Configuring Ethernet Interfaces

This chapter provides information about configuring the Gigabit Ethernet interface modules.

For more information about the commands used in this chapter, see the Cisco IOS XE 3S Command References.

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Configuring Ethernet Interfaces

This section describes how to configure the Gigabit and Ten Gigabit Ethernet interface modules and includes information about verifying the configuration.

Limitations and Restrictions

- Conflicting VLAN ranges and the exact VLAN values on different EFPs for same interface is not supported. When the EFP of an interface has second-dot1q between the range from 1000 to 2000, then any no other service instance can have a second-dot1q within the same range.
- Interface module A900-IMA8Z in slot 0 with A900-RSP3C-200-S supports a maximum of 6 ports at 10GE speed and needs explicit enablement using the **hw-module subslot 0/0 A900-IMA8Z mode 6-port** command.
- VRF-Aware Software Infrastructure (VASI) interface commnads **interface vasileft** and interface vasiright are not supported starting Cisco IOS XE Release 3.15.
- Interface modules have slot restrictions, see ASR 900 Series Hardware Installation Guides
- MPLS MTU is *not* supported on releases prior to Cisco IOS XE Release 3.10.2 on the router. This is not applicable for Cisco IOS XE Everest 16.5.1.
- IP MTU and MPLS MTU are supported. But MPLS MTU support is restricted only to CPU originated traffic. For the forwarded traffic, it is the IP MTU that decides the behavior.
- On the RSP3 module, MTU value configured for a BDI interface should match with the MTU configuration for all the physical interfaces, which have a service instance associated with this BDI.

- If the packet size is more than the configured MTU value and exceeds 1Mbps, packets are dropped. Packets are fragmented when the packet size is more than the configured MTU value and when traffic is lesser than 1Mbps.
- To replace the configured interface module with a different interface module in a particular slot, run the **hw-module subslot *slot-num* default** command.
- Only A900-IMA8Z Interface Modules support LAN/WAN-PHY mode on the Cisco ASR 900 RSP3 Module.
- SNMP support is not available for WAN-PHY in Cisco IOS XE Release 3.18.1SP.
- IEEE 1588 and SyncE are not supported in the WAN-PHY mode on A900-IMA8Z Interface Modules.
- Giant counters are not supported.
- Mixed configurations of features are not supported on the same port. For example, one OC-3 port can have only CEM (CESoP or SAToP), ATM, IMA or DS3 configurations, but not a combination of these features on a single port.
- Ingress counters are not incremented for packets of the below packet format on the RSP3 module for the 10 Gigabit Ethernet interfaces, 100 Gigabit Ethernet interfaces, and 40 Gigabit Ethernet interfaces:

  MAC header---->Vlan header---->Length/Type

  When these packets are received on the RSP3 module, the packets are not dropped, but the counters are not incremented.
- If the IM is shutdown using **hw-module subslot shutdown** command, then the IM goes out-of-service. You should perform a Stateful Switchover (SSO) in the interim, as the IM needs to be re-inserted for successful reactivation.
- Following are some of the IMs that are not supported on certain slots when IPsec license is enabled:
  - The below IMs are not supported on the Slot 11 on the Cisco ASR 907 router:
    - SPA_TYPE_ETHER_IM_8x10GE
    - SPA_TYPE_ETHER_IM_2x40GE
  - The below IMs are not supported on the Slot 2 on the Cisco ASR 903 router for RSP3-200 and RSP3-400:
    - SPA_TYPE_ETHER_IM_8xGE_SFP_1x10GE
    - SPA_TYPE_ETHER_IM_8xGE_CU_1x10GE
    - SPA_TYPE_ETHER_IM_1x10GE
    - SPA_TYPE_ETHER_IM_8x10GE
    - SPA_TYPE_OCX_IM_OC3OC12
    - SPA_TYPE_ETHER_IM_8xGE_SFP
    - SPA_TYPE_ETHER_IM_8xGE_CU
- CTS signal goes down, when control signal frequency is configured more than 5000 ms and timeout setting is more than 20,000 ms (4x control_frequency), which is greater than the OIR time (~20s) for a

selected subordinate to complete an OIR cycle. This results in the primary being unaware that the subordinate is down and CTS of all subordinates are down too. To avoid this situation, ensure that the timeout is shorter than the OIR time of the subordinate. Set the control frequency to less than or equal to 5000 ms and the timeout setting to less than or equal to 20,000 ms before you perform OIR.

- You may ignore the following error that is seen during IM OIR or while the router goes down:

```
%IOSXE-2-PLATFORM: R1/0: kernel: Address caused MCE = 0x0, DEAR = <>
```

- Interfaces with CU SFP flap twice during router boot up or IM OIR.
- In routers with Cu optics, physical SFP OIR, the following I2C error occurs:

```
%IOMD_IMFPGA-3-I2C_WRITE: C0/1: iomd: IM slot 1: An I2C write has
failed for addr: 0x56 reg: 0x16 data: 0x0
```

As physical SFP OIR is an externally triggered event, it is not possible to prevent such errors. To avoid the error, we recommend to put the port in Shutdown state and do OIR.

Configuring an Interface

This section lists the required configuration steps to configure Gigabit and Ten Gigabit Ethernet interface modules.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	Do one of the following: • **interface gigabitethernet** *slot/subslot/port* • **interface tengigabitethernet** *slot/subslot/port* **Example:** `Router(config)# interface gigabitethernet 0/0/1` **Example:** **Example:** `Router(config)# interface tengigabitethernet 0/0/1`	Specifies the Gigabit Ethernet or Ten Gigabit Ethernet interface to configure and enters interface configuration mode, where: **Note** The slot number is always 0.
Step 3	**ip address** *ip-address mask* {**secondary**} | **dhcp** {**client-id** *interface-name*}{**hostname** *host-name*}] **Example:**	Sets a primary or secondary IP address for an interface that is using IPv4, where: • *ip-address* —The IP address for the interface.

