Interface Configuration Commands

Use the following commands to configure and monitor the interfaces on the Cisco ONS 15530.

cdl defect-indication force hop-endpoint

To configure an interface as an end-of-hop, use the **cdl defect-indication force hop-endpoint** command. To disable end-of-hop configuration on an interface, use the **no** form of this command.

cdl defect-indication force hop-endpoint

no cdl defect-indication force hop-endpoint

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled

Command Modes

Interface 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 configure the interface as a hop endpoint for in-band message channel defect indications.

A node acting as an end-of-hop terminates hop-by-hop defect indications for the in-band message channel. If you use the **cdl defect-indication force hop-endpoint** command, it is only in effect when APS is not configured on the interface. When APS is configured, the node always acts as end-of-hop. If APS is not configured, we recommend forcing end-of-hop at administrative boundaries. This ensures that FDI-H (forward defect indication hop) and BDI-H (backward defect indication hop) between two administrative domains reflect only errors that occur between the domains.

Examples

The following example shows how to enable hop endpoint on an interface.

```
Switch# configure terminal
Switch(config)# interface waveethernetphy 8/0
Switch(config-if)# cdl defect-indication force hop-endpoint
```

Related Commands

Command	Description
debug cdl defect-indication	Initiates debugging of defect indication on in-band message channel capable interfaces.
show cdl defect-indication	Displays defect indication information on in-band message channel capable interfaces.
show interfaces	Displays interface information.

cdl enable

To enable in-band message channel functionality on an interface, use the **cdl enable** command. To disable in-band message channel functionality, use the **no** form of this command.

cdl enable

no cdl enable

Syntax Description

This command has no other arguments or keywords.

Defaults

Enabled

Command Modes

Interface 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

Enable the in-band message channel on both interfaces supporting the signal.

Examples

The following example shows how to enable in-band message channel on an interface.

```
Switch# configure terminal
Switch(config)# interface esconphy 10/0/0
Switch(config-if)# cdl enable
```

Related Commands

Command	Description
cdl defect-indication force hop-endpoint	Configures an interface as an end-of-hop.
cdl flow identifier	Specifies the in-band message channel flow identifier value.

Command	Description
debug cdl defect-indication	Initiates debugging of the defect indication on in-band message channel capable interfaces.
show cdl defect-indication	Displays defect indication information on in-band message channel capable interfaces.
show interfaces	Displays interface information.

cdl flow identifier

To configure the in-band message channel flow identifier on an esconphy, gigabitphy, or twogigabitphy interface, use the **cdl flow identifier** command.

To remove the flow identifier, use the **no** form of this command.

cdl flow identifier *number*

no cdl flow identifier

Syntax Description

number	Specifies the flow identifier for the signal. The range is 0 to 174.

Defaults

255

Command Modes

Interface 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)EV	Added support for gigabitphy interfaces.
12.1(12c)EV1	Changed the highest flow identifier value available from 254 to 174.
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

Configure the same in-band message channel flow identifier on both interfaces supporting the signal.

Note If traffic from an ESCON aggregation card mixes with GE traffic from a 4-port 1-Gbps/2-Gbps FC aggregation card or an 8-port FC/GE aggregation card on the same 10-Gbps ITU trunk card, all the esconphy interfaces must have flow control identifiers assigned (using this command or the **cdl flow identifier reserve** command if the ESCON SFPs are not fully populated) and enabled with a **no shutdown** command if the SFPs are present.

Examples

The following example shows how to configure the flow identifier on an interface.

```
Switch# configure terminal
Switch(config)# interface esconphy 10/0/0
Switch(config-if)# cdl flow identifier 100
```

Related Commands

Command	Description
cdl flow identifier reserve	Specifies the in-band message channel flow identifier values for all esconphy interfaces on an ESCON aggregation card.
show interfaces	Displays interface information.

cdl flow identifier reserve

To configure the in-band message channel flow identifiers on all esconphy interfaces on an ESCON aggregation card, use the **cdl flow identifier reserve** command. To remove the flow identifiers, use the **no** form of this command.

cdl flow identifier reserve *group-name*

no cdl flow identifier reserve

Syntax Description

group-name	Specifies the group of reserved identifiers to assign to the esconphy interfaces on a 10-port ESCON aggregation card. Valid values are **group-1** (175 to 184), **group-2** (185 to 194), **group-3** (195 to 204), **group-4** (205 to 214), **group-5** (215 to 224), **group-6** (225 to 234), **group-7** (235 to 244), and **group-8** (245 to 254).

Defaults

255

Command Modes

Interface 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 when the traffic from an ESCON aggregation card is mixed with GE traffic on a 10-Gbps ITU trunk card. This command ensures that all ten interfaces have flow identifiers, even when the card is not fully populated with SFPs. The command is supported on the portgroup interface.

Configure the same in-band message channel flow identifiers on both interfaces supporting the signal.

If the **cdl flow identifier** command is used to configure a flow identifier on an esconphy interface, that flow identifier takes precedence over a reserved flow identifier.

Note If ESCON traffic mixes with GE traffic on the same 10-Gbps ITU trunk card, all the esconphy interfaces must have flow control identifiers configured and must be enabled with a **no shutdown** command, if the SFP is present.

Examples

The following example shows how to configure the flow identifiers for all esconphy interfaces on an ESCON aggregation card.

```
Switch# configure terminal
Switch(config)# interface portgroup 10/0/0
Switch(config-if)# cdl flow identifier reserve group-1
```

Related Commands

Command	Description
cdl flow identifier	Specifies the in-band message channel flow identifier value.
show interfaces	Displays interface information.

clear performance history

To clear and reset the performance history counters, use the **clear performance history** command.

clear performance history [*interface*]

Syntax Description

interface	Specifies the interface on which the command is to be executed.

Defaults

Clears all performance history counters (the current counter, all 15-minute history counters, and the 24-hour counter) for all Cisco ONS 15530 interfaces.

Command Modes

EXEC and privileged EXEC.

Command History

This table includes the following release-specific history entries:

SV-Release	Modification
12.2(29)SV	This command was introduced.

Usage Guidelines

Use this command to clear and reset the performance history counters.

Examples

The following example shows how to clear the performance history counters for a transparent interface.

```
Switch# clear performance history transparent 8/0/0
Reset performance history on interface?[confirm]y
Switch#
```

Related Commands

Command	Description
show performance	Displays the performance history counters for the specified interface.
clear counters	Clears all the interface counters.
auto-sync counters interface	Enables the automatic synchronization of the performance history counters and the interface counters.

clock rate

To configure the signal clock rate without an associated protocol on a transparent interface, use the **clock rate** command. To disable the clock rate, use the **no** form of this command.

clock rate *value*

no clock rate

Syntax Description

value	Specifies the signal rate. The range is 16000 to 2500000 kHz.

Defaults

Disabled

Command Modes

Interface 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

You can configure either the signal clock rate with either the **encapsulation** command or the **clock rate** command, but not both. Protocol monitoring cannot be enabled on the interface when the **clock rate** command is configured because no protocol is specified.

Note Use the **encapsulation** command for clock rates supported by protocol monitoring rather than the **clock rate** command.

Table 3-1 lists the clock rates for well-known protocols supported by the transponder line card:

Table 3-1 Supported Clock Rates for Well-Known Protocols

Well-Known Protocol	Clock Rate (in kbps)
DS3	44,736
DV1[1] in ADI[2] mode	270,000
E3	34,368
ESCON	200,000
Fibre Channel (1 Gbps)	1,062,500
Fibre Channel (2 Gbps)	2,125,000
FICON (1 Gbps)	1,062,500
FICON (2 Gbps)	2,125,000
Gigabit Ethernet	1,250,000
ISC Compatibility Mode (ISC-1)	1,062,500
ISC Peer Mode (ISC-3)	2,125,000
SONET OC-1	51,840
SONET OC-3/SDH STM-1	155,520
SONET OC-12/SDH STM-4	622,080
SONET OC-24	933,120
SONET OC-48/SDH STM-16	2,488,320

1. DV = digital video
2. ADI = Asynchronous Digital Interface

Note Error-free transmission of some D1 video signals (defined by the SMPTE 259M standard) and test patterns (such as Matrix SDI) cannot be guaranteed by the Cisco ONS 15500 Series because of the pathological pattern in D1 video. This well-known limitation is usually overcome by the D1 video equipment vendor, who uses a proprietary, second level of scrambling. No standards exist at this time for the second level of scrambling.

Examples

The following example shows how to configure the signal clock rate on an interface.

```
Switch# configure terminal
Switch(config)# interface transparent 10/0/0
Switch(config-if)# clock rate 125000
```

Related Commands

Command	Description
encapsulation	Specifies the protocol encapsulation for a transparent interface.
show interfaces	Displays interface information.

connect

To configure the signal cross connections through the switch fabric, use the **connect** command. To remove the cross connection configuration, use the **no** form of the command.

connect *interface1 interface2* [**override**]

no connect *interface1 interface2*

Syntax Description

interface1 interface2	Specifies the interfaces to be cross connected. See the "Usage Guidelines" section for valid interface types.
override	Changes the cross connect state from protection to provisioned.

Defaults

None

Command Modes

Global 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 configure cross connections through the switch fabric.

To change the cross-connect state from protection to provisioned, use the **override** option with the **connect** command. When one of the interfaces specified in the connect command is APS protected, only one of the interfaces is specified in the connect command, but both are automatically included in the cross-connect installed in the switch fabric.

This option is useful for migration scenarios, when moving the APS protection to different interfaces without taking a data hit.

Valid cross connections between modules are:

- Portgroup interface on an ESCON aggregation card, 4-port 1-Gbps/2-Gbps FC aggregation card, or 8-port FC/GE aggregation card to waveethernetphy subinterface on a 2.5-Gbps ITU trunk card **portgroup** *slot1/subcard1/port* **waveethernetphy** *slot2/subcard2*

- Portgroup interface on an ESCON aggregation card, 4-port 1-Gbps/2-Gbps FC aggregation card, or 8-port FC/GE aggregation card to waveethernetphy subinterface on a 10-Gbps ITU trunk card

  portgroup *slot1*/*subcard1*/*port* **waveethernetphy** *slot2*/*subcard2*.*subinterface*

- Portgroup interface on an ESCON aggregation card, 4-port 1-Gbps/2-Gbps FC aggregation card, or 8-port FC/GE aggregation card to tengigethernetphy subinterface on a 10-Gbps uplink card

  portgroup *slot1*/*subcard1*/*port* **tengigethernetphy** *slot2*/*subcard2*.*subinterface*

You cannot preconfigure a cross connection. The interfaces must exist on the shelf before configuring them.

The order of the interfaces in the command does not affect the cross connect configuration. For example, configuring a cross connect with the command **connect portgroup 1/0/0 waveethernetphy 2/0.1** is equivalent to configuring a cross connect with **connect waveethernetphy 2/0.1 portgroup 1/0/0**.

Examples

The following example shows how to cross connect an ESCON aggregation card and a 10-Gbps ITU trunk card.

```
Switch# configure terminal
Switch(config)# connect portgroup 1/0/0 waveethernetphy 3/0.0 override
```

Related Commands

Command	Description
show connect	Displays the cross connections in the system.

encapsulation

To configure the protocol encapsulation for the client signal on a transparent, twogigabitphy, gigabitphy, or multirate interface, use the **encapsulation** command. To disable the encapsulation for the client signal, use the **no** form of this command.

Transparent Interfaces

encapsulation {**fastethernet** | **fddi** | **gigabitethernet** | **escon** |
sysplex {**clo** | **etr** | **isc** {**compatibility** | **peer** [**1g** | **2g**]}} |
ficon {**1g** | **2g**} |
sonet {**oc3** | **oc12** | **oc48**} |
sdh {**stm-1** | **stm-4** | **stm-16**} |
fibrechannel {**1g** | **2g**} [**ofc** {**enable** | **disable**}]}

no encapsulation

Twogigabitphy Interfaces

encapsulation {**fibrechannel** {**1g** | **2g**| **auto**} [**ofc** {**enable** | **disable**}] |
ficon {1g | **2g**| **auto**} **[ofc** {**enable** | **disable**}] |
sysplex isc {**compatibility** | **peer** {**1g** | **2g**}}}

no encapsulation

Gigabitphy Interfaces

encapsulation {**fibrechannel** [**ofc** {**enable** | **disable**}] |
ficon [**ofc** {**enable** | **disable**}] |
gigabitethernet |
sysplex isc {**compatibility** | **peer**}}

no encapsulation

Multirate Interfaces

encapsulation {**t1** | **e1** | **dvb** | **sdi** | **its** | **escon** |
fibrechannel |
ficon |
gigabitethernet {**optical** | **copper**} |
fastethernet {**optical** | **copper**} |
sdh stm-1 | **sonet oc3**}

Syntax Description

fastethernet	Specifies Fast Ethernet encapsulation. The OFC[1] safety protocol is disabled.
fddi	Specifies FDDI encapsulation. OFC is disabled.
gigabitethernet	Specifies Gigabit Ethernet encapsulation. OFC is disabled.
escon	Specifies ESCON encapsulation. OFC is disabled.

sysplex	Specifies Sysplex encapsulation. **Note** This encapsulation is only supported on the multimode transponder line card.
clo	Specifies CLO[2] timing. OFC is disabled. Forward laser control is enabled on both the transparent and wave interfaces.
etr	Specifies ETR[3] timing. OFC is disabled.
isc	Specifies ISC[4] encapsulation.
compatibility	Specifies ISC links compatibility mode (ISC-1) with rate of 1.0625 Gbps. OFC is enabled on all interface types except multirate interfaces where OFC is not supported.
peer	Specifies ISC links peer mode (ISC-3). OFC is disabled.
1g	Specifies 1 Gbps for the protocol rate.
2g	Specifies 2 Gbps for the protocol rate.
auto	Enables automatic end-to-end speed negotiation on twogigabitphy interfaces encapsulated for FC or FICON traffic.
ficon	Specifies FICON encapsulation. OFC is disabled.
sonet	Specifies SONET encapsulation. OFC is disabled.
oc3	Specifies SONET rate of OC-3.
oc12	Specifies SONET rate of OC-12.
oc48	Specifies SONET rate of OC-48.
sdh	Specifies SDH encapsulation. OFC is disabled.
stm-1	Specifies SDH rate of STM-1.
stm-4	Specifies SDH rate of STM-4.
stm-16	Specifies SDH rate of STM-16.
fibrechannel	Specifies Fibre Channel encapsulation.
ofc {**enable** | **disable**}	Enables or disables OFC. The default OFC state is disabled. (Optional)
t1	Specifies T1 encapsulation.
e1	Specifies E1 encapsulation.
dvb	Specifies DVB-ASI[5] encapsulation.
sdi	Specifies SDI[6] encapsulation.
its	Specifies ITS[7] encapsulation.
{**optical** | **copper**}	Specifies the type of SFP.

