Gigabit Ethernet Interface Processor (GEIP)

Feature Summary

The Gigabit Ethernet Interface Processor (GEIP) is a single-port fixed configuration interface processor that, when combined with the appropriate optical fiber cable, provides one 1000-Mbps Gigabit Ethernet interface that complies with IEEE 802.3z specifications. The Gigabit Ethernet interface operates in full-duplex mode at 1000 Mbps for transmit (TX) and receive (RX) directions.

The GEIP is available on all Cisco 7500 series routers and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The maximum Ethernet frame size is 1518 bytes but GEIP supports MTU size up to 4470 bytes in full-duplex mode for point-to-point links. The **mtu** interface command (maximum transmission unit) is supported to allow you to specify an MTU size up to 4470 bytes.

Benefits

The GEIP supports the following benefits:

- Applicable IEEE 802.3z standards; full-duplex operation only
- IEEE 802.3x flow control
- Supports Cisco HSRP protocol for router “hot standby”
- Supports IEEE 802.1Q VLAN standard
- Supports distributed switching for multicast and ISL packets
- Layer 3 distributed services, including RSP packet forwarding, distributed optimum switching, fast switching, distributed flow switching, and distributed committed access rate (DCAR)
- Maximum transmission unit (MTU) of 4,470 bytes
- Ethernet Inter-Switch Link (ISL) encapsulation
- Online insertion and removal of the GEIP and the Gigabit interface converter (GBIC)

Document Conventions

Command descriptions use these conventions:

- **Boldface** indicates commands and keywords that are entered literally as shown.
- *Italics* indicate arguments for which you supply values; in contexts that do not allow italics, arguments are enclosed in angle brackets (>).
- Square brackets ([ ]) indicate optional elements.
- Braces ({ }) group required choices, and vertical bars (|) separate alternative elements.
- Braces and vertical bars within square brackets ([{ | }]) indicate a required choice within an optional element.

Platforms

The GEIP feature is supported on these platforms:

- Cisco 7000 series routers with RSP7000 and RSP7000CI
- Cisco 7500 series routers

Configuration Task

Configure Gigabit Ethernet Interface

To configure the Gigabit Ethernet interface, perform the following steps.

Task		Command
Step 1	Enter configuration mode.	**configure terminal**
Step 2	Specify the first interface to configure.	**interface gigabitethernet** *slot/port-adapter/port*
Step 3	If IP routing is enabled on the system, you can assign an IP address and subnet mask to the interface.	**ip address 1.1.1.10 255.255.255.252**
Step 4	Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics for your configuration requirements.	
Step 5	Change the shutdown state to up and enable the interface.	**no shutdown**
Step 6	When you have included all the configuration subcommands to complete the configuration, press Ctrl-Z to exit configuration mode	**Ctrl-Z**
Step 7	Write the new configuration to start up the configuration.	**copy running-config startup-config**

After configuring the new Gigabit Ethernet interface, use **show** commands to display the status of the new interface, or to verify changes you have made.

Note Full-duplex operation is the default for the GEIP. Half-duplex operation is not supported.

For more information on the GEIP interface, refer to the publication, *Gigabit Ethernet Interface Processor (GEIP) Installation and Configuration*. For information on other commands that you can use on the GEIP interface, refer to the Cisco IOS Release 11.1 configuration guides.

Configuration Examples

The following sections provide Gigabit Ethernet interface configuration examples, including subcommands required to enable routing protocols and set the interface characteristics for your configuration requirements.

- Gigabit Ethernet interface example
- Automatic network connection example
- Setting the maximum transmission unit (MTU) example

Configuring the Gigabit Ethernet Interface

This example shows how to configure the Gigabit Ethernet interface. The following commands are configured on slot 5, port 0.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)# interface gigabitethernet 5/0/0
Router(config-if)
Router(config-if)# ip address 1.1.1.10 255.255.255.252
Router(config-if)# end
```

Automatic Network Connection

This example shows how to set up an automatic network connection between the Gigabit Ethernet interface and its remote partner. The following commands are configured on slot 5, port 0.