	Command or Action	Purpose
	`Router(config-if)# ip address 192.168.1.1 255.255.255.255 dhcp hostname host1`	• *mask* —The mask for the associated IP subnet. • **secondary**—(Optional) Specifies that the configured address is a secondary IP address. If this keyword is omitted, the configured address is the primary IP address. • **dhcp**—Specifies that IP addresses will be assigned dynamically using DHCP. • **client-id** *interface-name*—Specifies the client identifier. The *interface-name* sets the client identifier to the hexadecimal MAC address of the named interface. • **hostname** *host-name*—Specifies the hostname for the DHCP purposes. The *host-name* is the name of the host to be placed in the DHCP option 12 field.
Step 4	**no negotiation auto** **Example:** `Router(config-if)# no negotiation auto`	(Optional) Disables automatic negotitation. **Note** Use the **speed** command only when the mode is set to no negotiation auto.
Step 5	**speed**{ **10** | **100** | **1000**} **Example:** `Router(config-if)# speed 1000`	(Optional) Specifies the speed for an interface to transmit at 10, 100, and 1000 Mbps (1 Gbps), where the default is 1000 Mbps.
Step 6	**mtu** *bytes* **Example:** `Router(config-if)# mtu 1500`	(As Required) Specifies the maximum packet size for an interface, where: • *bytes*—The maximum number of bytes for a packet. The default is 1500 bytes; the range is from 1500 to 9216.
Step 7	**standby** [*group-number*] **ip** [*ip-address* [**secondary**]] **Example:** `Router(config-if)# standby 250 ip 192.168.10.1`	Creates or enables the Hot Standby Router Protocol (HSRP) group using its number and virtual IP address, where: • (Optional) *group-number*—The group number on the interface for which HSRP is being enabled. The range is from 0 to 255; the default is 0. If there is only one HSRP group, you do not need to enter a group number.

	Command or Action	Purpose
		• (Optional on all but one interface if configuring HSRP) *ip-address*—The virtual IP address of the hot standby router interface. You must enter the virtual IP address for at least one of the interfaces; it can be learned on the other interfaces. • (Optional) **secondary**—Specifies that the IP address is a secondary hot standby router interface. If neither router is designated as a secondary or standby router and no priorities are set, the primary IP addresses are compared and the higher IP address is the active router, with the next highest as the standby router. **Note** This command is required only for configurations that use HSRP. **Note** This command enables HSRP but does not configure it further.
Step 8	**no shutdown** **Example:** `Router(config-if)# no shutdown`	Enables the interface.

Specifying the Interface Address on an Interface Module

To configure or monitor Ethernet interfaces, you need to specify the physical location of the interface module and interface in the CLI. The interface address format is slot/subslot/port, where:

- slot—The chassis slot number in the chassis where the interface module is installed.

Note The interface module slot number is always 0.

- subslot—The subslot where the interface module is installed. Interface module subslots are numbered from 0 to 5 for ASR 903 and from 0 to 15 for ASR 907, from bottom to top.
- port—The number of the individual interface port on an interface module.

The following example shows how to specify the first interface (0) on an interface module installed in the first interface module slot:

```
Router(config)# interface GigabitEthernet 0/0/0
 no ip address
 shutdown
 negotiation auto
 no cdp enable
```

Configuring Hot Standby Router Protocol

Hot Standby Router Protocol (HSRP) provides high network availability because it routes IP traffic from hosts without relying on the availability of any single router. You can deploy HSRP in a group of routers to select an active router and a standby router. (An *active* router is the router of choice for routing packets; a *standby* router is a router that takes over the routing duties when an active router fails, or when preset conditions are met).

HSRP is enabled on an interface by entering the **standby** [*group-number*] **ip** [*ip-address* [**secondary**]] command. The **standby** command is also used to configure various HSRP elements. This document does not discuss more complex HSRP configurations. For additional information on configuring HSRP, see to the HSRP section of the Cisco IP Configuration Guide publication that corresponds to your Cisco IOS XE software release. In the following HSRP configuration, standby group 2 on Gigabit Ethernet port 0/1/0 is configured at a priority of 110 and is also configured to have a preemptive delay should a switchover to this port occur:

```
Router(config)#interface GigabitEthernet 0/1/0
Router(config-if)#standby 2 ip 192.168.1.200
Router(config-if)#standby 2 priority 110
Router(config-if)#standby 2 preempt
```

The maximum number of different HSRP groups that can be created on one physical interface is 4. If additional groups are required, create 4 groups on the physical interface, and the remaining groups on the BDI or on another physical interface.

The maximum number of HSRP or VRRP groups allowed are:

- RSP1A —128 HSRP or VRRP groups. 128 HSRP or VRRP groups restriction implies that the maximum number of different interfaces that can be configured with VRRP or HSRP is 128. You cannot configure HSRP or VRRP for more than 128 interfaces but you can configure upto 256 HSRP or VRRP groups in those 128 interfaces.
- RSP1B —256 HSRP or VRRP groups
- RSP2A-64 and RSP2-128—128 HSRP or VRRP groups, prior to Cisco IOS Release XE 3.15S
- RSP2A-64 and RSP2-128 —256 HSRP or VRRP groups, starting Cisco IOS Release XE 3.15S
- RSP3-200 and RSP3-400—255 HSRP or VRRP groups, starting Cisco IOS Release XE 3.18.1SP

Note TCAM space utilization changes when HSRP groups are configured on the router. If HSRP groups are configured the TCAM space is utilized. Each HSRP group takes 1 TCAM entry. The “Out of TCAM” message may be displayed if total number of TCAM space used by HSRP groups and prefixes on the router exceeds scale limit.