1. OFC = open fiber control
2. CLO = Control Link Oscillator
3. ETR = external time reference
4. ISC = InterSystem Channel
5. DVB-ASI = Digital Video Broadcasting Asynchronous Serial Interface
6. SDI = Serial Digital Interface
7. ITS = Integrated Trading System

Defaults

The default rate on twogigabitphy interfaces **fibrechannel 1g**.

Encapsulation disabled is on all other interfaces.

The default rate for Sysplex ISC peer mode on transparent interfaces is 2-Gbps.

See the "Syntax Description" section for the default OFC state.

Command Modes

Interface 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)EV	Added support for gigabitphy interfaces.
12.1(12c)EV1	Added support for 2-Gbps FC and FICON on transparent interfaces.
SV-Release	**Modification**
12.2(29)SV	Added support for end-to-end speed negotiation on twogigabitphy interfaces encapsulated for FC or FICON traffic.
12.2(18)SV	This command was integrated in this release.
12.2(23)SV	Added support for twogigabitphy interfaces.
12.2(24)SV	Added support for 1-Gbps ISC links peer mode on transparent and gigabitphy interfaces.
12.2(25)SV	Added support for multirate interfaces and new keywords **t1**, **e1**, **dvb**, **sdi**, **its**, **copper**, and **optical**.
S-Release	**Modification**
12.2(22)S	**This command was integrated in this release from release 12.2(22)SV.**
12.2(25)S	Added support for 1-Gbps ISC links peer mode on transparent interfaces.

Usage Guidelines

Transponder Line Card

Use this command to provide clocking for the client signal for specific protocols. The protocol encapsulation must be configured for the transparent interface to allow signal monitoring to be enabled with the **monitor enable** command. The following protocol encapsulation types are supported in 3R mode plus protocol monitoring:

- ESCON (200 Mbps) SM and MM
- Fibre Channel (1 Gbps and 2 Gbps) SM
- FICON (Fiber Connection) (1 Gbps and 2 Gbps) SM
- Gigabit Ethernet (1250 Mbps) SM
- ISC (InterSystem Channel) links compatibility mode
- ISC links peer mode (1Gbps and 2 Gbps)
- SDH (Synchronous Digital Hierarchy) STM-1 SM and MM
- SDH STM-4 SM and MM

- SDH STM-16 SM
- SONET OC-3 SM and MM
- SONET OC-12 SM and MM
- SONET OC-48 SM

The following protocol encapsulation types are supported in 3R mode without protocol monitoring:

- Fast Ethernet
- FDDI
- Sysplex CLO (control link oscillator)
- Sysplex ETR (external timer reference)

To specify the signal clock rate without specifying a protocol, use the **clock rate** command.

Sysplex CLO and Sysplex ETR are supported outside the nominal range of the clock rates for the Cisco ONS 15530 because of the nature of the traffic type.

Note Encapsulation cannot be changed without first disabling monitoring using the **no monitor enable** command.

Removing the encapsulation on an interface with the **no encapsulation** command does not turn off the laser. To turn off the transmit laser to the client equipment, use the **shutdown** command.

Gigabitphy Interfaces

Removing the encapsulation on an interface with the **no encapsulation** command does not turn off the laser. To turn off the transmit laser to the client equipment, use the **shutdown** command.

Twogigabitphy Interfaces

Removing the encapsulation on an interface with the **no encapsulation** command does not turn off the laser. To turn off the transmit laser to the client equipment, use the **shutdown** command.

Note The 4-port 1-Gbps/2-Gbps FC aggregation card supports oversubscription.

Multirate Interfaces

The 8-port multi-service muxponder does not support FICON bridge.

You must disable a multirate interface with the **shutdown** command before removing or changing the protocol encapsulation. You can then reenable the interface with the **no shutdown** command.

Note The 8-port multi-rate muxponder does not support oversubscription. The cumulative rate of the protocol encapsulations on the multirate interfaces cannot exceed 2.488 Gbps.

Note Multirate interfaces do not support OFC.

Note Auto encapsulation is not supported with **OFC**.

Examples

The following example shows how to configure SONET encapsulation at a rate of OC-3 on a transparent interface.

```
Switch# configure terminal
Switch(config)# interface transparent 2/0/0
Switch(config-if)# encapsulation sonet oc3
```

Related Commands

Command	Description
clock rate	Configures a clock rate on a transparent interface.
monitor enable	Enables signal monitoring for certain protocol encapsulations.
show interfaces	Displays interface information.
shutdown	Disables an interface.

flow control

To adjust the flow of data and enable buffer credits for FC and FICON on 4-port 1-Gbps/2-Gbps FC aggregation cards and on 8-port FC/GE aggregation cards, use the **flow control** command. To revert to the default value, use the **no** form of this command.

flow control [**asymmetric** | **symmetric**]

no flow control

Syntax Description

asymmetric	Specifies asymmetric mode for twogigabitphy interfaces.
symmetric	Specifies symmetric mode for twogigabitphy interfaces.

Defaults

Disabled

When enabled, the default mode is symmetric on twogigabitphy interfaces.

Command Modes

Interface configuration

Command History

This table includes the following release-specific history entries:

- SV-Release
- S-Release

SV-Release	Modification
12.2(18)SV	This command was introduced.
12.2(23)SV	Added support for twogigabitphy interfaces and added the **asymmetric** and **symmetric** keywords 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

This command is only available on gigabitphy interfaces and twogigabitphy interfaces encapsulated for Fibre Channel or FICON traffic.

You can use symmetric mode in most configurations. However, use asymmetric mode if the following conditions occur when using symmetric mode:

1. No errors occur when flow control is disabled on the twogigabitphy interface.
2. CRC errors are seen on the FC or FICON client device when flow control is enabled.
3. The **show controller** command output for the twogigabitphy interface shows the following:
   - The QDR CRC errors are larger than the Tx CRC errors. Typically, Tx CRC errors are zero.
   - The QDR CRC errors are larger than the QDR Parity errors.Typically, QDR Parity errors are zero.

Examples

The following example shows how to enable flow control.

```
Switch(config)# configure terminal
Switch(config-if)# interface gigabitphy 3/0/0
Switch(config-if)# encapsulation fibrechannel
Switch(config-if)# flow control
```

The following example shows how to disable flow control.

```
Switch(config)# configure terminal
Switch(config-if)# interface gigabitphy 3/0/0
Switch(config-if)# no flow control
```

Related Commands

Command	Description
encapsulation	Configures the encapsulation of the client signal on the interface.
show interfaces	Displays interface information.
tx-buffer size	Configures the size of the transmit latency buffer.

laser control forward enable

To enable forward laser control, which automatically shuts down line card lasers when a Loss of Light failure occurs, use the **laser control forward enable** command. To disable this feature, use the **no** form of this command.

laser control forward enable

no laser control forward

Syntax Description

This command has no other arguments or keywords.

Defaults

Enabled on esconphy interfaces

Enabled on multirate interfaces when encapsulated for ESCON traffic

Disabled on all other interfaces

Command Modes

Interface 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)EV	Added support for 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.
12.2(25)SV	Added support for multirate interfaces.
S-Release	**Modification**
12.2(22)S	**This command was integrated in this release from release 12.2(22)SV.**

Usage Guidelines

Automatically shutting down the laser prevents the transmission of unreliable data. However, when the laser is shut down, fault isolation is more difficult.

Forward laser control is supported on transparent and wave interfaces on transponder line cards, esconphy interfaces on ESCON aggregation cards, twogigabitphy interfaces on 4-port 1-Gbps/2-Gbps FC aggregation cards, gigabitphy interfaces on 8-port FE/GE aggregation cards, and multirate interfaces on 8-port multi-service muxponders:

- Transparent and wave interfaces

Use this command to enable forward laser control on both the transparent and wave interfaces of a transponder line card. If configured on a transparent interface, the client side laser of a transponder line card shuts down when the trunk side receiver detects a Loss of Light. If configured on the wave interface, the trunk side laser of the transponder line card shuts down when the client side receiver detects a Loss of Light.

Note To function correctly, configure forward laser control on both interfaces on a transponder line card. For y-cable protection, configure forward laser control on both the transparent and wave interfaces on both transponder line cards.

This feature is convenient for configurations, such as Sysplex, where signal protection is performed in the client hardware and quick laser shutdown causes quick path switchover.

Caution Do not configure forward laser control when OFC is enabled. Combining these features interferes with the OFC protocol.

- Esconphy interfaces

  When forward laser control is enabled on an esconphy interface and a Loss of Light is detected on the port, the transmitter laser on the corresponding port on the remote node is turned off, regardless of the forward laser control configuration on the remote esconphy interface.

- Twogigabitphy interfaces

  When forward laser control is enabled on a twogigabitphy interface and a Loss of Light is detected on the port, the transmitter laser on the corresponding port on the remote node is turned off only if forward laser control is configured on the remote twogigabitphy interface.

- Gigabitphy interfaces

  When forward laser control is enabled on a twogigabitphy interface and a Loss of Light is detected on the port, the transmitter laser on the corresponding port on the remote node is turned off only if forward laser control is configured on the remote twogigabitphy interface.

- Multirate interfaces

  When forward laser control is enabled on a multirate interface and a Loss of Light, Loss of Sync, or Loss of Lock is detected on the port, the transmitter laser on the corresponding port on the remote node is turned off only if forward laser control is configured on the remote multirate interface.

Note Forward laser control is not supported on multirate interface when the configured encapsulation is copper FE, copper GE, DVB-ASI, SDI-SDTI, T1, or E1.

Examples

The following example shows how to enable forward laser control on a transparent interface.

```
Switch# configure terminal
Switch(config)# interface transparent 3/0/0
Switch(config-if)# laser control forward enable
```

The following example shows how to enable forward laser control on a transponder line card wave interface.

```
Switch# configure terminal
Switch(config)# interface wave 2/0
```

```
Switch(config-if)# laser control forward enable
```

Related Commands

Command	Description
show interfaces	Displays interface information.

laser control safety enable

To enable laser safety control on a wave, waveethernetphy, wavesonetphy, or tengigethernetphy interface, use the **laser control safety enable** command. To disable laser safety control, use the **no** form of this command.

laser control safety enable

no laser control safety

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled

Command Modes

Interface 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.
12.2(25)SV	Added support for wavesonetphy interfaces.
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 automatically shut down the lasers transmitting to the trunk fiber when a Loss of Light failure occurs, such as a trunk fiber cut. Enable laser safety control on all wave interfaces in the shelf, including the OSC wave interface.

Laser safety control uses the same protocol state machine as OFC, but not the same timing. Laser safety control uses the pulse interval and pulse durations timers compliant with the ALS (automatic laser shutdown) standard (ITU-T G.664).

Caution Do not configure laser safety control when OFC is enabled. Combining these features interferes with the OFC safety protocol operation.

Caution Use this command only with line card protected configurations or unprotected configurations.

Examples

The following example shows how to enable laser safety control on a wave interface.

```
Switch# configure terminal
Switch(config)# interface wave 2/0
Switch(config-if)# laser control safety enable
```

Related Commands

Command	Description
show interfaces	Displays interface information.

laser frequency

To select the desired channel frequency on a transparent transponder line card, 10-Gbps ITU trunk card, 10-Gbps ITU tunable trunk card, 2.5-Gbps ITU trunk card, or 8-port multi service muxponders, use the **laser frequency** command.

To revert to the default value, use the **no** form of the command.

laser frequency *number*

no laser frequency

Syntax Description

number	One of the two channel frequencies supported by the transponder line card, or one of the four channel frequencies supported by a 10-Gbps ITU trunk card.

Defaults

The lower frequency for the transponder laser

Command Modes

Interface 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)EV	Added support for waveethernetphy interfaces.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.
12.2(25)SV	Added support for wavesonetphy interfaces.
12.2(26)SV	Added support for 10-Gbps ITU tunable trunk cards.
S-Release	**Modification**
12.2(22)S	**This command was integrated in this release from release 12.2(22)SV.**

Usage Guidelines

The transponder line card can be tuned to support one of two channel frequencies and the 10-Gbps ITU tunable trunk card can be tuned to support one of four channel frequencies.

The change from one frequency to another takes about 10 seconds. Do not expect traffic to transit the system until the frequency selection completes. Also, successive **laser frequency** commands are ignored until after the new channel frequency stabilizes.

Note This interface command is applicable only to tunable lasers that support transmission over multiple frequencies on the ITU grid. The values displayed for selection vary depending on the capabilities of the line card.

Examples

The following example shows how to select the channel frequency on a transponder line card wave interface:

```
Switch(config)# interface wave 9/0
Switch(config-if)# laser frequency 194100
```

The following example shows how to select the channel frequency on a 2.5-Gbps ITU trunk card and 10-Gbps ITU tunable trunk card waveethernetphy interface:

```
Switch(config)# interface waveethernetphy 9/0
Switch(config-if)# laser frequency 194100
```

Related Commands

Command	Description
show interfaces	Displays interface information.

laser shutdown

To turn off the laser on a module supporting the in-band message channel or DCC, use the **laser shutdown** command. To turn the laser on, use the **no** form of this command.

laser shutdown

no laser shutdown

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled

Command Modes

Interface 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.
12.2(25)SV	Added support for wavesonetphy interfaces.
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 explicitly shut down the laser. The interface **shutdown** command disables data traffic; however the control traffic carried over in-band message channel or DCC continues to flow. Use this command to turn off the laser and stop all traffic.

Note The interface **shutdown** command must precede the **laser shutdown** command. To bring the interface administratively up, the **no laser shutdown** must precede the **no shutdown** command.

Note If you turn off the laser on an interface and save the configuration to the startup configuration, the interface comes up with the laser turned off when the system boots.

Note A 10-Gbps laser on a waveethernetphy interface must warm up for 2 minutes before carrying traffic.

Examples

The following example shows how to turn off the laser on a waveethernetphy interface.

```
Switch(config)# interface waveethernetphy 4/0
Switch(config-if)# laser shutdown
```

Related Commands

Command	Description
show interfaces	Displays interface information.

loopback

To configure a signal loopback on an interface, use the **loopback** command. To disable interface loopback, use the **no** form of this command.

loopback [**facility** | **terminal**]

no loopback [**facility** | **terminal**]

Syntax Description

facility	Enables facility loopback. The signal from the receive input is looped back to the transmit output.
terminal	Enables terminal loopback. The signal sent for transmit output is looped back to the receive input. This is an internal loopback used for hardware debug and diagnostics.

Defaults

Disabled

When neither **facility** or **terminal** is specified in the command, the default is **facility**.

Command Modes

Interface 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)EV	Added support for facility and terminal loopbacks on gigabitphy, waveethernetphy, and tengigethernetphy interfaces.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.
12.2(23)SV	Added support for facility and terminal loopbacks on twogigabitphy interfaces.
12.2(25)SV	Added support for facility and terminal loopbacks for multirate and wavesonetphy interfaces.
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 facility loopbacks on transparent, wave, esconphy, or multirate interfaces, and facility and terminal loopbacks on waveethernetphy, wavesonetphy, or tengigethernetphy interfaces. On a transponder line card, you can configure a loopback on either the wave interface or the transparent interface, but not both simultaneously.