```
Router#configure terminal
Router#interface gigabitethernet 5/0/0
Router#negotiation auto
Router(config-if)#end
```

Use the **show interface gigabitethernet** command to view automatic negotiation statistics

```
Router#show interface gigabitethernet 5/0/0
GigabitEthernet5/0/0 is up, line protocol is up
  Hardware is cyBus GigabitEthernet Interface, address is 0010.145a.00a0 (bia 0)
  Internet address is 64.0.0.5/8
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliablility 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex mode, link type is autonegotiation, media type is SX
```

Setting the Maximum Transmission Unit (MTU)

This example shows how to set the maximum transmission unit (MTU) to 4470 bytes (size of the next packet sent). The following commands are configured on slot 5, port 0.

```
Router#configure terminal
Router(config)#interface gigabitethernet 5/0/0
Router(config-if)#mtu 1501
Router(config-if)#end
```

Use the **show interface gigabitethernet** command to view MTU statistics.

```
Router#show interface gigabitethernet 5/0/0

GigabitEthernet5/0/0 is up, line protocol is up
  Hardware is cyBus GigabitEthernet Interface, address is 0010.145a.00a0 (bia 0)
  Internet address is 64.0.0.5/8
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.1 command references.

- **mtu**
- **negotiation auto**
- **show interface gigabitethernet**

mtu

To adjust the maximum transmission unit (MTU) size, use the **mtu** interface configuration command. Use the **no** form of this command to restore the MTU value to its original default value of 1500.

mtu ***bytes***

no mtu

Syntax Description

bytes	Specifies the size in bytes. The range is 1500 to 4470. The byte size specified becomes the new maximum packet sent size and received by the interface. Configure both ends with the same MTU value. If they are different, the end configured with the smaller value will discard the larger packet.

Default

The default value is 1500, the standard Ethernet maximum packet size.

Command Mode

Interface configuration

Usage Guidelines

This command was updated in Cisco IOS Release 11.1 CC to increase the maximum byte size to support the GEIP.

Note The **mtu** command will cause all interfaces on the router to be reset.

Example

The following example shows how to configure the MTU for the Gigabit Ethernet interface port slot 5:

```
Router# configure terminal
Router(config)# interface gigabit ethernet 5/0/0
Router(config-if)# mtu 1500
```

negotiation auto

The automatic negotiation mode is enabled by default. Some early Gigabit Ethernet products that predate the IEEE 802.3z standard might not support the automatic negotiation process or have problems establishing a connection. In these cases, the link is established by disabling the auto negotiation mode. GEIP allows the automatic negotiation process to be re-enabled by the **negotiation auto** command or bypassed by issuing the **no negotiation auto** command.

negotiation auto
no negotiation auto

Syntax Description

This command has no arguments or keywords.

Default

negotiation auto

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC.

The **negotiation auto** command is applicable only to the Gigabit Ethernet interface (GEIP). This command configures the GEIP to follow the IEEE 802.3z (1000 Mbps) standard of negotiating with its remote partner to establish a network connection. This is the default mode of operation after the Gigabit Ethernet interface is recognized.

To disable auto negotiation, use the **no negotiation auto** command. This forces the interface to enter a state called force-link-up. Use the **show interface** command to display the current state.

Note Flow control is disabled in this state.

Example

The following example shows how to enable negotiation of the Gigabit Ethernet interface port in slot 5:

```
Router# configure terminal
Router(config)# interface gigabitethernet 5/0/0
Router(config-if)# negotiation auto
```

Related Commands

show interface gigabitethernet

show interface gigabitethernet

To display information about the Gigabit Ethernet interface, use the **show interface gigabitethernet** privileged EXEC command.

show interface gigabitethernet [*slot*/*port-adapter*/*port*] Cisco 7500 series and Cisco 7000 series routers with RSP7000 and RSP7000CI

Syntax Description

slot	Slot location of the port adapter.
port-adapter	On the Cisco 7500 series and Cisco 7000 series with RSP, specifies the ports on a VIP card. The value can be 0 or 1.
port	Port number on the port adapter.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CC to support the GEIP.