Note HSRP state flaps with sub-second “Hello” or “Dead” timers.

Restrictions

HSRPv2 is not supported.

Verifying HSRP

To verify the HSRP information, use the show standby command in EXEC mode:

```
Router# show standby
Ethernet0 - Group 0
Local state is Active, priority 100, may preempt
Hellotime 3 holdtime 10
Next hello sent in 0:00:00
Hot standby IP address is 198.92.72.29 configured
Active router is local
Standby router is 198.92.72.21 expires in 0:00:07
Standby virtual mac address is 0000.0c07.ac00
Tracking interface states for 2 interfaces, 2 up:
UpSerial0
UpSerial1
```

Modifying the Interface MTU Size

Table 1: Feature History

Feature Name	Release	Description
Increase Maximum MTU Size	Cisco IOS XE Bengaluru 17.4.1	Maximum Transmission Unit (MTU) is increased to a maximum of 9644 bytes on the Cisco RSP3 module. You can configure the MTU bytes using the **mtu** *bytes* command.
Increase Maximum MTU Size	Cisco IOS XE Cupertino 17.8.1	Maximum Transmission Unit (MTU) is increased to a maximum of 9670 bytes on the Cisco RSP2 module. You can configure the MTU bytes using the **mtu** *bytes* command.

Note The maximum number of unique MTU values that can be configured on the physical interfaces on the chassis is 8. Use the **show platform hardware pp active interface mtu command** to check the number of values currently configured on the router. This is not applicable on Cisco ASR 900 RSP3 Module.

The Cisco IOS software supports three different types of configurable maximum transmission unit (MTU) options at different levels of the protocol stack:

- Interface MTU—The interface module checks the MTU value of incoming traffic. Different interface types support different interface MTU sizes and defaults. The interface MTU defines the maximum packet size allowable (in bytes) for an interface before drops occur. If the frame is smaller than the interface MTU size, but is not smaller than the minimum frame size for the interface type (such as 64 bytes for Ethernet), then the frame continues to process.
- IP MTU—Can be specified on an interface. If an IP packet exceeds the IP MTU size, then the packet is fragmented.

  When the value of the IP MTU is 9216 bytes and the packet is sent with 9214 bytes, 18 bytes are added to the packet by FPGA. The total size of the packet then becomes 9232 bytes. The maximum supported MTU of the packet without fragmentation in ASIC is 9232, so there is no traffic loss with a packet size

of 9214. When IP MTU is 9216, and the packet is sent with either 9215 or 9216 bytes, 18 bytes are added to the packet by FPGA. The total size of the packet then becomes 9233 or 9234 bytes respectively. As the packet size exceeds the maximum supported MTU size of the packet without fragmentation, the packet is dropped.

When the traffic with packet size greater than 9216 bytes is sent and the MTU is configured as 9216 bytes, the packet is fragmented. Hence, the packet loss is prevented.

Note The IP MTU configured on BDI should not be greater than the Layer2 MTU configured on the underlying Layer2 interface. For Cisco ASR 900 RSP3 Module the IP MTU configured on a BDI should be equal to the Layer2 MTU configured on the underlying Layer 2 interface.

- MPLS MTU—If the MPLS MTU is set to a value, for example, 1500 bytes, the value is programmed as 1504 bytes at the hardware level to allow the addition of one label. Consider the case of pseudowire. If the packet size of Layer 2 traffic sent with four bytes of Frame Check Sequence (FCS) to the pseudowire is 1500 bytes, then and four bytes of pseudowire control word and one pseudowire label (label size is four bytes) is added to the packet, the packet size is now 1508 bytes with FCS. However, note that while calculating the packet size, FCS is not considered. So the calculated packet size is 1504 bytes, which is equal to the MPLS MTU programmed in the hardware. This packet is forwarded as expected.

  However, if another label is added to this packet, the packet size becomes 1508 bytes without FCS. This value is greater than programmed MTU value, so this packet is dropped. This restriction applies not only to pseudowire, but to the entire MPLS network.

  To ensure that packets are not dropped, MPLS MTUs should be set considering the maximum size of the label stack that is added to the packet in the network.

Encapsulation methods and MPLS MTU labels add additional overhead to a packet. For example, Subnetwork Access Protocol (SNAP) encapsulation adds an 8-byte header, dot1q encapsulation adds a 2-byte header, and each MPLS label adds a 4-byte header (*n* labels x 4 bytes).

For the Gigabit Ethernet interface module on the chassis, the default MTU size is 1500 bytes. The interface module automatically adds an additional 22 bytes to the configured MTU size to accommodate some of the additional overhead.

Increase Maximum MTU Size on RSP3 module

Effective Cisco IOS XE Bengaluru 17.4.1, a maximum of 9644 MTU bytes are supported on the Cisco RSP3 module.

Prior to Cisco IOS XE Bengaluru 17.4.1, you can configure a maximum of 9216 bytes on the Cisco RSP3 module.

Increase Maximum MTU Size on RSP2 module

Effective Cisco IOS XE Cupertino 17.8.1, a maximum of 9644 MTU bytes are supported on the Cisco RSP2 module.