A configured loopback differs from an external loopback where you simply run a cable from the output of a given interface to its input. Using the **loopback** command, you can set loopbacks *without* the need to change the cabling. This is useful for remote testing, configuration, and troubleshooting.

Caution Loopbacks on waveethernetphy, tengigethernetphy, wavesonetphy, and multirate interfaces disrupt service. Use this feature with care.

Note If you enable loopback on an interface and save the configuration to NVRAM, the interface comes up with loopback enabled when the system boots.

The **facility** and **terminal** options are available only on waveethernetphy and tengigethernetphy interfaces. If neither the **facility** or **terminal** keywords are used, the default is a terminal loopback.

Examples

The following example shows how to enable loopback on a transparent interface.

```
Switch# configure terminal
Switch(config)# interface transparent 2/0/0
Switch(config-if)# loopback
```

The following example shows how to enable loopback on a wave interface.

```
Switch# configure terminal
Switch(config)# interface wave 10/0
Switch(config-if)# loopback
```

Related Commands

Command	Description
show interfaces	Displays interface information.

monitor enable

To monitor signal quality and protocol error statistics in the transponder line card, use the **monitor enable** command. To disable monitoring, use the **no** form of this command.

monitor enable

no monitor

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled

Command Modes

Interface 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 and added support for 2-Gbps FC and FICON.
12.2(22)SV	Added monitoring support for 2-Gbps ISC links peer mode.
S-Release	**Modification**
12.2(22)S	**This command was integrated in this release from release 12.2(22)SV.**
12.2(25)S	Added monitoring support for 1-Gbps ISC links peer mode.

Usage Guidelines

Use this command to collect error statistics on signal quality in the transponder line card. The following protocols can be monitored:

- ESCON (200 Mbps) SM and MM
- Fibre Channel (1 Gbps and 2 Gbps) SM
- FICON (Fiber Connection) (1 Gbps and 2 Gbps) SM
- Gigabit Ethernet (1250 Mbps) SM
- ISC (InterSystem Channel) links compatibility mode
- ISC links peer mode (1 Gbps and 2 Gbps)
- SDH (Synchronous Digital Hierarchy) STM-1 SM and MM

- SDH STM-4 SM and MM
- SDH STM-16 SM
- SONET OC-3 SM and MM
- SONET OC-12 SM and MM
- SONET OC-48 SM

Note To monitor 2-Gbps FC, FICON, and ISC links peer mode, you must upgrade the transponder line card functional image to release 1.A3.

When monitoring is enabled on the transparent interface, it is automatically enabled on the corresponding wave interface.

For GE, FC, and FICON traffic, the Cisco ONS 15530 monitors the following conditions:

- CVRD (code violation running disparity) error counts
- Loss of Sync
- Loss of Lock
- Loss of Light

For SONET errors, the Cisco ONS 15530 monitors the SONET section overhead only, not the SONET line overhead. Specifically, the Cisco ONS 15530 monitors the B1 byte and the framing bytes. The system can detect the following defect conditions:

- Loss of Light
- Loss of Lock (when the clock cannot be recovered from the received data stream)
- Severely Errored Frame
- Loss of Frame

For SONET performance, the system monitors the B1 byte, which is used to compute the four SONET section layer performance monitor parameters:

- SEFS-S (section severely errored framing seconds)
- CV-S (section code violations)
- ES-S (section errored seconds)
- SES-S (section severely errored seconds)

For ISC link compatibility and peer mode traffic, the system monitors the following conditions:

- CVRD error counts
- Loss of CDR (clock data recovery) Lock
- Loss of Light

Note Before monitoring can be enabled, you must configure protocol encapsulation for the interface using the **encapsulation** command.

Monitoring signal error statistics is useful for isolating system and network faults.

Examples

The following example shows how to monitor error counters on a transparent interface.

```
Switch# configure terminal
Switch(config)# interface transparent 2/0/0
Switch(config-if)# monitor enable
```

Related Commands

Command	Description
encapsulation	Configures the encapsulation of the client signal on the interface.
show interfaces	Displays interface information.

negotiation auto

To enable autonegotiation for Gigabit Ethernet on 8-port FC/GE aggregation cards, use the **negotiation auto** command. To revert to the default value, use the **no** form of this command.

negotiation auto

no negotiation auto

Syntax Description

This command has no other arguments or keywords.

Defaults

Enabled

Command Modes

Interface configuration

Command History

This table includes the following release-specific history entries:

- SV-Release
- S-Release

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

Usage Guidelines

This command is available on gigabitphy interfaces encapsulated for Gigabit Ethernet traffic and on multirate interfaces encapsulate for copper Fast Ethernet or copper Gigabit Ethernet.

Examples

The following example shows how to enable autonegotiation on a gigabitphy interface.

```
Switch(config)# configure terminal
Switch(config-if)# interface gigabitphy 3/0/0
Switch(config-if)# encapsulation gigabitethernet
Switch(config-if)# negotiation auto
```

The following example shows how to disable autonegotiation on a multirate interface.

```
Switch(config)# configure terminal
Switch(config-if)# interface multirate 8/0/3
Switch(config-if)# encapsulation gigabitethernet copper
Switch(config-if)# no negotiation auto
```

Related Commands

Command	Description
encapsulation	Configures the encapsulation of the client signal on the interface.
show interfaces	Displays interface information.

optical attenuation automatic desired-power

To configure automatic attenuation on a voain interface, use the **optical attenuation automatic desired-power** command. To revert to manual attenuation at the previously configured automatic desired power value, use the **no** form of the command**.**

optical attenuation automatic desired-power *value*

no optical attenuation automatic desired-power

Syntax Description

value	Specifies the attenuation value in 0.1 dB. The range is –400 to 250.

Defaults

None

Command Modes

Interface configuration

Command History

This table includes the following release-specific history entries:

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

EV-Release	Modification
12.1(12c)EV1	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 automatically set the optical attenuation on a WB-VOA module interface. Once you set a desired signal power and the system checks every second until the signal power comes into attenuable range. Then the system sets the attenuation so that the signal transmits at the desired power value. The system waits 60 seconds before checking the signal power again and adjusting the attenuation if necessary. The system automatically adjusts the attenuation only if it is at least 0.5 dBm out of range.

To determine the desired power setting, use the **show interfaces** command with the **attenuation desired-power** keywords.

Note Automatic attenuation and manual attenuation are mutually exclusive. Only one method can be active at a given time. If manual attenuation is in effect, the **optical attenuation automatic desired-power** command overrides that configuration.

Examples

The following example shows how to set the optical attenuation on a WB-VOA module interface.

```
Switch# configure terminal
Switch(config)# interface voain 7/0/0
Switch(config-if)# optical attenuation automatic desired-power 100
```

Related Commands

Command	Description
optical attenuation manual	Manually sets the attenuation value for the input interfaces on VOA modules.
show interfaces	Displays interface information.

optical attenuation manual

To manually set the attenuation level on a VOA module interface, use the **optical attenuation manual** command. To revert to the default value, use the **no** form of the command**.**

optical attenuation manual *value*

no optical attenuation manual

Syntax Description

value	Specifies the attenuation value in 0.1 dB. The *value* range for WB-VOA modules is 17 to 300. The *value* range for single band PB-OE modules is 34 to 300. The *value* range for dual band PB-OE modules is 37 to 300.

Defaults

For single and double WB-VOA (wide-band variable optical attenuator) modules the default is 1.7 dB.

For single band PB-OE (per-band optical equalizer) modules the default is 3.4 dB.

For dual band PB-OE modules the default is 3.7 dB.

Command Modes

Interface 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)EV1	Changed command to **optical attenuation manual**.
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 manually set the optical attenuation on a VOA module interface.

To determine the power setting, use the **show interfaces** command with the **attenuation desired-power** keywords.

Note Automatic attenuation and manual attenuation are mutually exclusive. Only one method can be active at a given time. If automatic attenuation is in effect, the **optical attenuation manual** command overrides that configuration.

Examples

The following example shows how to set the optical attenuation on a WB-VOA module interface.

```
Switch# configure terminal
Switch(config)# interface voain 7/0/0
Switch(config-if)# optical attenuation manual 100
```

The following example shows how to set the optical attenuation on a PB-OE module interface.

```
Switch# configure terminal
Switch(config)# interface voafilterin 7/0/0.1
Switch(config-subif)# optical attenuation manual 100
```

Related Commands

Command	Description
optical attenuation automatic desired-power	Configures automatic attenuation on a WB-VOA module interface.
show interfaces	Displays interface information.

optical threshold power receive

To set the optical threshold power for alarms on a transponder line card, VOA module, 2.5-Gbps ITU trunk card, 10-Gbps ITU tunable and non tunable trunk card, or 8-port multi-service muxponder use the **optical threshold power receive** command. To revert to the default values, use the **no** form of the command.

optical threshold power receive [**after-attenuation**] {**low** | **high**} {**alarm** | **warning**} *value* [**severity** {**critical** | **major** | **minor** | **not alarmed** | **not reported**}]

no optical threshold power receive [**after-attenuation**] {**low** | **high**} {**alarm** | **warning**}

Syntax Description

after-attenuation	Indicates that the threshold is measured after passing through a VOA (variable optical attenuator) at this interface. This keyword is not present when there is no VOA at this interface.
low	Specifies a low threshold value.
high	Specifies a high threshold value.
alarm	Indicates that an alarm is raised when the threshold is exceeded.
warning	Indicates that a warning indication is reported when the threshold is exceeded.
value	The threshold value in tenths of a dBm. See the “Usage Guidelines” section for the ranges for each type of interface.
severity	Specifies the severity for the threshold.
critical	Indicates the threshold level for service-affecting conditions that require immediate corrective action. This severity applies only to alarms.
major	Indicates the threshold level for hardware or software conditions that cause serious service disruption, or malfunctioning or failure of important hardware. These problems require the immediate attention and response of a technician to restore or maintain system capability. The urgency is less than in critical situations because of a lesser immediate or impending effect on service or system performance. This severity applies only to alarms.
minor	Indicates the threshold level for problems that do not have a serious effect on service, or for problems in hardware that do not affect the essential operation of the system. This severity applies to both alarms and warnings.
not-alarmed	Indicates the threshold level for negligible discrepancies that do not cause alarm notifications to be generated. The information for these events is retrievable from the network element. This severity applies only to warnings.
not reported	Indicates the threshold level for negligible discrepancies that do not cause notifications to be generated. The information for these events is retrievable from the network element. This severity applies only to warnings.

Defaults

Interface Type	Low Alarm (dBm)	Low Warning (dBm)	High Warning (dBm)	High Alarm (dBm)
Voafilterin subinterface	–29	–27	9	11
Voain	–29	–27	9	11
2.5-Gbps ITU trunk card wavepatch	–28	–26	–10	–8
10-Gbps ITU tunable and non tunable trunk card wavepatch	–22	–20	–10	–8
Transponder line card active wavepatch	–28	–24	–10	–8
Transponder line card standby wavepatch	–28	–24	–15	–13
8-port multi-service muxponder wavepatch	–28	–24	–10	–8

Alarm severity: **major**

Warning severity: **not alarmed**

Command Modes

Interface configuration for WB-VOA modules, transponder line cards, 2.5-Gbps ITU trunk cards, and 10-Gbps ITU tunable and non tunable trunk cards

Subinterface configuration for PB-OE modules

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)EV	Added support for the 2.5-Gbps ITU trunk card.
12.1(12c)EV2	Changed the default values for the 10-GE transponder module high warning and high alarm.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.
12.2(25)SV	Added support for the 8-port multi-service muxponder.
12.2(26)SV	Added support for the 10-Gbps ITU tunable trunk card.
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 set the optical power thresholds for alarms and warning on VOA module interfaces, transponder line card interfaces, 2.5-Gbps ITU trunk card interfaces, 10-Gbps ITU tunable and non tunable trunk card interfaces, or 8-port multi-service muxponder interfaces.

The default value for high alarm threshold corresponds to the receiver saturation level for the transponder line card.

The default value for low alarm threshold corresponds to the Loss Of Light condition. Exceeding the low alarm threshold on the active wavepatch interface causes a protection switchover to the standby wavepatch interface, provided that the standby interface is up and operating normally prior to the protection switchover.

The default values apply to most network configurations. However, when optical amplifiers are used in the network in the receive direction as preamplifiers, the low alarm threshold value should be reconfigured, because the amplified noise level might be higher than the sensitivity of the receiver and the protection switchover might not be triggered. In such cases, we recommend setting the low alarm threshold either to 10 dB below the power level measured at the interface when a signal exists or to –28 dB for transponder line cards, 8-port multi-service muxponders, and 2.5-Gbps ITU trunk cards, or to –22 dB for 10-Gbps ITU tunable and non tunable trunk cards, whichever value is higher.

Note The value of a high warning threshold must be less than the value of the high alarm threshold. The value of a low warning threshold must be greater than the value of the low alarm threshold.

Examples

The following example shows how to set the optical power low alarm threshold on a PB-OE module.

```
Switch(config)# interface voafilterin 9/0/0.1
Switch(config-subif)# optical threshold power receive after-attenuation low alarm -210
```

The following example shows how to set the optical power high alarm threshold on a WB-VOA module.

```
Switch(config)# interface voain 8/0/0
Switch(config-if)# optical threshold power receive after-attenuation high alarm -200
```

The following example shows how to set the optical power low warning threshold on a wavepatch interface.

```
Switch(config)# interface wavepatch 4/0/0
Switch(config-if)# optical threshold power receive low warning -200
```

Related Commands

Command	Description
show interfaces	Displays interface information.

over-subscription

To oversubscribe 4-port 1-Gbps/2-Gbps FC aggregation cards, use the **over-subscription** command. To disable oversubscription, use the **no** form of this command.

over-subscription

no over-subscription

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled.

Command Modes

Interface configuration.

Command History

This table includes the following release-specific history entries:

- SV-Release

SV-Release	Modification
12.2(29)SV	This command was introduced.

Usage Guidelines

Oversubscription is supported only in the FC/FICON mode and not in the ISC mode. To maximize throughput, Cisco recommends that you configure oversubscription along with flow control.

You can oversubscribe a 4-port 1-Gbps/2-Gbps FC aggregation card only if the following conditions are met:

- The 4-port 1-Gbps/2-Gbps FC aggregation cards at both ends are configured to support oversubscription and the Functional version is 1.20 or later.
- The IOS version is 12.2(29)SV or later.
- 10-Gbps ITU2 cards with Functional version 2.31 or later are installed.
- 2.5-Gbps trunk cards with Functional version 1.70 or later are installed.