Sample Display

The following example shows the first Gigabit Ethernet interface port on a GEIP in interface processor slot 5:

```
Router# show interface gigabit 5/0/0
GigabitEthernet5/0/0 is up, line protocol is up
 Hardware is cyBus GigabitEthernet, address is 0010.145a.00a0 (bia 0010.145a.0)
  Internet address is 40.0.0.3/8
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  Full-duplex mode, link type is autonegotiation, media type is SX
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 01:29:50, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     592 packets input, 42084 bytes, 0 no buffer
     Received 564 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 101796 frame, 0 overrun, 0 ignored
     0 watchdog, 4 multicast, 0 pause input
     39528 packets output, 4092713 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 263 deferred
     57 lost carrier, 0 no carrier, 0 pause output
     0 output buffers copied, 0 interrupts, 0 failures
```

Table 1 describes significant fields shown in the display.

Table 1 Show Interface GigabitEthernet Field Descriptions

Field	Description
GigabitEthernet 5/0/0... is {up | down} ...is administratively down	Indicates whether the interface hardware is currently active (whether carrier detect is present) or if it has been taken down by an administrator.
line protocol is {up | down}	Indicates whether the software processes that handle the line protocol consider the line usable (that is, whether keepalives are successful) or if it has been taken down by an administrator.
Address is	IP address?
Hardware is	Hardware type.
Internet address is	Internet address and subnet mask.
MTU	Maximum transmission unit of the interface.
BW	Value of the bandwidth parameter that has been configured for the interface (in kilobits per second). The bandwidth parameter is used to compute IGRP metrics only.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100% reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method assigned to interface.
loopback	Indicates whether loopback is set or not.
keepalive set	Indicates whether keepalives are set or not.
Full-duplex mode	Indicates what mode is set.
link type	Indicates whether auto negotiation is set or not.
media type	Indicates what GBIC type is used.
output flow control	Indicates whether output flow control is supported or not.
input flow control	Indicates whether input flow control is supported or not.
ARP type	Existing feature.
ARP Timeout	Existing feature.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the “last” fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks are printed.
Last clearing of show interface counters	Time since the counters were cleared.
Queuing strategy	Existing feature.
Output queue	

Table 1 Show Interface GigabitEthernet Field Descriptions (Continued)

Input queue	
30 second input rate 30 second output rate	Average number of bits and packets transmitted per second in the last 30 seconds. The 30 second input and output rates should be used only as an approximation of traffic per second during a given 30-second period. These rates are exponentially weighted averages with a time constant of 30-seconds. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Total number of error-free packets received by the interface.
bytes	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
Received... broadcasts	Total number of broadcast or multicast packets received by the interface.
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's MTU size.
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so that this sum might not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.
frame	Number of packets not framed correctly.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.
watchdog	Existing feature.
multicast	Existing feature.
pause input	Number of PAUSE (XOFF) packets received.
packets output	Total number of messages transmitted by the interface.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle. This should not occur on this interface.

Table 1 Show Interface GigabitEthernet Field Descriptions (Continued)

output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this might not balance with the sum of the enumerated output errors, because some datagrams can have more than one error, and others can have errors that do not fall into any of the specifically tabulated categories.
collisions	Not applicable.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds' time. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal, or by a cable problem. If the system notices that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
babbles	Not applicable.
late collision	Not applicable.
deferred	Number of packets deferred during transmission when the network media is busy.
lost carrier	Number of times the interface detection link is lost.
no carrier	Indicates whether there is a carrier or not.
pause output	Indicates number of PAUSE packets transmitted.
output buffers copied	Number of packets copied to system memory.
interrupts	Should always be zero.
failures	Number of no resource errors received on the output.