Prior to this release, you can configure a maximum of 9216 bytes on the Cisco RSP2 module.

Limitations

- In EtherLike-MIB, the **dot3StatsFrameTooLongs** frames count in SNMP increases when the frame packet size is more than the default MTU.
- If the packet size is more than the configured MTU value and exceeds 1Mbps, packets are dropped. Packets are fragmented when the packet size is more than the configured MTU value and when traffic is lesser than 1Mbps.
- Due to hardware limitation on the Cisco RSP2 module, ping is not supported with MTU size of greater than 9215 bytes.

Interface MTU Configuration Guidelines

When configuring the interface MTU size, consider the following guidelines:

- The default interface MTU size accommodates a 1500-byte packet, plus 22 additional bytes to cover the following additional overhead:
  - Layer 2 header—14 bytes
  - Dot1q header—4 bytes
  - CRC—4 bytes

Note If you are using MPLS, ensure that the **mpls mtu** command is configured for a value less than or equal to the interface MTU. This is not applicable for Cisco ASR 900 RSP3 Module.

- If you are using MPLS labels, then you should increase the default interface MTU size to accommodate the number of MPLS labels. Each MPLS label adds 4 bytes of overhead to a packet.
- Interface MTU is not supported on BDI Interface

Configuring Interface MTU

To modify the MTU size on an interface, use the following command in interface configuration mode:

Command	Purpose
mtu *bytes* `Router(config-if)# mtu bytes`	Configures the maximum packet size for an interface, where: • *bytes*— Specifies the maximum number of bytes for a packet. The default is 1500 bytes and the maximum configurable MTU is 9216 bytes.

To return to the default MTU size, use the **no** form of the command.

Note When IP FRR over BDI is configured, the maximum allowed packet size is 1504 bytes.

When the BGP-PIC core is enabled, a packet destined to a prefix that is learnt through eBGP, is dropped if the packet size is greater than 1504 bytes. To work around this limitation, do one of the following:

- Disable the BGP-PIC core,
- Use the static route, or
- Use routed-port instead of BDI.

Verifying the MTU Size

To verify the MTU size for an interface, use the **show interfaces gigabitethernet** privileged EXEC command and observe the value shown in the "MTU" field.

The following example shows an MTU size of 1500 bytes for interface port 0 (the second port) on the Gigabit Ethernet interface module installed in slot 1:

```
Router# show interfaces gigabitethernet 0/1/0
GigabitEthernet0/1/0 is up, line protocol is up
  Hardware is A900-IMA8T , address is d0c2.8216.0590 (bia d0c2.8216.0590)
  MTU 1500 bytes
, BW 1000000 Kbit/sec, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 22/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
```

MPLS MTU

MPLS MTU configuration is supported starting with Cisco IOS XE Release 3.10.2 and later. The **platform mpls mtu-enable** command is introduced to enable MPLS MTU on the router.

Restrictions

- MPLS MTU is not supported if IP address is not configured on the interface.
- MPLS MTU is not supported with MPLS LDP Auto configuration.
- MPLS MTU is not supported with BGP send-label.
- IP MTU configuration on an interface does not program MPLS MTU in the hardware. MPLS MTU value is obtained from the Interface MTU or IP MTU.
- In releases prior to Cisco IOS XE Release 3.10.2, if IP MTU is changed, MPLS MTU also changes.
- If both Interface MTU and IP MTU are configured MPLS MTU is obtained from IP MTU. See Table 2: MTU Normal Behavior (Command Not Enabled), on page 10.

Table 2: MTU Normal Behavior (Command Not Enabled)

Interface-MTU	IP MTU	MPLS MTU	MPLS MTU Value Derived
Yes	No	No	Interface MTU
No	Yes	No	IP MTU
Yes	Yes	No	IP MTU

- If MPLS MTU is enabled using **platform mpls mtu-enable** command, then IP MTU does not affect the MPLS MTU configuration. See Table 3: MTU Behavior with platform mpls mtu-enable Command Configured, on page 11.

Table 3: MTU Behavior with platform mpls mtu-enable Command Configured

Interface MTU	IP MTU	MPLS MTU	MPLS MTU Value Derived
Yes	No	No	Interface MTU
No	Yes	No	Default value
Yes	Yes	No	Interface MTU
No	No	No	Default value
Yes	No	Yes	MPLS MTU
No	Yes	Yes	MPLS MTU
Yes	Yes	Yes	MPLS MTU
No	No	Yes	MPLS MTU

Configuring MPLS MTU Globally

We recommend not to toggle the command as inconsistent results may be displayed.

Note After configuring or unconfiguring the command, we recommend that all MTU values on all the interfaces are re-configured.

Procedure

	Command or Action	Purpose
Step 1	**platform mpls mtu-enable** **Example:** `Router (config)# platform mpls mtu-enable`	Configures MPLS MTU globally on the router
Step 2	**interface gigabitethernet** *slot /subslot /port* **Example:** `Router (config)# interface GigabitEthernet 0/0/1` **Example:**	Specifies the Gigabit Ethernet or Ten Gigabit Ethernet interface to configure and enters interface configuration mode, where: **Note** The slot number is always 0.

	Command or Action	Purpose
Step 3	**mpls mtu** *mtu-value* **Example:** `Router(config-if)# mpls mtu 700` **Example:**	Configures the MTU value.

Verifying MPLS MTU

Use the **show platform hardware pp active featurempls mtu-table** command to display the MPLS MTU values configured on the router.

```
Router# show platform hardware pp active feature mpls mtu-table
MPLS MTU Table
Index     MTU   Ref-Count
-----------------------------
0      1504   1
1       704  0
2       0 0
3       0 0
4       0 0
5       0  0
6       0 0
7       0 0
```

Configuring the Encapsulation Type

The only encapsulation supported by the interface modules is IEEE 802.1Q encapsulation for virtual LANs (VLANs).