Examples

The following example shows how to enable oversubscription on a 4-port 1-Gbps/2-Gbps FC aggregation card:

```
Switch(config)# configure terminal
Switch(config-if)# interface portgroup 3/0/0
Switch(config-if)# over-subscription
Switch(config-if)# exit
```

The following example shows how to disable oversubscription on a 4-port 1-Gbps/2-Gbps FC aggregation card:

```
Switch(config)# configure terminal
Switch(config-if)# interface portgroup 3/0/0
Switch(config-if)# no over-subscription
Switch(config-if)# exit
```

Related Commands

Command	Description
sub-rate	Configures the subrate for the twogigabitphy interfaces that are part of an oversubscribed portgroup or a superportgroup.
show interfaces	Displays interface information.

patch

To configure the patch connections within a shelf, use the **patch** command. To remove the patch connection configuration, use the **no** form of the command.

patch *interface1* [**transmit** | **receive**] *interface2*

no patch *interface1* [**transmit** | **receive**] *interface2*

Syntax Description

interface1	Specifies the first patched interface. See the "Usage Guidelines" section for valid interface types.
transmit	Indicates that *interface1* is patched to *interface2* in the transmit direction.
receive	Indicates that a*interface1* is patched to *interface2* in the receive direction.
interface2	Specifies the second patched interface. See the "Usage Guidelines" section for valid interface types.

Defaults

Both directions

Command Modes

Global 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)EV	Added support for wdmrelay interfaces.
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 describe the patch connections between the OADM modules.

Valid patch connections between modules are:

- Thru interface to thru interface between OADM modules

  thru *slot1/subcard1* **thru** *slot/subcard2*

- OSC wave interface to OSC oscfilter interface

  wave *slot/subcard* **oscfilter** *slot/subcard*

- OSC wave interface to WB-VOA voain interface
  wave *slot/subcard* **voain** *slot/subcard/port*
- OSC oscfilter interface to WB-VOA voaout interface
  oscfilter *slot/subcard* **voaout** *slot/subcard/port*
- Wavepatch interface to OADM filter interface
  wavepatch *slot/subcard/port* **filter** *slot/subcard/port*
- Wavepatch interface to PSM wdmrelay interface
  wavepatch *slot/subcard/port* **wdmrelay** *slot/subcard/port*
- OADM wdm interface to PSM wdmrelay interface
  wdm *slot/subcard* **wdmrelay** *slot/subcard/port*
- OADM wdm interface to WB-VOA voain interface
  wdm *slot/subcard* **voain** *slot/subcard/port*
- OADM wdm interface to WB-VOA voaout interface
  wdm *slot/subcard* **voaout** *slot/subcard/port*
- OADM wdm interface to PB-OE voafilterin interface
  wdm *slot/subcard* **voafilterin** *slot/subcard/port*
- OADM wdm interface to PB-OE voafilterout interface
  wdm *slot/subcard* **voafilterout** *slot/subcard/port*
- PB-OE voabypassout interface to WB-VOA voain interface
  voabypassout *slot/subcard/port* **voain** *slot/subcard/port*
- WB-VOA voaout interface to PB-OE voabypassin interface
  voaout *slot/subcard/port* **voabypassin** *slot/subcard/port*
- PB-OE voabypassout interface to PB-OE voafilterin interface
  voabypassout *slot/subcard/port* **voafilterin** *slot/subcard/port*
- PB-OE voafilterout interface to PB-OE voabypassin interface
  voafilterout *slot/subcard/port* **voabypassin** *slot/subcard/port*

You cannot preconfigure a patch connection. The interfaces must exist on the shelf before configuring them.

The order of the interfaces in the command does not affect the patch connect configuration. For example, configuring **patch wdm 0/1 thru 0/0** is equivalent to configuring **patch thru 0/0 wdm 0/1**.

In case of an optical interface where the transmitted and received signals travel on two different strands of fiber, it is possible that each fiber is patched to a different interface. The direction keywords **receive** and **transmit** indicate whether *interface1* is patched to the *interface2* in the receive direction or the transmit direction. The absence of the keyword indicates that *interface1* is patched to *interface2* in both directions.

When one interface in a patch connection is physically removed from the shelf, the patch connection configuration persists but does not appear in the **show running-config** output. A subsequent **patch** command that includes the remaining interface overwrites the previous patch connection configuration.

Note When a patch connection between a OADM module and a PSM is configured, topology learning on the wdm interface is disabled.

Examples

The following example shows how to describe the patch connection between two OADM modules in the same slot.

```
Switch# configure terminal
Switch(config)# patch wdm 0/0 wave 1/1
```

The following example shows how to describe the patch connection in the transmit direction between an OADM module and a PB-OE module.

```
Switch# configure terminal
Switch(config)# patch wdm 1/0 transmit voafilterin 1/1/0
```

Related Commands

Command	Description
debug ports	Enables debugging of optical port activity.
show optical filter	Displays the channels supported by the OADM modules.
show patch	Displays optical patch connection configuration.
snmp-server enable traps cdl	Enables SNMP trap notifications for patch connection activity.

portgroup

To map a twogigabitphy interface to a portgroup interface, use the **portgroup** command. To remove the interface mapping configuration, use the **no** form of the command.

portgroup *interface-number*

no portgroup

To map portgroups to a superportgroup on a 4-port 1-Gbps/2-Gbps FC aggregation card, use the **portgroup** command. To remove the interface mapping configuration, use the **no** form of the command.

portgroup *interface-number* **{identifier** *trunk flow identifier***}**

no portgroup *interface-number*

Syntax Description

interface-number	Specifies the portgroup interface number to which to map the twogigabitphy interface. The range is 0 to 3.
identifier *trunk flow identifier*	Specifies the flow identifier of the trunk.

Defaults

None

Command Modes

Interface configuration

Command History

This table includes the following release-specific history entries:

- SV-Release

SV-Release	Modification
12.2(29)SV	Added support for oversubscription configurations.
12.2(23)SV	This command was introduced.

Usage Guidelines

If the portgroup is not oversubscribed, you can map two twogigabitphy interfaces carrying 1-Gbps traffic to a single portgroup interface. If the twogigabitphy interface carries 2-Gbps traffic, it is the only interface you can map to the portgroup interface. If oversubscription is enabled on the portgroup, any number of twogigabitphy interfaces can be mapped to the portgroup. The total subrates of all the clients in a portgroup must not exceed the portgroup bandwidth (250 MBps).

When a portgroup is associated to the superportgroup, oversubscription is automatically enabled on that portgroup. If you disassociate a portgroup from the superportgroup, oversubscription is automatically disabled on that portgroup. Moreover, while superportgroup is configured, oversubscription cannot be enabled on any other portgroup (in the same 4-port 1-Gbps/2-Gbps FC aggregation card) that is not part of the superportgroup. A portgroup that is associated to a superportgroup cannot be connected to any twogigabitphy interfaces.

In a superportgroup, client-to-client mappings are fixed. For instance, port-0 of the 4-port 1-Gbps/2-Gbps FC aggregation card at one end will communicate only with port-0 of the 4-port 1-Gbps/2-Gbps FC aggregation card at the other end.

Examples

The following example shows how to configure the mapping between a twogigabitphy interface and a portgroup interface.

```
Switch(config)# interface twogigabitphy 4/0/0
Switch(config-if)# portgroup 2
```

The following example shows how to configure the mapping between a portgroup interface and the superportgroup interface.

```
Switch# configure terminal
Switch(config)# interface superportgroup 7/0/0
Switch(config-if)# portgroup 0 identifier 16
```

Related Commands

Command	Description
encapsulation	Configures the encapsulation of the client signal on the interface.
superportgroup	Associates twogigabitphy interfaces encapsulated for FC or FICON traffic to a superportgroup.
show interfaces	Displays interface information.

show cdl defect-indication

To display the defect indication information on in-band message channel capable interfaces use the **show cdl defect-indication** command.

show cdl defect-indication [**interface** *interface* | **detail**]

Syntax Description

detail	Displays the defect indication information for in-band message channel capable interfaces.
interface *interface*	Displays the defect indication information for a specific interface.

Defaults

Displays a defect indication summary

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

This command is used to display the defect indication information on in-band message channel capable interfaces.

Examples

The following example shows how to display in-band message channel defect indication information. (See Table 3-2 for field descriptions.)

```
Switch# show cdl defect-indication
CDL Defect-Indication Status Summary
Interface    Interface   DI       Defect-Indication       Defect-Indication
Name         Status      Status          Receive                Transmit
------------ ----------- ------ ----------------------- -----------------------
WaveE3/0     up          up     BDI-H                           None
WaveE4/0     up          up              None                    None
WaveE9/0     up          up              None                    None
WaveE10/0    up          up              None                    None
```

Table 3-2 show cdl defect-indication Field Descriptions

Field	Description
Interface Name	Shows the interface identifier.
Interface Status	Shows the interface status.
DI Status	Shows the defect indication status.
Defect-Indication Receive	Shows the defect indication on the receive signal.
Defect-Indication Transmit	Shows the defect indication on the transmit signal.

The following example shows how to display the defect indication information for in-band message channel capable interfaces.

```
Switch# show cdl defect-indication detail

Interface WaveEthernetPhy3/0
Operational  Status       : up
Administrative Status     : up
CDL Status                : Enabled
Defect Indication state   : up
Configured Node Behavior  : None
Current Node Behavior     : Path Terminating
Defect Indication Receive : BDI-H
Defect Indication Transmit:          None
```

Related Commands

Command	Description
cdl defect-indication force hop-endpoint	Configures an interface as an end-of-hop.
cdl enable	Enables in-band message channel functionality.
cdl flow identifier	Specifies the in-band message channel flow identifier value.
debug cdl defect-indication	Initiates debugging of defect indication on in-band message channel capable interfaces.

show cdl flow

To display in-band message channel flow identifier and defect indication information on a per-flow basis, use the **show cdl flow** command.

show cdl flow [**interface** *interface*]

Syntax Description

interface *interface*	Displays flow identifier and defect indication information for a specific interface.

Defaults

Shows all flow identifiers and defect indications on the system

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(12c)EV1	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 is used to display the flow identifier and defect indication information on in-band message channel capable interfaces.

Examples

The following example shows how to display in-band message channel flow identifier information. (See Table 3-3 for field descriptions.)

```
Switch# show cdl flow

DI = Defect Indication

Interface        Flow         DI Received             DI Transmitted
              Identifier      from CDL network        to CDL network
------------  ---------- ---------------------- ----------------------
Esco9/0/0        50
Esco9/0/1        255
Esco9/0/2        255
Esco9/0/3        255
```

```
Esco9/0/4         255
Esco9/0/5         255
Esco9/0/6         255
Esco9/0/7         255
Esco9/0/8         255
Esco9/0/9         255
Esco10/0/0        255
Esco10/0/1        255
Esco10/0/2        255
Esco10/0/3        255
Esco10/0/4        255
Esco10/0/5        255
Esco10/0/6        255
Esco10/0/7        255
Esco10/0/8        255
Esco10/0/9        255
```

Table 3-3 show cdl flow Field Descriptions

Field	Description
Interface	Shows the interface identifier.
Flow Identifier	Shows the flow identifier for the interface. The default value is 255.
DI Received from CDL network	Shows the defect indications received for the flow.
DI Transmitted to CDL network	Shows the defect indications transmitted for the flow.

Related Commands

Command	Description
cdl defect-indication force hop-endpoint	Configures an interface as an end-of-hop.
cdl enable	Enables in-band message channel functionality.
cdl flow identifier	Specifies the in-band message channel flow identifier value.
debug cdl defect-indication	Initiates debugging of defect indication on in-band message channel capable interfaces.

show cdl flow defect-indication

To display in-band message channel defect indication information on a per-flow basis, use the **show cdl flow defect-indication** command.

show cdl flow defect-indication [**interface** *interface*]

Syntax Description

interface *interface*	Displays defect indication information for a specific interface.

Defaults

Shows defect indications for all flows on the system

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(12c)EV1	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 is used to display the defect indication information on in-band message channel capable interfaces.

Examples

The following example shows how to display in-band message channel flow identifier information. (See Table 3-4 for field descriptions.)

```
Switch# show cdl flow defect-indication

DI = Defect Indication

Interface           DI Received             DI Transmitted
                    from CDL network        to CDL network
------------   ---------------------- ----------------------
Esco10/0/0
Esco10/0/1
Esco10/0/2
Esco10/0/3
Esco10/0/4
```

```
Esco10/0/5
Esco10/0/6
Esco10/0/7
Esco10/0/8
Esco10/0/9
```

Table 3-4 show cdl flow defect-indication Field Descriptions

Field	Description
Interface	Shows the interface identifier.
DI Received from CDL network	Shows the defect indications received for the flow.
DI Transmitted to CDL network	Shows the defect indications transmitted for the flow.

Related Commands

Command	Description
cdl defect-indication force hop-endpoint	Configures an interface as an end-of-hop.
cdl enable	Enables in-band message channel functionality.
cdl flow identifier	Specifies the in-band message channel flow identifier value.
debug cdl defect-indication	Initiates debugging of defect indication on in-band message channel capable interfaces.

show cdl flow identifier

To display in-band message channel flow identifier information, use the **show cdl flow identifier** command.

show cdl flow identifier [**interface** *interface*]

Syntax Description

interface *interface*	Displays flow identifier information for a specific interface.

Defaults

Shows all flow identifiers on the system

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(12c)EV1	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 is used to display the flow identifier information for in-band message channel capable interfaces.

Examples

The following example shows how to display in-band message channel flow identifier information. (See Table 3-5 for field descriptions.)

```
Switch# show cdl flow identifier
Interface       Flow
              Identifier
------------  ----------
Esco8/0/0        80
Esco8/0/1        81
Esco8/0/2        82
Esco8/0/3        83
Esco8/0/4        84
Esco8/0/5        85
Esco8/0/6        86
Esco8/0/7        87
```

```
Esco8/0/8        88
Esco8/0/9        89
Esco10/0/0       100
Esco10/0/1       255
Esco10/0/2       255
Esco10/0/3       255
Esco10/0/4       255
Esco10/0/5       255
Esco10/0/6       255
Esco10/0/7       255
Esco10/0/8       255
Esco10/0/9       255
```

Table 3-5 show cdl flow identifier Field Descriptions

Field	Description
Interface	Shows the interface identifier.
Flow Identifier	Shows the flow identifier for the interface. The default value is 255.

Related Commands

Command	Description
cdl defect-indication force hop-endpoint	Configures an interface as an end-of-hop.
cdl enable	Enables in-band message channel functionality.
cdl flow identifier	Specifies the in-band message channel flow identifier value.
debug cdl defect-indication	Initiates debugging of defect indication on in-band message channel capable interfaces.

show connect

To display the connection relationships between the interfaces in the shelf, use the **show connect** command.

show connect [**edges** | **intermediate** [**sort-channel** | **interface** *interface*]]

Syntax Description

edges	Displays the connections between the client (transparent) interfaces and network trunk (wdm) interfaces of the shelf.
intermediate	Displays the complete connections between the client transparent interfaces and network trunk wdm interfaces of the shelf, including all the intermediate internal interfaces.
sort-channel	Sorts the display by channel number.
interface *interface*	Displays the intermediate connection information for a specific interface.

Defaults

Summary of configured cross connections

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

This command shows the relationships between the interfaces in the shelf. Use this command to trace a single channel from the client side interface to the trunk side OADM interface.

