: sf-lp, 0, 0, 1+1, uni
receive  k1k2: sf-lp, 0, 0, 1+1, uni
switched chan: 0
channel  ( 0): Transparent4/0/0 (STANDBY - UP), Wave4/0 (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: • 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: • 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
  prot. mode...: network side splitter
  direction....: prov: uni, current: uni, remote prov: uni
  revertive....: no
  aps state....: enabled (associated)
  request timer: holddown: 5000 ms, max: 15000 ms, count 2
  msg-channel..: auto (up on osc)
  created......: 5 minutes
  auto-failover: disabled
  transmit k1k2: sf-lp, 0, 0, 1+1, uni
  receive  k1k2: sf-lp, 0, 0, 1+1, uni
  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 transparent 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
  prot. mode...: client side y-cable
  direction....: prov: uni, current: uni, remote prov: uni
  revertive....: no
  aps state....: enabled (associated)
  request timer: holddown: 5000 ms, max: 15000 ms, count 2
  msg-channel..: auto (up on osc)
  created......: 5 minutes
  auto-failover: disabled
  transmit k1k2: sf-lp, 0, 0, 1+1, uni
  receive  k1k2: sf-lp, 0, 0, 1+1, uni
  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
~~~~~~~~~~~~~~~~~~~~~ ~~ ~~ ~~ ~~~ ~~~~~~~~~~~~~~~~~~~~ ~~~~~~~~~~~~~~~~~~~~
Wavepatch8/0/0          Wk Ac Up LOL Wavepatch8/0/1        w
Wavepatch8/0/1          Pr St Up -   Wavepatch8/0/0        w
```

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.

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

Field	Description
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).
MPL (Minimum Protection Level)	Shows the minimum protection level for signal switchover. Valid values are: • 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** | **filter** *value* | **last** *number* | **detail** {**on** | **off**}]

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.
filter *value*	Displays only those entries that match the *value* argument.
last *number*	Displays the last number of entries indicated in the *number* argument.
detail {on	off}	Enables and disables the generation of detailed output.

Defaults

Displays all APS and APS Channel Protocol activity information in memory.

Trace is active.

Detailed output generation is disabled.

Command Modes

EXEC and privileged EXEC

Command History

This table includes the following release-specific history entries:

- EV-Release
- SV-Release
- S-Release

EV-Release	Modification
12.1(10)EV2	This command was introduced.
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 CPU switch module 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
3163.496 APS: Portgroup1/0/0: if_active
3163.496 APS: Portgroup3/0/0: if_active
3163.504 APS: Portgroup9/0/0: if_active
3164.140 ACP: lc: transmit request: (SF-LP, 0, 0, 1+1, B, 216) on DCC
3175.600 APS: WaveEthernetPhy10/0: state change (4): systeminit_flag TRUE
3175.600 APS: lc: xconnect ACTIVE  for channel 1
3175.600 APS: lc: xconnect DORMANT for channel 0
3175.600 APS: lc: state W_UP_P_UP
3175.600 APS: lc: active_red_standby
3175.600 APS: lc: work_active_red_prot_standby
3175.604 APS: lc: notify CM: assn state 3: activate channel 1
3175.604 APS: WaveEthernetPhy10/0: if_standby
3175.604 APS: WaveEthernetPhy8/0: if_active
3175.604 APS: WaveEthernetPhy8/0: lcp line active action
3175.604 APS: lc: sync state with hw, W active, P standby, caller 604E8960
3175.604 APS: lc: start hwfov_enable timer
3175.604 ACP: lc: local request: (NR, 0), caller 604EF3D4
3175.604 ACP: lc: transmit request: (NR, 0, 0, 1+1, B, 217) on DCC
3177.604 APS: lc: hwfov_enable timer expired
3177.604 APS: lc: enable auto-failover
3204.832 ACP: lc: transmit request: (NR, 0, 0, 1+1, B, 218) on DCC
3233.616 ACP: lc: transmit request: (NR, 0, 0, 1+1, B, 219) on DCC
3263.552 ACP: lc: transmit request: (NR, 0, 0, 1+1, B, 220) on DCC
```

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