Note VLANs are only supported on Ethernet Virtual Connection (EVC) service instances and Trunk Ethernet Flow Point (EFP) interfaces.

For more information about how to configure these features, see the Configuring Ethernet Virtual Connections on the Cisco ASR 900 Series Router document.

Configuring Autonegotiation on an Interface

Gigabit Ethernet interfaces use a connection-setup algorithm called *autonegotiation.* Autonegotiation allows the local and remote devices to configure compatible settings for communication over the link. Using autonegotiation, each device advertises its transmission capabilities and then agrees upon the settings to be used for the link.

For the Gigabit Ethernet interfaces on the chassis, flow control is autonegotiated when autonegotiation is enabled. Autonegotiation is enabled by default.

The Copper SFP does not auto-negotiate full duplex with 8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8X1GE) with speed 100 configured.

When enabling autonegotiation, consider these guidelines:

- If autonegotiation is disabled on one end of a link, it must be disabled on the other end of the link. If one end of a link has autonegotiation disabled while the other end of the link does not, the link will not come up properly on both ends.
- Flow control is enabled by default.
- Flow control will be on if autonegotiation is disabled on both ends of the link.

Enabling Autonegotiation

To enable autonegotiation on a Gigabit Ethernet interface, use the following command in interface configuration mode:

Command	Purpose
negotiation auto `Router(config-if)# negotiation auto`	Enables autonegotiation on a Gigabit Ethernet interface. Advertisement of flow control occurs.

Disabling Autonegotiation

Autonegotiation is automatically enabled and can be disabled on Gigabit Ethernet interfaces . During autonegotiation, advertisement for flow control, speed, and duplex occurs, depending on the media (fiber or copper) in use.

Speed and duplex configurations can be advertised using autonegotiation. The values that are negotiated are:

- For Gigabit Ethernet interfaces using RJ-45 ports and for Copper (Cu) SFP ports—10, 100, and 1000 Mbps for speed and full-duplex mode. Link speed is not negotiated when using fiber interfaces.

To disable autonegotiation, use the following command in interface configuration mode:

Command	Purpose
no negotiation auto `Router(config-if)# no negotiation auto`	Disables autonegotiation on Gigabit Ethernet interfaces. No advertisement of flow control occurs.

Configuring Carrier Ethernet Features

For information about configuring an Ethernet interface as a layer 2 Ethernet virtual circuit (EVC) or Ethernet flow point (EFP), see the Ethernet Virtual Connections Configuration. .

Saving the Configuration

To save your running configuration to NVRAM, use the following command in privileged EXEC configuration mode:

Command	Purpose
copy running-config startup-config `Router# copy running-config startup-config`	Writes the new configuration to NVRAM.

For information about managing your system image and configuration files, refer to the Cisco IOS Configuration Fundamentals Configuration Guide and Cisco IOS Configuration Fundamentals Command Reference publications that correspond to your Cisco IOS software release.

Shutting Down and Restarting an Interface

You can shut down and restart any of the interface ports on an interface module independently of each other. Shutting down an interface stops traffic and enters the interface into an "administratively down" state.

If you are preparing for an OIR of an interface module, it is not necessary to independently shut down each of the interfaces prior to deactivation of the module.

Command	Purpose
shutdown `router#configure terminal` `Enter configuration commands, one per line. End with CNTL/Z.` `router(config)` `router(config)#interface GigabitEthernet 0/1/0` `router(config-if)#shutdown` **no shutdown** `router#configure terminal` `Enter configuration commands, one per line. End with CNTL/Z.` `router(config)` `router(config)#interface GigabitEthernet 0/1/0` `router(config-if)#no shutdown`	Restarts, stops, or starts an interface.

Shutting Down and Restarting an Interface Module

You can use the following commands in EXEC mode to automatically stop traffic on the affected interfaces and deactivate them along with the interface module in preparation for OIR:

Command	Purpose
hw-module subslot *slot/subslot* {**reload** [**force**] | **start** | **stop** [**force**]}	Restarts, stops, or starts a subslot and its interfaces. You can also use this command to disable or enable onboard logging of the hardware.

Verifying the Interface Configuration

Besides using the **show running-configuration** command to display the configuration settings, you can use the **show interfaces gigabitethernet** command to get detailed information on a per-port basis for your Gigabit Ethernet interface module.

Verifying Per-Port Interface Status

To find detailed interface information on a per-port basis for the Gigabit Ethernet interface module, use the **show interfaces gigabitethernet** command.