Examples

The following example shows how to display configured cross connection information. (See Table 3-6 for field descriptions.)

```
Switch# show connect
Index Client Intf     Trunk Intf      Kind        C2TStatus  T2CliStatus
----- --------------- --------------- ----------- ----------  ---------
15    Port3/0/0       WaveE8/0.1      Provisioned Up         Up
```

```
15    Port3/0/0       WaveE10/0.1     Protection  Up         Dormant
```

Table 3-6 show connect Field Descriptions

Field	Description
Index	Shows the index value in the MIB.
Client Intf	Shows the client interface identifier.
Trunk Intf	Shows the trunk interface identifier.
Kind	Indicates the kind of cross connections. The values are: • Provisioned • Protection
C2TStatus	Indicates the status of the signal from the client interface to the trunk interface.The values are: • Up • Down
T2CliStatus	Indicates the status of the signal from the trunk interface to the client interface.The values are: • Up • Dormant

The following example shows how to display edge connection information. (See Table 3-7 for field descriptions.)

```
Switch# show connect edges
client/
wave        wdm  channel
----------  ---  -----
Tran4/0/0     0/1     4
```

Table 3-7 show connect edges Field Descriptions

Field	Description
client/wave	Shows the client side interface identifier.
wdm	Shows the wdm interface identifier.
channel	Shows the ITU wavelength number supported by this connection.

The following example shows how to display intermediate connection information. (See Table 3-8 for field descriptions.)

```
Switch# show connect intermediate
client/       wave          wave           wdm
client/       wave          wave            wdm
wave          client        patch   filter   trk  channel
------------  ------------  -------  ------  -----  -------
Esco3/0/0     WaveE8/0      8/0/0*
                            8/0/1
Esco3/0/1     WaveE8/0      8/0/0*
                            8/0/1
Esco3/0/2     WaveE8/0      8/0/0*
```

```
                                8/0/1
Esco3/0/3     WaveE8/0          8/0/0*
                                8/0/1
Esco3/0/4     WaveE8/0          8/0/0*
                                8/0/1
Esco3/0/5     WaveE8/0          8/0/0*
                                8/0/1
Esco3/0/6     WaveE8/0          8/0/0*
                                8/0/1
Esco3/0/7     WaveE8/0          8/0/0*
                                8/0/1
Esco3/0/8     WaveE8/0          8/0/0*
                                8/0/1
Esco3/0/9     WaveE8/0          8/0/0*
                                8/0/1
client/       wave              wave              wdm
wave          client            patch    filter   trk   channel
------------  ------------  -------  ------  -----  -------

Tran4/0/0     Wave4/0           4/0/0*   0/1/3    0/1     4
                                4/0/1
Tran7/0/0     Wave7/0           7/0/0
                                7/0/1*   0/0/2    0/0     3
```

Table 3-8 show connect intermediate Field Descriptions

Field	Description
client/wave	Shows the client side interface identifier.
wave client	Shows the wave interface identifier.
wave patch	Shows the wavepatch interface identifier. The interface with the asterisk (*) carries the active signal.
filter	Shows the filter interface identifier.
wdm trk	Shows the wdm interface identifier.
channel	Shows the channel number supported by this connection.

The following example shows how to display interface connection information. (See Table 3-9 for field descriptions.)

```
Switch# show connect interface transparent 2/0/0
client/       wave              wave              wdm
wave          client            patch    filter   trk   channel
------------  ------------  -------  ------  -----  -------
Esco3/0/0     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/1     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/2     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/3     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/4     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/5     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/6     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
Esco3/0/7     WaveE8/0.1        8/0/0*   0/0/1    0/0     2
                                8/0/1    0/1/1    0/1     2
```

```
Esco3/0/8     WaveE8/0.1     8/0/0*  0/0/1    0/0    2
                             8/0/1   0/1/1    0/1    2
Esco3/0/9     WaveE8/0.1     8/0/0*  0/0/1    0/0    2
                             8/0/1   0/1/1    0/1    2
client/       wave           wave             wdm
wave          client         patch   filter   trk  channel
------------  ------------  -------  ------  -----  -------

Tran4/0/0     Wave4/0        4/0/0*  0/1/3    0/1    4
                             4/0/1
Tran7/0/0     Wave7/0        7/0/0
                             7/0/1*  0/0/2    0/0    3
```

Table 3-9 show connect interface Field Descriptions

Field	Description
Client	Shows the client side interface identifier.
Wave	Shows the wave interface identifier.
Wavepatch	Shows the wavepatch interface identifier.
Filter	Shows the filter interface identifier.
Wdm	Shows the wdm interface identifier.
Thru	Shows the thru interface identifier.
Wdm (trnk)	Shows the identifier of the wdm interface attached to the trunk fiber.

Related Commands

Command	Description
debug ports	Enables debugging of optical port activity.
show optical filter	Displays information about the channels supported by the OADM modules.
show optical wavelength mapping	Displays the mapping of the Cisco ONS 15530 channels to the ITU grid wavelengths and frequencies.

show controllers

To display hardware register information for an interface, use the **show controllers** command.

show controllers [*type slot*[/*subcard*[/*port*]]]

Syntax Description

type	Specifies one of the interface types listed in Table 3-10.
slot	Specifies a chassis slot.
subcard	Specifies a subcard position in a motherboard.
port	Specifies a port.

Defaults

Displays controller information for all interfaces on the system.

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.
12.1(12c)EV	Added support for gigabitphy and wdmsplit interfaces.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.
12.2(23)SV	Added support for twogigabitphy interfaces.
12.2(25)SV	Added support for multirate, wavesonetphy, and sdcc interfaces.
S-Release	**Modification**
12.2(22)S	**This command was integrated in this release from release 12.2(22)SV.**

Usage Guidelines

The **show controllers** command displays the contents of hardware registers for the interfaces. This information is useful for troubleshooting system problems.

Table 3-10 shows the interface types for the **show controller** command.

Table 3-10 Interface Types for the show controller Command

Type	Description
fastethernet 0	Shows the NME interface information.
filter *slot/subcard/port*	Shows the filter interface information.

Table 3-10 Interface Types for the show controller Command (continued)

Type	Description
gigabitphy *slot*/**0**/*port*	Shows the gigabitphy interface information.
multirate *slot*/**0**/*port*	Show the multirate interface information.
oscfilter *slot*/*subcard*	Shows the OSC oscfilter interface information.
portgroup *slot*/**0**/*port*	Shows the portgroup interface information.
wavesonetphy *slot*/**0**	Shows the wavesonetphy information.
thru *slot*/*subcard*	Shows the thru interface information.
transparent *slot*/**0**/**0**	Shows the transparent interface information.
twogigabitphy *slot*/**0**/*port*	Shows the twogigabitphy interface information.
wave *slot*[/*subcard*]	Shows the wave interface information.
waveethernetphy *slot*/**0**	Shows the waveethernetphy interface information.
wavepatch *slot*/**0**/*port*	Shows the wavepatch interface information.
wdm *slot*/*subcard*	Shows the wdm interface information.

Examples

The following example shows how to display hardware register information about a transparent interface. (See Table 3-11 for field descriptions.)

```
Switch# show controllers transparent 3/0/0
Controller info for Transparent interface Transparent3/0/0
  LRC start addr = 0x200000
  hardware port = 1
    RCI0 monitor.............:enabled
    port 1 intr SRC/CPU.....:enabled
    CPU0 MSB MAC.............:0x0
    CPU0 LSB MAC.............:0x0
    CPU1 MSB MAC.............:0x0
    CPU1 LSB MAC.............:0x0
    port error register.....:0x10000
    port ctrl msg intf mask.....:0x0
    port APS port fail mask.....:0x0
  HuJr start addr = 0x240000
  Optics control and status:
    LSC indication..............:ok
    trunk laser failure alarm...:clear
    LSC indication enable.......:disabled
    trunk laser alarm enable....:disabled
    line transceiver mode.......:non pluggable
    loss of light..............:yes
    trunk laser deviation alarm.:clear
    LSC.........................:disabled
    quick shutdown (FLC).....:disabled
    wavelength select..........:n-1 [lo wlen]
  CDR control and status:
    loss of lock..............:yes
    loss of lock enable.....:disabled
  SerDes control and status:
    diags loop back.............:disabled
    line loop back..............:disabled
  GE handler control and status:
    loss of sync..............:no
    loss of sync enable.....:disabled
```

```
FC/ESCON handler control and status:
  loss of sync.............:no
  loss of sync enable.....:disabled
SONET handler control and status:
  loss of frame............:yes
  severely errored frame.....:yes
  LOF enable...............:disabled
  SEF enable...............:disabled
```

Table 3-11 show controllers Command Field Descriptions for Transparent Interfaces

Field	Description
Optics control and status:	Shows control and status information for the optical components in the interface.
LSC indication	Shows laser safety control status (valid only on wave interfaces).
trunk laser failure alarm	Shows the status of the trunk laser alarm. The values are: • clear—no failure • indicated—failure
LSC indication enable	Indicates whether laser safety control has been enabled (valid only on wave interfaces).
trunk laser alarm enable	Shows the status of the trunk laser alarm. If enabled, the system will signal when laser failure occurs.
loss of light	Indicate whether there is a Loss of Light condition.
trunk laser deviation alarm	Shows the status of the wavelength deviation alarm. If enabled, the system will signal when there is a deviation in the functioning of the laser.
LSC	Indicates whether laser safety control is enabled from the CLI (valid only on wave interfaces).
quick shutdown (FLC)	Indicates whether forward laser control is enabled on the interface (valid only on wave interfaces).
wavelength select	Indicates whether a transponder line card is transmitting the lower wavelength (lo wlen) or the higher wavelength (hi wlen).
CDR control and status:	Shows the CDR (clock and data recovery) control and status information.
loss of lock	Indicated whether there is a Loss of Lock condition.
loss of lock enable	Indicates whether Loss of Lock monitoring is enabled on the interface via the **monitor enable** command.
SerDes control and status:	Shows the SerDes (serializer/deserializer) information.
GE handler control and status:	Shows Gigabit Ethernet control and status information.
loss of sync	Indicates whether there is a Loss of Synchronization for the signal. This field is only valid if protocol encapsulation is Gigabit Ethernet, and monitoring is enabled.
loss of sync enable	Indicates whether Loss of Synchronization monitoring is enabled via the **monitor enable** command.
FC/ESCON handler control and status:	Shows Fibre Channel and ESCON control and status information.

Table 3-11 show controllers Command Field Descriptions for Transparent Interfaces (continued)

Field	Description
loss of sync	Indicates whether there is a Loss of Synchronization for the signal. This field is only valid if protocol encapsulation is Fibre Channel or ESCON, and monitoring is enabled.
loss of sync enable	Indicates whether Loss of Synchronization monitoring is enabled via the **monitor enable** command.
SONET handler control and status:	Shows SONET control and status information.
loss of frame	Indicates whether there is a Loss of Frame for the signal. This field is only valid if protocol encapsulation is SONET, and monitoring is enabled.
severely errored frame	Indicates whether there is a severely errored frame in the signal. This field is only valid if protocol encapsulation is SONET, and monitoring is enabled.
LOF enable	Indicates whether Loss of Frame monitoring is enabled via the **monitor enable** command.
SEF enable	Indicates whether severely errored frame monitoring is enabled via the **monitor enable** command.

The following example shows how to display hardware register information about a transponder line card wave interface. (See Table 3-11 for field descriptions.)

```
Switch# show controllers wave 3/1
Controller info for Wave interface Wave3/1
  LRC start addr = 0x200000
  hardware port = 2
    RCI1 monitor.............:enabled
    port 2 intr SRC/CPU.....:enabled
    CPU0 MSB MAC.............:0x0
    CPU0 LSB MAC.............:0x0
    CPU1 MSB MAC.............:0x0
    CPU1 LSB MAC.............:0x0
    port error register.....:0x10000
    port ctrl msg intf mask.....:0xF00FC00A
    port APS port fail mask.....:0x0
  HuJr start addr = 0x250000
  Optics control and status:
    auto fail-over indication...:normal
    optical switch alarm.....:clear
    line laser degrade alarm....:clear
    optical switch position.....:Mux 1
    loss of light............:no
    BLC and LAS..............:disabled
    LSC......................:disabled
    quick shutdown (FLC).....:disabled
  CDR control and status:
    loss of lock.............:yes
    loss of lock enable.....:enabled
  SerDes control and status:
    diags loop back..........:disabled
    line loop back...........:disabled
  GE handler control and status:
    loss of sync.............:no
    loss of sync enable.....:disabled
```

```
  FC/ESCON handler control and status:
    loss of sync.............:no
    loss of sync enable.....:disabled
  SONET handler control and status:
    loss of frame............:yes
    severely errored frame.....:yes
    LOF enable...............:disabled
    SEF enable...............:disabled
```

The following example shows how to display hardware register information about an OSC wave interface. (See Table 3-11 for field descriptions.)

```
Switch# show controllers wave 3/0
Controller info for OSC wave interface Wave3/0
  LRC start addr = 0x900000
  hardware port = 0
    RCI0 monitor.............:enabled
    port 0 intr SRC/CPU.....:enabled
    CPU0 MSB MAC.............:0x0
    CPU0 LSB MAC.............:0x1060000
    CPU1 MSB MAC.............:0x0
    CPU1 LSB MAC.............:0x1070000
    port error register.....:0x8002
    port ctrl msg intf mask.....:0x0
    port APS port fail mask.....:0x0
  HuJr start addr = 0x940000
  CDL add/drop control and status:
    FIFO overflow indication....:clear
    HEC error threshold exceeded:indicate
    FIFO overflow enable.....:disabled
    HEC error threshold enable..:disabled
    CDL alarm status.........:true alarm
    CDL add enable...........:enabled
    CDL drop enable..........:enabled
  Optics control and status:
    LSC indication...........:ok
    trunk laser failure alarm...:indicated
    LSC indication enable.....:disabled
    trunk laser alarm enable....:disabled
    loss of light............:yes
    wavelength deviation alarm..:clear
    LSC......................:disabled
    wavelength select........:n [hi wlen]
  CDR control and status:
    loss of lock.............:yes
    loss of lock enable.....:disabled
  SerDes control and status:
    diags loop back..........:disabled
    network loop back........:disabled
  GE handler control and status:
    loss of sync.............:yes
    loss of sync enable.....:disabled
```

Related Commands

Command	Description
encapsulation	Specifies the protocol encapsulation for a transparent interface.
laser control forward enable	Configures forward laser control, which automatically shuts down transponder line card lasers.
laser control safety enable	Configures laser safety control on a wave, waveethernetphy, or tengigethernetphy interface.

Command	Description
loopback	Configures signal loopback on transparent and wave interfaces.
monitor enable	Enables signal monitoring for certain protocol encapsulations.
show interfaces	Displays interface information.

show interfaces

To display interface information, use the **show interfaces** command.

show interfaces [*type slot*[/*subcard*[/*port*]]] [**attenuation desired-power** *value*]

Syntax Description

type	Specifies one of the interface types listed in Table 3-12.
slot	Specifies a chassis slot.
subcard	Specifies a subcard position in a motherboard.
port	Specifies a port.
attenuation desired-power *value*	Specifies the desired attenuation power for voain interfaces.

Defaults

Displays information for all interfaces on the system.

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.
12.1(12c)EV	Added support for gigabitphy, wdmrelay, and wdmsplit interfaces.
12.1(12c)EV1	Added the **attenuation desired-power** keyword.
SV-Release	**Modification**
12.2(29)SV	Added support for superportgroup interface.
12.2(18)SV	This command was integrated in this release.
12.2(23)SV	Added support for twogigabitphy interfaces.
12.2(25)SV	Added support for multirate, wavesonetphy, and sdcc interfaces.
S-Release	**Modification**
12.2(22)S	**This command was integrated in this release from release 12.2(22)SV.**

Usage Guidelines

Table 3-12 shows the interface types for the **show interfaces** command.

Table 3-12 Interface Types for the show interfaces Command

Type	Description
esconphy *slot*/**0**/*port*	Shows the esconphy interface information.
fastethernet 0	Shows the NME interface information.
fastethernet-sby 0	Shows the NME interface information for the standby CPU switch module.
filter 0/*subcard*/*port*	Shows the filter interface information.
gigabitphy *slot*/**0**/*port*	Shows the gigabitphy interface information.
multirate *slot*/**0**/*port*	Show the multirate interface information.
oscfilter *slot*/*subcard*	Shows the OSC oscfilter interface information.
portgroup *slot*/**0**/*port*	Shows the portgroup interface information.
sdcc *slot*/**0**/**0**	Shows the sdcc interface information.
superportgroup *slot*/**0**/*port*	Shows the superportgroup interface information.
wavesonetphy *slot*/**0**	Shows the wavesonetphy information.
tengigethernetphy *slot*/**0**	Shows the tengigethernetphy interface information.
tengigethernetphy *slot*/**0.***subinterface*	Shows the tengigethernetphy subinterface information.
thru 0/*subcard*	Shows the thru interface information.
transparent *slot*/**0**/**0**	Shows the transparent interface information.
twogigabitphy *slot*/**0**/*port*	Shows the twogigabitphy interface information.
voabypassin *slot*/*subcard*/**0**	Shows the voabypassin interface information.
voabypassout *slot*/*subcard*/**0**	Shows the voabypassout interface information.
voafilterin *slot*/*subcard*/**0.***subinterface*	Shows the voafilterin interface information.
voafilterout *slot*/*subcard*/**0**	Shows the voafilterout interface information.
voain *slot*/*subcard*/**0.***subinterface*	Shows the voain interface information.
voaout *slot*/*subcard*/**0**	Shows the voaout interface information.
wave *slot*/**0**	Shows the wave interface information.
wavepatch *slot*/**0**/*port*	Shows the wavepatch interface information.
waveethernetphy *slot*/**0**	Shows the waveethernetphy interface information.
waveethernetphy *slot*/**0.***subinterface*	Shows the waveethernetphy subinterface information.
wdm 0/*subcard*	Shows the wdm interface information.
wdmrelay 0/*subcard*	Shows the wdmrelay interface information.
wdmsplit 0/*subcard*/*port*	Shows the wdmsplit interface information.

Examples

The following example shows how to display the configuration of a waveethernetphy interface:

```
Switch# show interfaces waveethernetphy 10/0
WaveEthernetPhy10/0 is down, line protocol is down
  Channel:30   Frequency:195.7 Thz   Wavelength:1531.90 nm
  Active Wavepatch      :Wavepatch10/0/1
  Splitter Protected    :No
```

```
  Signal quality        :Loss of lock
  Receive power level   :-35.0 dBm
  Laser Bias Current    :91 mA
  Laser Temperature     :31.0 degree C
  Laser shut down       :No
  Osc physical port     :No
  Wavelength used for inband management:No
  Loopback not set

  Configured threshold Group:None
  CDL HEC error count:0
  Number of times SF threshold exceeded:0
  Number of times SD threshold exceeded:0
  CRC error count:0
  Number of times SF threshold exceeded:0
  Number of times SD threshold exceeded:0
  Code violation and running disparity error count( 64b66b cvrd):0
  Number of times SF threshold exceeded:0
  Number of times SD threshold exceeded:0

  Defect Indication Status      :up
  Configured Node Behavior      :None
  Current Node Behavior         :Path Terminating
  Defect Indication Receive     :         None
  Defect Indication Transmit    :BDI-H

  Total Tx Frames Sent to N/W:  0
  Tx Gen CDL Idle Frame:        1843017892

  Rx Frames rcvd from N/W:      0
  Rx CRC Errors:                0
  Rx HEC Errors:                0
  Rx XGMII Errors:              0
  Rx IPG drpd pkts:             0
  Rx Idle Packets :             0
  Rx Oversize Frames :          0
  Rx Undersize Frames :         0

  Rx SII mismatch drpd data Frames :    0
  Rx SII mismatch drpd idle Frames :    0

  Last clearing of "show interface" counters never
  Hardware is data_enabled_port
```

The following example shows how to display transparent interface information. (See Table 3-13 for field descriptions.)

```
Switch# show interfaces transparent 3/0/0
Transparent3/0/0 is administratively up, line protocol is up
  Signal quality: Loss of lock
  Encapsulation: Sonet    Rate: oc3
  Signal monitoring: on
  Forward laser control: Off
  Configured threshold Group: None
  Threshold monitored for: BIP1 error
  Set threshold SF:10e-5  SD:10e-7
  Section code violation error count(bip1): 61286
  Number of errored seconds(es): 2
  Number of severely errored seconds(ses): 2
  Number of severely errored framing seconds(sefs): 273
  Number of times SEF alarm raised: 0
  Number of times SF threshold exceeded: 0
  Number of times SD threshold exceeded: 2
```

```
  Loopback not set
  Last clearing of "show interface" counters never
Hardware is transparent
```

Table 3-13 show interfaces transparent Field Descriptions

Field	Description
Transparent 3/0/0 is administratively up	Shows the interface state, either up or down.
line protocol is up	Shows the state of the line protocol, either up or down.
Signal quality	Shows signal quality.
Encapsulation	Shows the encapsulation for the interface.
Rate	Shows the encapsulation rate—either the configured clock rate or the protocol clock rate, if the protocol supports multiple rates.
Signal monitoring	Shows whether signal monitoring is enabled.
Forward laser control	Shows whether forward laser control is enabled.
Configured threshold group	Shows whether a threshold group has been configured for the interface.
Threshold monitored for	Shows what the threshold group is monitored for.
Set threshold	Shows alarm thresholds. The output example shows the alarm thresholds for signal failure (SF) and signal degrade (SD).
Section code violation error count (bip1)	Shows the number of BIP1 errors.
Number of errored seconds (es)	Shows the number of errored seconds.
Number of severely errored seconds (ses)	Shows the number of severely errored seconds.
Number of severely errored framing seconds (sefs)	Shows the number of severely errored framing seconds.
Number of times SEF alarm raised	Shows the number of times the SEF alarm was raised.
Number of times SF threshold exceeded	Shows the number of times the signal failure (SF) threshold was exceeded.
Number of times SD threshold exceeded	Shows the number of times the signal degrade (SD) threshold was exceeded.
Loopback not set	Shows whether loopback is enabled.
Last clearing of “show interface” counters	Shows the last time “show interface” counters were cleared.
Hardware is transparent	Shows the hardware type.

The following example shows how to display information on a wavepatch interface. (See Table 3-14 for field descriptions.)

```
Switch# show interfaces wavepatch 1/0/0
Wavepatch1/0/0 is down, line protocol is down
  Receiver power level: < -23.00 dBm

  Optical threshold monitored for : Receive Power (in dBm)
  Threshold exceeded for  : Low Warning  and Low Alarm
  Low alarm value           = -22.0 dBm  (default)
```

```
  Low Alarm Severity         = major
  Low warning value          = -20.0 dBm  (default)
  Low Warning Severity       = not alarmed
  High alarm value           = -6.0 dBm  (default)
  High Alarm Severity        = major
  High warning value         = -8.0 dBm  (default)
  High Warning Severity      = not alarmed
  Hardware is passive_port
```

The following example shows how to display wave interface information. (See Table 3-14 for field descriptions.)

```
Switch# show interfaces wave 10/0
Wave10/0 is administratively up, line protocol is up
  Channel: 25   Frequency: 195.1 Thz    Wavelength: 1536.61 nm
  Splitter Protected: Yes
  Receiver power level: -37.30 dBm
  Laser safety control: Off
  Forward laser control: Off
  Osc physical port: No
  Wavelength used for inband management: No
  Configured threshold Group: None
  Section code violation error count(bip1): 0
  Number of errored seconds(es): 29
  Number of severely errored seconds(ses): 29
  Number of severely errored framing seconds(sefs): 0
  Number of times SEF alarm raised: 0
  Number of times SF threshold exceeded: 0
  Number of times SD threshold exceeded: 0
  Loopback not set
  Last clearing of "show interface" counters 4d03h
  Hardware is data_only_port
```

Table 3-14 show interfaces wave Field Descriptions

Field	Description
Wave10/0 is administratively up	Shows the interface state, either up or down.
line protocol is up	Shows the state of the line protocol, either up or down.
Channel Frequency Wavelength	Shows the channel number, frequency, and wavelength of the wave interface.
Splitter Protected	Shows whether the interface is splitter protected.
Receiver power level	Shows the receiver power level. **Note** This field is not present in the OSC wave interface output.
Laser safety control	Shows whether laser safety control is enabled.
Forward laser control	Shows whether forward laser control is enabled.
Osc physical port	Shows whether the interface is an OSC physical port.
Wavelength used for inband management	Shows whether the interface is used for in-band management.

Table 3-14 show interfaces wave Field Descriptions (continued)

Field	Description
Configured threshold group	Shows whether a threshold group has been configured for the interface.
Section code violation error count (bip1)	Shows the number of BIP1 errors.
Number of errored seconds (es)	Shows the number of errored seconds.
Number of severely errored seconds (ses)	Shows the number of severely errored seconds.
Number of severely errored framing seconds (sefs)	Shows the number of severely errored framing seconds.
Number of times SEF alarm raised	Shows the number of times the SEF alarm was raised.
Number of times SF threshold exceeded	Shows the number of times the signal failure (SF) threshold was exceeded.
Number of times SD threshold exceeded	Shows the number of times the signal degrade (SD) threshold was exceeded.
Loopback not set	Shows whether loopback is enabled.
Last clearing of “show interface” counters	Shows the last time “show interface” counters were cleared.
Hardware is data_only_port	Shows the interface type.

The following example shows how to display OSC wave interface information. (See Table 3-14 for field descriptions.)

```
Switch# show interfaces wave 2/0
Wave2/0 is up, line protocol is up
  Channel: 0    Frequency: 191.9 Thz    Wavelength: 1562.23 nm
  Laser safety control: Off
  Osc physical port: Yes
  Wavelength used for inband management: No
  Configured threshold Group: None
  Last clearing of "show interface" counters never
  Hardware is OSC_phy_port
  Internet address is 1.0.0.3/16
  MTU 1492 bytes, BW 10000000 Kbit, DLY 0 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SNAP, loopback not set
  Last input 00:00:00, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     14719 packets output, 971930 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

The following example shows how to display wdm interface information. (See Table 3-15 for field descriptions.)

```
Switch# show interfaces wdm 0/0
Wdm0/0 is up, line protocol is up
```

```
Wdm Hw capability: N/A
Num of Wavelengths Add/Dropped: 5
List of Wavelengths: 0, 25, 26, 27, 28
 Hardware is wavelength_add_drop
```

Table 3-15 show interfaces wdm Field Descriptions

Field	Description
Wdm0/0 is up	Shows the interface state, either up or down.
line protocol is up	Shows the state of the line protocol, either up or down.
Patched Interface:	Shows how the OADM modules is optically patched.
Num of wavelengths Add/Dropped:	Shows the number of wavelengths added and dropped.
List of Wavelengths:	Shows list of wavelength channel numbers.
Hardware is wavelength_add_drop	Shows the hardware type.

The following example shows how to display wdm interface information. (See Table 3-16 for field descriptions.)

```
Switch# show interfaces voain 1/0/0 attenuation desired-power 0
Current Output Power:                                10.0dBm
  Desired Output Power:                              0.0dBm
  Minimum settable Attenuation:                      3.4dB
  Maximum settable Attenuation:                      30.0dB
  Current set Attenuation:                           3.4dB (default)
  Attenuation needed to achieve Desired Output Power:13.4dB
```

Table 3-16 show interfaces attenuation desired-power Field Descriptions

Field	Description
Current Output Power:	Shows the current power of the signal leaving the VOA module.
Desired Output Power:	Shows the desired power for the signal leaving the VOA module.
Minimum settable Attenuation:	Shows the minimum attenuation value that can be set.
Maximum settable Attenuation:	Shows the maximum attenuation value that can be set.
Current set Attenuation	Shows the current attenuation value.
Attenuation needed to achieve Desired Output Power:	Shows the attenuation value that must be set to achieve the desired power.

Related Commands

Command	Description
laser control forward enable	Configures forward laser control on transparent and wave interfaces.
laser control safety enable	Configures laser safety control on wave interfaces.
loopback	Configures loopback on transparent and wave interfaces.

Command	Description
optical attenuation automatic desired-power	Configures automatic attenuation on a voain interface.
optical attenuation manual	Manually sets the attenuation value for the input interfaces on VOA modules.
show controllers	Displays interface controller information.

show optical filter

To display information about the channels supported by the OADM modules, use the **show optical filter** command.

show optical filter [**detail**]

Syntax Description

detail	Shows optical patch connections between the OADM modules in addition to the channels supported. This information displays only if the patch connection has been configured with the **patch** command.

Defaults

Displays only the channels supported by the OADM modules.

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 verify the system configuration.

Examples

The following example shows how to display optical filter information. (See Table 3-17 for field descriptions.)

```
Switch# show optical filter
aggregate                          filtered
interface          channel(s)      interface
-----------------  -----------     ------------
Wdm0/0                  0          Oscfilter0/0
Wdm0/0                  1          Filter0/0/0
Wdm0/0                  2          Filter0/0/1
Wdm0/0                  3          Filter0/0/2
Wdm0/0                  4          Filter0/0/3
Wdm0/1                  0          Oscfilter0/1
Wdm0/1                  1          Filter0/1/0
```

```
Wdm0/1                  2           Filter0/1/1
Wdm0/1                  3           Filter0/1/2
Wdm0/1                  4           Filter0/1/3
```

Table 3-17 show optical filter Field Descriptions

Field	Description
aggregate interface	Shows the aggregate wdm interface.
channels	Shows the channels in the aggregate interface. In the output example, “remaining” indicates that whichever channels have not been dropped are passed to the thru interface.
filtered interface	Shows the filtered interface.
remaining	Indicates that the channels not supported on the OADM modules are passed thru to the next OADM module.
patched mux/demux interface	Shows the patch connection to another OADM module.

The following example shows how to display optical filter information on a shelf with OADM modules. (See Table 3-18 for field descriptions.)