The following example provides sample output for interface port 0 on the interface module located in slot 1:

```
Router# show interfaces GigabitEthernet0/1/0
GigabitEthernet0/1/0 is up, line protocol is up
  Hardware is A900-IMA8T , address is d0c2.8216.0590 (bia d0c2.8216.0590)
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1000Mbps, link type is auto, media type is RJ45
  output flow-control is off, input flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 08:59:45, output hang never
  Last clearing of show interface counters 09:00:18
  Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     11 packets input, 704 bytes, 0 no buffer
     Received 11 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

Verifying Interface Module Status

You can use various **show** commands to view information specific to SFP, XFP, CWDM, and DWDM optical transceiver modules.

Note The **show interface transceiver** command is *not* supported on the router.

To check or verify the status of an SFP Module or XFP Module, use the following **show** commands:

Use **show hw-module** *slot/subslot* **transceiver** *port* **status** or **show interfaces** *interface* **transceiver detail** to view the threshold values for temperature, voltage and so on.

For example, **show hw-module subslot 0/5 transceiver 1 status** or **show interfaces tenGigabitEthernet 0/5/1 transceiver detail** .

Command	Purpose
show hw-module *slot/subslot* **transceiver** *port* **idprom**	Displays information for the transceiver identification programmable read only memory (idprom). **Note** Transceiver types must match for a connection between two interfaces to become active.
show hw-module *slot/subslot* **transceiver** *port* **idprom status**	Displays information for the transceiver initialization status. **Note** The transmit and receive optical power displayed by this command is useful for troubleshooting Digital Optical Monitoring (DOM). For interfaces to become active, optical power must be within required thresholds.
show hw-module *slot/subslot* **transceiver** *port* **idprom dump**	Displays a dump of all EEPROM content stored in the transceiver.

The following **show hw-module subslot** command sample output is for 1000BASE BX10-U:

```
Router#show hw-module subslot 0/2 transceiver 0 idprom brief

IDPROM for transceiver GigabitEthernet0/2/0:
  Description                               = SFP or SFP+ optics (type 3)
  Transceiver Type:                         = 1000BASE BX10-U (259)
  Product Identifier (PID)                  = GLC-BX-U
  Vendor Revision                           = 1.0
  Serial Number (SN)                        = NPH20441771
  Vendor Name                               = CISCO-NEO
  Vendor OUI (IEEE company ID)              = 00.15.06 (5382)
  CLEI code                                 = IPUIAG5RAC
  Cisco part number                         = 10-2094-03
 Device State                              = Enabled.
  Date code (yy/mm/dd)                      = 16/11/12
  Connector type                            = LC.
  Encoding                                  = 8B10B (1)
  Nominal bitrate                           = GE (1300 Mbits/s)
  Minimum bit rate as % of nominal bit rate = not specified
  Maximum bit rate as % of nominal bit rate = not specified
Router#
```

The following **show hw-module subslot** command sample output is for an SFP+ 10GBASE-SR:

```
Router#show hw-module subslot 0/2 transceiver 8 idprom brief

IDPROM for transceiver TenGigabitEthernet0/2/8:
  Description                               = SFP or SFP+ optics (type 3)
  Transceiver Type:                         = SFP+ 10GBASE-SR (273)
  Product Identifier (PID)                  = SFP-10G-SR
  Vendor Revision                           = 2
  Serial Number (SN)                        = JUR2052G19W
  Vendor Name                               = CISCO-LUMENTUM
  Vendor OUI (IEEE company ID)              = 00.01.9C (412)
```