```
Swtich# show optical filter detail
aggregate                          filtered             patched mux/demux
interface           channel(s)     interface            interface
-----------------   -----------    -----------------    -----------------
Wdm0/0                  0          Oscfilter0/0
Wdm0/0                  1          Filter0/0/0
Wdm0/0                  2          Filter0/0/1
Wdm0/0                  3          Filter0/0/2
Wdm0/0                  4          Filter0/0/3
Wdm0/0              remaining      Thru0/0
Wdm0/1                  0          Oscfilter0/1
Wdm0/1                  1          Filter0/1/0
Wdm0/1                  2          Filter0/1/1
Wdm0/1                  3          Filter0/1/2
Wdm0/1                  4          Filter0/1/3
Wdm0/1              remaining      Thru0/1
```

Table 3-18 show optical filter detail Field Descriptions

Field	Description
aggregate interface	Shows the aggregate wdm interface.
channels	Shows the channels in the aggregate interface. In the output example, “remaining” indicates that whichever channels have not been dropped are passed to the thru interface.
filtered interface	Shows the filtered interface.
remaining	Indicates that the channels not supported on the OADM modules are passed thru to the next OADM module.
patched mux/demux interface	Shows the patch connection to another OADM module.

Related Commands

Command	Description
patch	Configures patch connections for a shelf.
show connect	Displays optical connection information.
show patch	Displays optical patch connection configuration.

show patch

To display the patch connections, use the **show patch** command.

show patch [**detail**]

Syntax Description

detail	Displays both the user and automatic local path connections.

Defaults

Displays summary patch connection 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 the patch connections on the OADM modules configured with the **patch** command.

The error field in the **show patch** command output helps troubleshoot shelf misconfigurations. When there is a channel mismatch between a transponder line card and an OADM module, “Channel Mismatch” appears for the patch connection. When more than one OADM module drops the same channels, “Channel Mismatch” appears for all patch connections.

Examples

The following example shows how to display patch connection information. (See Table 3-19 for field descriptions.)

```
Switch# show patch
Patch Interface     Patch Interface     Type       Dir   Error
------------------  ------------------  ---------  ----  ----------------
Oscfilter0/1        Wave2/1             USER       Both
Oscfilter0/0        Wave2/0             USER       Both
Filter0/1/2         Wavepatch10/0/0     USER       Both
Filter0/0/1         Wavepatch8/0/0      USER       Both
Filter0/1/1         Wavepatch8/0/1      USER       Both
```

```
Filter0/1/3         Wavepatch4/0/0      USER       Both
Filter0/0/2         Wavepatch7/0/1      USER       Both
```

The following example shows how to display detailed patch connection information. (See Table 3-19 for field descriptions.)

```
Switch# show patch detail
Patch Interface     Patch Interface     Type       Dir   Error
------------------  ------------------  ---------  ----  ----------------
Oscfilter0/1        Wave2/1             USER       Both
Oscfilter0/0        Wave2/0             USER       Both
Filter0/0/2         Wavepatch7/0/1      USER       Both
Filter0/0/1         Wavepatch8/0/0      USER       Both
Filter0/1/2         Wavepatch10/0/0     USER       Both
Filter0/1/1         Wavepatch8/0/1      USER       Both
Filter0/1/3         Wavepatch4/0/0      USER       Both

Switch# show patch detail
Patch Interface      Patch Interface      Type         Error
-----------------    -----------------    ---------    ----------------
Filter0/0/0          Wavepatch7/0/0       AUTOMATIC    Channel Mismatch
```

Table 3-19 show patch detail Field Descriptions

Field	Description
Patch Interface	Shows an interface identifier for the patch connection.
Type	Shows how the patch was configured, either by the system or by the user.
Error	Shows patch errors, such as channel mismatches.

Related Commands

Command	Description
debug ports	Enables debugging of optical port activity.
patch	Configures patch connections within a shelf.

show performance

To display the performance history counters, use the **show performance** command.

show performance {**current | history | 24-hour**} [*interface*] [*interval number*]

Syntax Description

current	Displays the current counter.
history	Displays the 15-minute history counter.
24-hour	Displays the 24-hour counter.
interface	Displays the performance history counter for the specified interface.
interval number	Displays the performance history counter with the specified interval number (1 to 96).

Defaults

Displays all performance history counters (the current counter, all 15-minute history counters, and the 24-hour counter) for all Cisco ONS 15530 interfaces.

Command Modes

EXEC and privileged EXEC

Command History

This table includes the following release-specific history entries:

SV-Release	Modification
12.2(29)SV	This command was introduced.

Usage Guidelines

Use this command to view the performance history counters for the Cisco ONS 15530 interfaces.

Examples

The following example shows how to display the current counter for an esconphy interface. (See Table 3-20 for field descriptions.)

```
Switch# show performance current esconphy 9/0/0
Current 15 minute performance register
---------------------------------------
Interface       : EsconPhy9/0/0
Interval Number : 23

Elapsed Time(seconds) : 454
Valid Time(seconds)   : 454

Received Frames  : 121203104
Transmit Frames  : 121203101
CRC Error count  : 659
Code violation and running disparity error count : 9
Egress Packet Sequence error count  : 0
Egress Packet Indicated error count : 10
```

Table 3-20 show performance current Field Descriptions

Field	Description
Interface	Shows the interface for which the current counter is displayed.
Interval Number	Shows the current counter's interval number.
Elapsed Time	Shows the elapsed time for the current counter.
Valid Time	Shows the time period during which the current counter was in the no shutdown state. A current counter with zero valid time will not contain any valid data.
Received Frames	Shows the total number of ESCON frames that were received from the client device during the elapsed time of the current performance counter.
Transmit Frames	Shows the total number of ESCON frames that were transmitted to the client device during the elapsed time of the current performance counter.
CRC Error Count	Shows the total number of ESCON frames that were received with CRC errors during the elapsed time of the current performance counter.
Code violation and running disparity error count	Shows the total number of code violation and running disparity (CVRD) errors in the ESCON frames that were received from the client device during the elapsed time of the current performance counter.
Egress Packet Sequence error count	Shows the total number of missing or out-of-order packets that were received from the client device during the elapsed time of the current performance counter.
Egress Packet Indicated error count	Shows the total number of packets that were carrying an error indication during the elapsed time of the current performance counter.

The following example shows how to display the 15-minute history counter for a gigabitphy interface. (See Table 3-21 for field descriptions.)

```
Switch# show performance history gigabitphy 2/0/0 53
15 minute performance history register
---------------------------------------
Interface       : GigabitPhy2/0/0
Interval Number : 53

Total Time(seconds)   : 900
Valid Time(seconds)   : 900

Received Frames : 17328419
Received Bytes  : 25992628500
Transmit Frames : 17328419
Transmit Bytes  : 25992630000
RX CRC Errors   : 0
TX CRC Errors   : 0
Code violation and running disparity error count : 0
Giant Packets   : 0
Runt Packets    : 0
```

Table 3-21 show performance history Field Descriptions

Field	Description
Interface	Shows the interface for which the 15-minute history counter is displayed.
Interval Number	Shows the 15-minute history counter's interval number.
Total Time	Shows the duration of the 15-minute history counter in seconds.
Valid Time	Shows the time period during which the 15-minute history counter was in the no shutdown state. A 15-minute history counter with zero valid time will not contain any valid data.
Received Frames	Shows the total number of Gigabit Ethernet (GE) frames that were received from the client device during the 15 minute period.
Received Bytes	Shows the total number of GE bytes that were received from the client device during the 15 minute period.
Transmit Frames	Shows the total number of GE frames that were transmitted to the client device during the 15 minute period.
Transmit Bytes	Shows the total number of GE bytes that were transmitted to the client device during the 15 minute period.
Rx CRC Error Count	Shows the total number of GE frames that were received with CRC errors during the 15 minute period.
Tx CRC Error Count	Shows the total number of GE frames that were transmitted with CRC errors during the 15 minute period.
Code violation and running disparity error count	Shows the total number of CVRD errors in the GE frames that were received from the client device during the 15 minute period.
Gaint Packets	Shows the total number of GE packets that were received with size greater than 10232 bytes during the 15 minute period.
Runt Packets	Shows the total number of GE packets that were received with size less than 64 bytes during the 15 minute period.

The following example shows how to display the 24-hour counter for a portgroup interface. (See Table 3-22 for field descriptions.)

```
Switch# show performance 24-hour portgroup 4/0/0
24 hour performance register
----------------------------
Interface       : Portgroup4/0/0

Total Time(seconds)   : 86400
Valid Time(seconds)   : 86400

Transmit Frames   : 57373022290
Received Frames   : 57372085236
Oversized Frames  : 0
Undersized Frames : 21
Code violation and running disparity error count : 4294967295
Secondary fabric CVRD count : 0
```

```
CRC error count          : 0
CDL HEC error count      : 23
SII Mismatch error count : 24
```

Table 3-22 show performance 24-hour Field Descriptions

Field	Description
Interface	Shows the interface for which the 24-hour counter is displayed.
Total Time	Shows the duration of the 24-hour counter in seconds.
Valid Time	Shows the time period during which the 24-hour counter was in the no shutdown state. A 24-hour counter with zero valid time will not contain any valid data.
Transmit Frames	Shows the total number of GE frames that were transmitted to the client port during the 24 hour period.
Received Frames	Shows the total number of GE frames that were received from the client port during the 24 hour period.
Oversized Frames	Shows the total number of GE frames that were received with size greater than 10232 bytes during the 24 hour period.
Undersized Frames	Shows the total number of GE packets that were received with size less than 64 bytes during the 24 hour period.
Code violation and running disparity error count	Shows the total number of CVRD errors in the GE frames that were received from the fabric during the 24 hour period.
Secondary fabric CVRD count	Shows the total number of secondary CVRD errors in the GE frames that were received from the fabric during the 24 hour period.
CRC Error Count	Shows the total number of GE frames that were received with CRC errors during the 24 hour period.
CDL HEC error count	Shows the total number of GE frames that were received with CDL HEC errors during the 24 hour period.
SII Mismatch error count	Shows the total number of GE frames that were received with SII mismatch errors during the 24 hour period.

Related Commands

Command	Description
show interfaces	Displays interface information.
auto-sync counters interface	Enables the automatic synchronization of the performance history counters and the interface counters.
clear performance history	Clears the performance history counters.

show tsi

To display the TSI (Time Slot Interchange) information on the 8-port multi-service muxponders, use the **show tsi** command.

show tsi [*slot-number*]

Syntax Description

slot-number	Displays TSI information for a specific slot.

Defaults

Displays TSI information for all slots.

Command Modes

EXEC and privileged EXEC

Command History

This table includes the following release-specific history entries:

- SV-Release

SV-Release	Modification
12.2(25)SV	This command was introduced.

Usage Guidelines

The 8-port multi-service muxponder assigns variable bandwidth using correctly sized STS-*n* streams for each client protocol and then aggregates the STS-*n* streams to form a 2.5-Gbps ITS signal. The aggregated signal is demultiplexing in the receive direction. This is achieved using a time slot interchange (TSI) mapping scheme.

Each supported client protocol uses a fixed number of STS-1 streams. Table 3-23 shows the bandwidth allocation.

Table 3-23 Bandwidth Allocation for Supported Protocols

Protocol	Bandwidth (in STS-1 streams)
Gigabit Ethernet (optical and copper)	21
Fibre Channel	18
FICON	18
Fast Ethernet (optical and copper)	3
ESCON	4
SONET OC-3	4
SDH STM-1	4
DVB-ASI	5
SDI	6
T1	1

Table 3-23 Bandwidth Allocation for Supported Protocols (continued)

Protocol	Bandwidth (in STS-1 streams)
E1	1
ITS	5

The trunk signal rate is 2.5-Gbps, which translates to 48 STS-1 streams. The STS-1 stream allocation algorithm is a simple top-down search using the first available required number of STS-1 streams.

Based on the order in which client protocols are configured and removed across the various client ports, the resulting TSI mapping in the client-to-trunk transmit direction can vary. The TSI protocol sends the transmit TSI mapping to the remote muxponder where it is used to program the trunk receive TSI maps.

Note The port-to-port mapping on the 8-port multi-service muxponder is static. For example, port 0 on the local muxponder maps to port 0 on the remote muxponder, port 1 on the local muxponder maps to port 1 on the remote muxponder, and so on.

Examples

The following example shows how to display TSI information. (See Table 3-24 for field descriptions.)

```
Switch# show tsi 1
Port  Local   Peer    Error       Trunk STS Map
      Encap   Encap           Transmit         Receive

 Card: 1, TSI Ver: 1, DCC: SDCC1/0/0, TSI-Protocol: Enabled

  0.  CFE     CFE     -     00 00 00 00 00 07   00 00 00 00 00 07
  1.  CFE     CFE     -     00 00 00 00 00 38   00 00 00 00 00 38
  2.  CFE     CFE     -     00 00 00 00 01 C0   00 00 00 00 01 C0
  3.  None    None    -
  4.  None    None    -
  5.  None    None    -
  6.  None    None    -
  7.  None    None    -
Available STS= 39
------------------------------

 Card: 9, TSI Ver: 1, DCC: SDCC9/0/0, TSI-Protocol: Enabled

  0.  T1      T1      -     00 00 00 00 00 01   00 00 00 00 00 01
  1.  FC1     FC1     -     00 FF FE 00 00 0E   00 00 00 07 FF FE
  2.  T1      T1      -     00 00 00 00 00 01   00 00 00 00 00 01
  3.  CFE     CFE     -     07 00 00 00 00 00   00 00 00 38 00 00
  4.  E1      E1      -     00 00 00 00 00 01   00 00 00 00 00 01
  5.  CGE     CGE     -     00 00 01 FF FF F0   07 FF FF C0 00 00
  6.  T1      ESCON   M     00 00 00 00 00 01   78 00 00 00 00 00
  7.  None    None    -
Available STS= 47
------------------------------
```

The following concepts are shown by the muxponder in slot 9:

- Fibre Channel is configured on port 1 (multirate 9/0/1 interface) on the local and remote muxponders. The Trunk STS Transmit field shows that 18 STS-1 (F+F+F+E+E = 4+4+4+3+3) streams are used for this interface. The exact STS-1 streams used are 2 through 5 and 25 through 40.

The Trunk STS Receive field shows that the STS-1 streams 2 to 19 on the incoming STS-48 signal carry client data from the remote node for this port. A similar explanation can be extended to port 3 (multirate 9/0/3) and port 5 (multirate 9/0/5).

- As shown by ports 0, 2, and 4, all the ports with T1 and E1 encapsulation use the same STS-1 stream. In this example, the first STS-1 stream on both the local and remote muxponders is used.
- If the configured local protocol encapsulation differs from the configured protocol on the remote port, the Error field indicates this as M, which indicates protocol mismatch.

Table 3-24 show tsi Field Descriptions

Field	Description
Port	Shows the port number.
Local Encap	Shows the protocol encapsulation of the local port.
Remote Encap	Shows the protocol encapsulation of the remote port.
Error	Shows the error state. An M value indicates a protocol mismatch.
Trunk STS Map Transmit	Shows the hexadecimal bit map for the STS usage for the STS-48 signal transmitted to the trunk. For each port this field shows the STS-1 streams used to transmit the client data from the port to the trunk. This field is displayed in hexadecimal format. The 48 bits represent the 48 STS-1 streams. A value one (1) for a particular STS-1 stream indicates that it is currently used by the corresponding port.
Trunk STS Map Receive	Shows the hexadecimal bit map for the STS usage for the STS-48 signal received from the trunk. For each port this field shows the STS-1 streams used to transmit the client data from the trunk to the port. This field is displayed in hexadecimal format. The 48 bits represent the 48 STS-1 streams. A value one (1) for a particular STS-1 stream indicates that it is currently used by the corresponding port.
Card:	Shows the slot number in the shelf.
TSI Ver:	Shows the TSI version.
DCC:	Shows the DCC interface identifier.
Available STS=	Shows the number of STS-1 streams available.

Related Commands

Command	Description
tsi-protocol	Enables the TSI protocol on a wavesonetphy interface.

shutdown

To disable an interface, use the **shutdown** command. To restart a disabled interface, use the **no** form of this command.

shutdown

no shutdown

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled

Command Modes

Interface configuration

Usage Guidelines

This command disables all functions on the specified interface.

This command also marks the interface as unavailable. To check whether an interface is disabled, use the **show interfaces** command. An interface that has been shut down is shown as administratively down in the **show interfaces** output.

On transparent, esconphy, gigabitphy, twogigabitphy, and multirate interfaces, use the **shutdown** command to turn off the transmit lasers. To turn the transmit lasers on, use the **no shutdown** command.

On wave, waveethernetphy, or tengigethernetphy interfaces, a **shutdown** command issued does not affect administrative status of the corresponding wavepatch interfaces. To administratively shut down the wavepatch interfaces, issue **shutdown** commands directly. Also, the **shutdown** command does not shut down the laser on these interfaces or stop CDL message traffic. To shut down the laser, user the **laser shutdown** command.

On wavesonetphy interfaces, the **shutdown** command does not affect data or DCC traffic or the status of the wavepatch interfaces. To administratively shut down the wavepatch interfaces, issue **shutdown** commands directly. To shut down the laser, user the **laser shutdown** command.

To use splitter line cards for line card protection, you must shut down the standby wavepatch interfaces. (See the "Examples" section.)

Examples

The following example shows how to shut down a wave interface, which also turns off the laser that transmits to the trunk fiber.

```
Switch# configure terminal
Switch(config)# interface wave 3/0
Switch(config-if)# shutdown
```

The following example shows how to reenable a transparent interface and turn on the laser transmitting to the client equipment.

```
Switch# configure terminal
Switch(config)# interface transparent 8/0/0
Switch(config-if)# no shutdown
```

The following example shows how to disable the east (slot 1) side of the wavepatch interface pair on a splitter protected card or muxponder.

```
Switch# configure terminal
Switch(config)# interface wavepatch 3/0/1
Switch(config-if)# shutdown
```

Related Commands

Command	Description
laser shutdown	Shuts down the ITU laser.
show interfaces	Displays system interfaces.

tsi-protocol

To enable the TSI protocol on a wavesonetphy interface, use the **tsi-protocol** command. To disable this feature, use the **no** form of the command.

tsi-protocol

no tsi-protocol

Syntax Description

This command has no other arguments or keywords.

Defaults

Enabled

Command Modes

Interface configuration

Command History

This table includes the following release-specific history entries:

- SV-Release

SV-Release	Modification
12.2(25)SV	This command was introduced.

Usage Guidelines

Use the **show tsi** command to verify the status of the STS maps on both nodes.

If the TSI Protocol is disabled, then the user must ensure that the local trunk transmit STS maps match with the remote trunk receive STS map using the **show tsi** command.

Note The OSCP protocol must be in the 2way state for the STS maps to exchanged through the TSI protocol. Use the **show oscp interface** command to verify the OSCP state.

Note Traffic cannot flow through the 8-port multi-service muxponders until the STS maps are synchronized.

You can ensure that the maps are the same by provisioning the interfaces on each node in the same order.

Examples

The following example shows how to disable the TSI protocol on a wavesonetphy interface.

```
Switch# configure terminal
Switch(config)# interface wavesonetphy 4/0
Switch(config-if)# no tsi-protcol
```

Related Commands

Command	Description
show oscp interface	Display OSCP interface information.
show performance	Displays TSI protocol information.

tx-buffer size

To set the transmit buffer size for ESCON aggregation cards, 4-port 1-Gbps/2-Gbps FC aggregation cards, and 8-port Fibre Channel/Gigabit Ethernet aggregation cards, use the **tx-buffer size** command. To revert to the default value, use the **no** form of the command.

tx-buffer size *bytes*

no tx-buffer size

Syntax Description

bytes	Specifies the transmit buffer size. The range is 16 to 232 on esconphy interfaces and 256 to 13,824 on gigabitphy interfaces.

Defaults

16 bytes for esconphy interfaces on an ESCON aggregation card.

256 bytes for gigabitphy interfaces on an 8-port FC/GE aggregation card.

256 bytes for twogigabitphy interfaces on a 4-port 1-Gbps/2-Gbps FC aggregation card carrying 1-Gbps traffic.

512 bytes for twogigabitphy interfaces on a 4-port 1-Gbps/2-Gbps FC aggregation card carrying 2-Gbps traffic.

Command Modes

Interface configuration

Command History

Release	Modification
12.1(12c)EV	This command was introduced.
12.1(12c)EV1	This command is now configured on the esconphy interfaces on an ESCON aggregation card instead of the portgroup interface.
12.2(23)SV	Added support for twogigabitphy interfaces on a 4-port 1-Gbps/2-Gbps FC aggregation card.

Command History

This table includes the following release-specific history entries:

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

EV-Release	Modification
12.1(12c)EV	This command was introduced.
12.1(12c)EV1	This command is now configured on the esconphy interfaces on an ESCON aggregation card instead of the portgroup interface.
SV-Release	**Modification**
12.2(18)SV	This command was integrated in this release.
12.2(23)SV	Added support for twogigabitphy interfaces on a 4-port 1-Gbps/2-Gbps FC aggregation card.

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

Usage Guidelines

The ESCON aggregation card and 8-port FC/GE aggregation card add latency to the traffic transmission depending on the services configured on the transmitting node. Use the values listed in Table 3-25 to configure the transmission buffer on the esconphy interface on the ESCON aggregation card on the receiving node.

Table 3-25 ESCON Transmit Buffer Settings for ESCON Aggregation Cards

	Transmit Buffer Size (in Bytes) on the Receiving Node			
Traffic Mix on Transmitting Node	**No GE**	**1518-Byte GE Packets**	**4470-Byte GE Packets**	**10,230-Byte GE Packets**
ESCON only	16 (default)			
ESCON and FC/FICON/ISC on the same 10-Gbps ITU tunable or non tunable trunk card	16 (default)			
ESCON and GE only on the same 10-Gbps ITU tunable or non tunable trunk card		24	72	168

Note Changing the transmit buffer size on one esconphy interface changes it for all esconphy interfaces on the ESCON aggregation card.

Use the values listed inTable 3-26 and Table 3-27 to configure the transmission buffer on the twogigabitphy interfaces on the 4-port 1-Gbps/2-Gbps FC aggregation card on the receiving node.

Note FC and FICON traffic on interfaces with buffer credits enabled with the **flow control** command is not affected by latency.

Table 3-26 1-Gbps FC, FICON, and ISC Latency Values for 4-port 1-Gbps/2-Gbps FC Aggregation Cards

	Transmit Buffer Size (in Bytes) on the Receiving Node			
Traffic Mix on Transmitting Node	**No GE**	**1518-Byte GE Packets**	**4470-Byte GE Packets**	**10,232-Byte GE Packets**
One FC/FICON/ISC signal only on the 2.5-Gbps aggregated signal carried over a 2.5-Gbps ITU trunk card	256 (default)			
Two FC/FICON/ISC signals only on the 2.5-Gbps aggregated signal carried over a 2.5-Gbps ITU trunk card	256 (default)			

Table 3-26 1-Gbps FC, FICON, and ISC Latency Values for 4-port 1-Gbps/2-Gbps FC Aggregation Cards (continued)

One FC/FICON/ISC signal only on the 2.5-Gbps aggregated signal carried over a10-Gbps ITU tunable or non tunable trunk card	256 (default)			
Two FC/FICON/ISC signals only on the 2.5-Gbps aggregated signal carried over a 10-Gbps ITU tunable or non tunable trunk card	256 (default)			
One FC/FICON/ISC signal only on the 2.5-Gbps aggregated signal carried over a 10-Gbps ITU tunable or non tunable trunk card		384	640	1280
Two FC/FICON/ISC signals and GE on the same 2.5-Gbps aggregated signal carried over a 10-Gbps ITU tunable or non tunable trunk card		384	640	1280

Table 3-27 2-Gbps FC, FICON, and ISC Latency Values for 4-port 1-Gbps/2-Gbps FC Aggregation Cards

	Transmit Buffer Size (in Bytes) on the Receiving Node			
Traffic Mix on Transmitting Node	**No GE**	**1518-Byte GE Packets**	**4470-Byte GE Packets**	**10,232-Byte GE Packets**
One FC/FICON/ISC signal only on the 2.5-Gbps aggregated signal carried over a 2.5-Gbps ITU trunk card	512 (default)			
One FC/FICON/ISC signal only on the 2.5-Gbps aggregated signal carried over a 10-Gbps ITU tunable or non tunable trunk card	512 (default)			
One FC/FICON/ISC signal only on the 2.5-Gbps aggregated signal carried over a 10-Gbps ITU tunable or non tunable trunk card		768	1280	2560

Use the values listed inTable 3-28 to configure the transmission buffer on the gigabitphy interfaces on the 8-port FC/GE aggregation card on the receiving node.

Note The transmit buffer must be configured correctly for all gigabitphy interfaces encapsulated for FC, FICON, or ISC traffic regardless of the flow control mode configured on the interfaces.

Table 3-28 FC, FICON, and ISC Transmit Buffer Settings for Gigabitphy Interfaces

	Transmit Buffer Size (in Bytes) on the Receiving Node			
Traffic Mix on Transmitting Node	**No GE**	**1518-Byte GE Packets**	**4470-Byte GE Packets**	**10,232-Byte GE Packets**

Table 3-28 FC, FICON, and ISC Transmit Buffer Settings for Gigabitphy Interfaces (continued)

FC/FICON/ISC only on the port pair[1] carried over a 2.5-Gbps ITU trunk card	256 (default)			
FC/FICON/ISC only on the port pair carried over a 10-Gbps ITU trunk card	256 (default)			
FC/FICON/ISC only on the port pair mixed with GE on the same 10-Gbps ITU trunk card		384	640	1280
FC/FICON/ISC and GE on the same port pair carried over a 2.5-Gbps ITU trunk card		768	1792	3712
FC/FICON/ISC and GE on the same port pair carried over a 10-Gbps ITU trunk card		1280	3584	7296

1. A port pair on an 8-port FC/GE aggregation card consists of ports 0–1, 2–3, 4–5, or 6–7.

Caution Momentary disruption of data flow through the interface might occur when using the **tx-buffer size** command. On an ESCON aggregation card, all esconphy interfaces might experience momentary disruption of data flow.

Examples

The following example shows how to set the transmit buffer size for a gigabitphy interface on the receiving node.

```
Switch# configure terminal
Switch(config)# interface gigabitphy 2/0/0
Switch(config-if)# shutdown
Switch(config-if)# tx-buffer size 250
Switch(config-if)# no shutdown
```

Related Commands

Command	Description
show interfaces	Displays interface information.
flow control	Enables buffer credits for FC and FICON traffic on 8-port FC/GE aggregation cards.

sub-rate

To configure subrates for twogigabitphy interfaces that part of an oversubscribed portgroup or a superportgroup on a 4-port 1-Gbps/2-Gbps FC aggregation card, use the **sub-rate** command. To remove the subrate configuration, use the **no** form of the command.

sub-rate *rate* **{lock| }**

no sub-rate

Syntax Description

rate	Specifies the subrate for twogigabitphy interfaces that are part of an oversubscribed portgroup or a superportgroup. Subrate is specified in megabytes per second (MBps).
lock	Specify **lock** if you want to lock the client bandwidth. To unlock it, execute the **sub-rate** command without the **lock** attribute.

Defaults

The default subrate is 1 MBps.

Command Modes

Interface configuration

Command History

This table includes the following release-specific history entries:

- SV-Release

SV-Release	Modification
12.2(29)SV	This command was introduced.

Usage Guidelines

When you oversubscribe a portgroup, you need to configure subrates for every client interface. Subrate is specified in megabytes per second (MBps). For example, to permit full-rate 1-Gbps or 2-Gbps FC traffic over an oversubscribed portgroup, you must specify 106 MBps or 212 MBps as the subrate for that client interface. By default, for each client interface, subrate is set to 1 MBps.

Subrates can be configured only for those client interfaces that are already connected to an oversubscribed portgroup or superportgroup. Incorrect subrate configuration can lead to under utilization of the portgroup bandwidth.

Examples

The following example shows how to configure the subrate for a twogigabitphy interface that is part of an oversubscribed portgroup.

```
Switch# configure terminal
Switch(config)# interface twogigabitphy 4/0/0
Switch(config-if)# sub-rate 50
```

Related Commands

Command	Description
over-subscription	Enables oversubscription on the 4-port 1-Gbps/2-Gbps FC aggregation card's portgroup interface.
superportgroup	Associates twogigabitphy interfaces to the superportgroup.
show interfaces	Displays interface information.

superportgroup

To associate twogigabitphy interfaces encapsulated for FC or FICON traffic to a superportgroup, use the **superportgroup** command. To remove the superportgroup configuration, use the **no** form of the command.

superportgroup

no superportgroup

Syntax Description

This command has no other arguments or keywords.

Defaults

Disabled.

Command Modes

Interface configuration.

Command History

This table includes the following release-specific history entries:

SV-Release	Modification
12.2(29)SV	This command was introduced.

Usage Guidelines

To configure superportgroup, the following system requirements must be met:

- 4-port 1-Gbps/2-Gbps FC aggregation cards with Functional version 1.20 or later are installed at both ends.
- The Cisco IOS version is 12.2(29)SV or later.
- 10-Gbps trunk cards with Functional version 2.31 or later are installed.
- Superportgroup is configured at both ends.

Examples

The following example shows how to associate a superportgroup to a twogigabitphy interface:

```
Switch(config)# configure terminal
Switch(config-if)# interface twogigabitphy 3/0/0
Switch(config-if)# superportgroup
```

Related Commands

Command	Description
sub-rate	Configures subrates for twogigabitphy interfaces that are part of an oversubscribed portgroup or a superportgroup.
show interfaces	Displays interface information.
portgroup	Maps portgroups to a superportgroup on the 4-port 1-Gbps/2-Gbps FC aggregation card.