```
  CLEI code                                  = COUIA8NCAA
  Cisco part number                          = 10-2415-03
  Device State                               = Enabled.
  Date code (yy/mm/dd)                       = 16/12/21
  Connector type                             = LC.
  Encoding                                   = 64B/66B (6)
  Nominal bitrate                            =  (10300 Mbits/s)
  Minimum bit rate as % of nominal bit rate = not specified
  Maximum bit rate as % of nominal bit rate = not specified
Router#
```

Note VID for optics displayed in **show inventory** command and vendor revision shown in **idprom detail** command output are stored in diffrent places in Idprom.

Configuring LAN/WAN-PHY Controllers

The LAN/WAN-PHY controllers are configured in the physical layer control element of the Cisco IOS XE software.

Restrictions for LAN/WAN-PHY Mode

- Effective with Cisco IOS XE Release 3.18.1SP, A900-IMA8Z Interface Modules (IM) support LAN/WAN-PHY mode on the Cisco ASR 900 RSP3 Module.
- The following A900-IMA8Z IM alarms are not supported on the Cisco ASR 900 RSP3 Module:
  - NEWPTR
  - PSE
  - NSE
  - FELCDP
  - FEAISP

Configuring LAN-PHY Mode

This section describes how to configure LAN-PHY mode on the Gigabit Ethernet interface modules.

Procedure

	Command or Action	Purpose
Step 1	**show controllers wanphy** *slot/subslot/port* **Example:** `Router# show controllers wanphy 0/1/0` `TenGigabitEthernet0/1/0`	Displays the configuration mode of the LAN/WAN-PHY controller. Default configuration mode is LAN. If the configuration mode is WAN, complete the rest of the procedure to change the configuration mode to LAN.

	Command or Action	Purpose
	Mode of Operation: WAN Mode SECTION LOF = 0 LOS = 0 BIP(B1) = 0 LINE AIS = 0 RDI = 0 FEBE = 0 BIP(B2) = 0 PATH AIS = 0 RDI = 0 FEBE = 0 BIP(B3) = 0 LOP = 0 NEWPTR = 0 PSE = 0 NSE = 0 WIS ALARMS SER = 0 FELCDP = 0 FEAISP = 0 WLOS = 0 PLCD = 0 LFEBIP = 0 PBEC = 0 Active Alarms[All defects]: SWLOF LAIS PAIS SER Active Alarms[Highest Alarms]: SWLOF Alarm reporting enabled for: SF SWLOF B1-TCA B2-TCA PLOP WLOS Rx(K1/K2): 00/00 Tx(K1/K2): 00/00 S1S0 = 00, C2 = 0x1A PATH TRACE BUFFER: UNSTABLE Remote J1 Byte : BER thresholds: SD = 10e-6 SF = 10e-3 TCA thresholds: B1 = 10e-6 B2 = 10e-6 B3 = 10e-6	• *slot* /*subslot* /*port*—The location of the interface.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	Do one of the following: • **hw-module subslot** *slot/subslot* **enable LAN** • **hw-module subslot** *slot/subslot* **interface** *port* **enable LAN** **Example:** `Router(config)# hw-module subslot 0/1 enable LAN` **Example:** `Router(config)# hw-module subslot 0/1 interface 1 enable LAN`	Configures LAN-PHY mode for the Ethernet interface module. • *slot* /*subslot* /*port*—The location of the interface. **hw-module subslot** *slot/subslot* **enable LAN** command is only applicable for A900-IMA1X on the ASR 903 RSP1 and RSP2 Modules. Use the **hw-module subslot** *slot/subslot* **interface** *port enable LAN* command to configure the LAN-PHY mode for the Ethernet interface module on the ASR 903 RSP3 Module.
Step 4	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode and enters privileged EXEC mode.

	Command or Action	Purpose
Step 5	**show controllers wanphy** *slot/subslot/port* **Example:** `Router# show controllers wanphy 0/1/2` `TenGigabitEthernet0/1/2` **`Mode of Operation: LAN Mode`**	Displays configuration mode for the LAN/WAN-PHY controller. The example shows the mode of operation as LAN mode for the Cisco 8-Port 10 Gigabit Ethernet LAN/WAN-PHY Controller.

Configuring WAN-PHY Mode

This section describes how to configure WAN-PHY mode on the Gigabit Ethernet interface modules.

Procedure

	Command or Action	Purpose
Step 1	**show controllers wanphy** *slot/subslot/port* **Example:** `Router# show controllers wanphy 0/1/0` `TenGigabitEthernet0/1/0` **`Mode of Operation: LAN Mode`**	Displays the configuration mode of the WAN-PHY controller. Default configuration mode is LAN. • *slot /subslot /port*—The location of the interface.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	Do one of the following: • **hw-module subslot** *slot/subslot* **enable WAN** • **hw-module subslot** *slot/subslot***interface** *port enable WAN* **Example:** `Router(config)# hw-module subslot 0/1 enable WAN` **Example:** `Router(config)# hw-module subslot 0/1 interface 1 enable WAN`	Configures WAN-PHY mode for the Ethernet interface module. • *slot /subslot /port* —The location of the interface. **hw-module subslot** *slot/subslot* **enable WAN** command is only applicable for A900-IMA1X on the ASR 903 RSP1 and RSP2 Modules. Use the **hw-module subslot** *slot/subslot* **interface** *port enable WAN* command to configure the WAN-PHY mode for the Ethernet interface module on the ASR 903 RSP3 Module.
Step 4	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode and enters privileged EXEC mode.

	Command or Action	Purpose
Step 5	**show controllers wanphy** *slot/subslot/port* **Example:** `Router# show controllers wanphy 0/1/5` `TenGigabitEthernet0/1/5` **`Mode of Operation: WAN Mode`** `SECTION` `  LOF = 0  LOS  = 0` `  BIP(B1) = 0` `LINE` `  AIS = 0  RDI  = 0` `  FEBE = 0  BIP(B2) = 0` `PATH` `  AIS = 0  RDI  = 0` `  FEBE = 0  BIP(B3) = 0` `  LOP = 0  NEWPTR = 0` `  PSE = 0  NSE  = 0` `WIS ALARMS` `  SER  = 0  FELCDP = 0` `  FEAISP = 0` `  WLOS  = 0  PLCD  = 0` `  LFEBIP = 0  PBEC  = 0` `Active Alarms[All defects]: SWLOF LAIS PAIS SER` `Active Alarms[Highest Alarms]: SWLOF` `Alarm reporting enabled for: SF SWLOF B1-TCA B2-TCA PLOP WLOS` `  Rx(K1/K2): 00/00  Tx(K1/K2): 00/00` `  S1S0 = 00, C2 = 0x1A` `PATH TRACE BUFFER: UNSTABLE` `Remote J1 Byte :` `BER thresholds:  SD = 10e-6  SF = 10e-3` `TCA thresholds:  B1 = 10e-6  B2 = 10e-6` `  B3 = 10e-6`	Displays configuration mode for the LAN/WAN-PHY controller. The example shows the mode of operation as WAN mode for the Cisco 8-Port 10 Gigabit Ethernet LAN/WAN-PHY Controller.

Configuring the Flag for Path Trace

The 1-Port 10GE LAN/WAN-PHY Shared Port Adapter can operate in either the WAN mode or the LAN mode. To check end-to-end connectivity, J1 flag byte values can be configured on the local SPA. The configured J1 byte values are displayed at the remote end in the **show controllers wanphy** *interface-path-id* command output.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters the global configuration mode.

	Command or Action	Purpose
Step 2	**controller wanphy** *interface-path-id* **Example:** `Router(config)# controller wanphy 2/1/0`	Enters the controller mode of the WAN-PHY SPA. In this example, it enters slot 1 of SIP 2.
Step 3	**wanphy flag j1 transmit** *string* **Example:** `Router(config-controller)# wanphy flag j1 transmit passing_string_from_localend`	Passes the string of J1 bytes specified to the remote end of WAN-PHY SPA. In this example, the string value passing_string_from_localend is transmitted to the remotely connected WAN-PHY SPA.
Step 4	**exit** **Example:** `Router(config-controller)# exit`	Exits Controller-configuration (config) mode and enters global configuration mode.
Step 5	**exit** **Example:** `Router(config)# exit`	Exits global-configuration (config) mode and enters privilege-exec mode.
Step 6	**show controller wanphy** <*interface-path-id*> **Example:** `Example:` `Router# show controller wanphy 2/2/0` `TenGigabitEthernet0/2/0` `Mode of Operation: WAN Mode` `SECTION` `  LOF = 0  LOS  = 0 BIP(B1) = 0` `LINE` `  AIS = 0  RDI  = 0` `  FEBE = 0  BIP(B2) = 0` `PATH` `  AIS = 0  RDI  = 0` `  FEBE = 0  BIP(B3) = 0` `  LOP = 0  NEWPTR = 0` `  PSE = 0  NSE  = 0` `WIS ALARMS` `  SER  = 0  FELCDP = 0` `  FEAISP = 0` `  WLOS  = 0  PLCD  = 0` `  LFEBIP = 0  PBEC  = 0` `Active Alarms[All defects]: None` `Active Alarms[Highest Alarms]: None` `Alarm reporting enabled for: SF SWLOF B1-TCA B2-TCA PLOP WLOS` `  Rx(K1/K2): 00/00  Tx(K1/K2): 00/00` `  S1S0 = 00, C2 = 0x1A` `PATH TRACE BUFFER: STABLE` `  Remote J1 Byte : passing_string_from_localend` `BER thresholds:  SD = 10e-6  SF = 10e-3` `TCA thresholds:  B1 = 10e-6  B2 = 10e-6` `  B3 = 10e-6`	This command must be executed on the remotely connected SPA. The command output displays the string of J1 byte values transmitted from the other end of the WAN-PHY SPA to check the path. In this example, the last line Remote J1 Byte, of the **show controller wanphy** *2/2/0* command output indicates that the string value passing_string_from_localend has been sent from the other end of the WAN-PHY SPA.

Configuring WAN-PHY Error Thresholds

This section describes how to configure WAN-PHY Signal Failure (SF) and Signal Degrade (SD) Bit Error Rate (BER) reporting and thresholds.

An SF alarm is triggered if the line bit error (B2) rate exceeds a user-provisioned threshold range (over the range of 10e-3 to 10e-9).

An SD alarm is declared if the line bit error (B2) rate exceeds a user-provisioned threshold range (over the range of 10e-3 to 10e-9). If the B2 errors cross the SD threshold, a warning about link quality degradation is triggered. The WAN-PHY alarms are useful for some users who are upgrading their Layer 2 core network from a SONET ring to a 10-Gigabit Ethernet ring.

Before you begin

The controller must be in the WAN-PHY mode before configuring the SF and SD BER reporting and thresholds.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**controller wanphy** *slot/subslot/port* **Example:** `Router(config)# controller wanphy 0/3/0`	Enters WAN physical controller configuration mode in which you can configure a 10-Gigabit Ethernet WAN-PHY controller. *slot* /*subslot* /*port* —The location of the interface.
Step 3	**wanphy** {**delay** | **flag** | **report-alarm** | **threshold** {**b1-tca** | **b2-tca** | **sd-ber** | **sf-ber** [*bit error rate*]}} **Example:** `Router(config-controller)# wanphy threshold b1-tca 6`	Configures WAN-PHY controller processing. • delay—Delays WAN-PHY alarm triggers. • flag—Specifies byte values. • report-alarm—Configures WAN-PHY alarm reporting. • threshold—Sets BER threshold values. • b1-tca—Sets B1 alarm BER threshold. • b2-tca—Sets B2 alarm BER threshold. • sd-ber—Sets Signal Degrade BER threshold. • sf-ber—Sets Signal Fail BER threshold. • bit error rate— Specifies bit error rate.
Step 4	**end** **Example:**	Exits controller configuration mode and enters privileged EXEC mode.

	Command or Action	Purpose
	`Router(config-controller)# end`	

Configuration Examples

Example: Basic Interface Configuration

The following example shows how to enter the global configuration mode to configure an interface, configure an IP address for the interface, and save the configuration:

```
! Enter global configuration mode.

!

Router# configure terminal

! Enter configuration commands, one per line. End with CNTL/Z.

!

! Specify the interface address.

!

Router(config)# interface gigabitethernet 0/0/1

!

! Configure an IP address.

!

Router(config-if)# ip address 192.168.50.1 255.255.255.0

!

! Start the interface.

!

Router(config-if)# no shut

!
```

```
! Save the configuration to NVRAM.

!

Router(config-if)# exit

Router# copy running-config startup-config
```

Example: MTU Configuration

Note The maximum number of unique MTU values that can be configured on the physical interfaces on the chassis is eight. Use the **show platform hardware pp active interface mtu command** to check the number of values currently configured on the router.

The following example shows how to set the MTU interface to 9216 bytes.

Note The interface module automatically adds an additional 38 bytes to the configured MTU interface size.

```
! Enter global configuration mode.

!

Router# configure terminal

! Enter configuration commands, one per line. End with CNTL/Z.

!

! Specify the interface address

!

Router(config)# interface gigabitethernet 0/0/1

!

! Configure the interface MTU.

!

Router(config-if)# mtu 9216
```

Example: VLAN Encapsulation

The following example shows how to configure interface module port 2 (the third port) and configure the first interface on the VLAN with the ID number 268 using IEEE 802.1Q encapsulation:

```
! Enter global configuration mode.
!
Router# configure terminal
! Enter configuration commands, one per line. End with CNTL/Z.
!
! Enter configuration commands, one per line. End with CNTL/Z.
!
Router(config)# service instance 10 ethernet
!
! Configure dot1q encapsulation and specify the VLAN ID.
Router(config-subif)# encapsulation dot1q 268
!
```

Note VLANs are supported only on EVC service instances and Trunk EFP interfaces.