Chapter 19

Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

This chapter describes the steps you take to isolate Fast Ethernet and Gigabit Ethernet interface problems. (See Table 43.)

Table 43: Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

Loopback Testing for Fast Ethernet and Gigabit Ethernet Interface Tasks	Command or Action
Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface on page 196	
1. Create a Loopback on page 196	
a. Create a Physical Loopback for a Fiber-Optic Interface on page 196	Connect the transmit port to the receive port.
b. Create a Loopback Plug for an RJ-45 Ethernet Interface on page 197	Cross pin 1 (TX +) and pin 3 (RX +) together, and pin 2 (TX-) and pin 6 (RX-) together.
c. Configure a Local Loopback on page 197	[edit interfaces *interface-name* (fastether-options | gigether-options)] set loopback local show commit
2. Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 198	show interfaces (fe-*fpc/pic/port* | ge-*fpc/pic/port*)
3. Configure a Static Address Resolution Protocol Table Entry on page 200	show interfaces ge-*fpc/pic/port* [edit interfaces *interface-name* unit *logical-unit-number* family inet address *address]* set arp *ip-address* mac *mac-address* show commit run show arp no-resolve
4. Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 201	clear interfaces statistics fe-*fpc/pic/port* | ge-*fpc/pic/port*
5. Ping the Fast Ethernet or Gigabit Ethernet Interface on page 202	ping *remote-IP-address* bypass-routing interface (fe-*fpc/pic/port* | ge-*fpc/pic/port* count 100 rapid
6. Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 202	show interfaces (fe-*fpc/pic/port* | ge-*fpc/pic/port*) extensive
Diagnose a Suspected Circuit Problem on page 204	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 196.

Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface

Purpose When you suspect a hardware problem, take the following steps to help verify if there is a problem.

Steps To Take To diagnose a suspected hardware problem with the Ethernet interface, follow these steps:

1. Create a Loopback on page 196
2. Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 198
3. Configure a Static Address Resolution Protocol Table Entry on page 200
4. Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 201
5. Ping the Fast Ethernet or Gigabit Ethernet Interface on page 202
6. Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 202

Step 1: Create a Loopback

Purpose You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the transmit and receive ports. If a field engineer is not available to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

Create a Physical Loopback for a Fiber-Optic Interface

Action To create a physical loopback at the port, connect the transmit port to the receive port using a known good fiber cable.

NOTE: Make sure you use single-mode fiber for a single-mode port and multimode fiber for a multimode port.

What It Means When you create and then test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

Create a Loopback Plug for an RJ-45 Ethernet Interface

Action To create a loopback plug, cross pin 1 (TX +) and pin 3 (RX +) together, and cross pin 2 (TX-) and pin 6 (RX-) together. You need the following equipment to create the loopback:

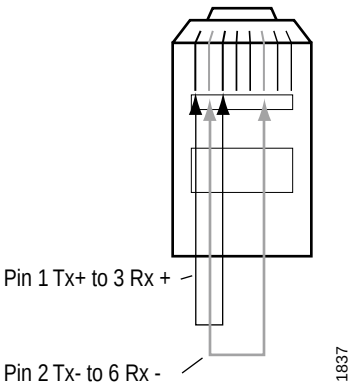
A 6-inch long CAT5 cable

An RJ-45 connector

A crimping tool

Figure 21 illustrates how to create a loopback plug for an RJ-45 Ethernet interface.

Figure 21: RJ-45 Ethernet Loopback Plug



What It Means When you create and then test a physical loopback, you are testing the RJ-45 interface of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

Configure a Local Loopback

Action To configure a local loopback without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   [edit]
   user@host# **edit interfaces** *interface-name* (fastether-options | gigether-options)

2. Configure the local loopback:

   [edit interfaces *interface-name* (fastether-options | gigether-options)]
   user@host# **set loopback local**

3. Verify the configuration:

   user@host# **show**

   For example:

   ```
   [edit interfaces fe-1/0/0 fastether-options]
   user@host# show
   loopback local;
   ```

4. Commit the change:

   user@host# **commit**

   For example:

   ```
   [edit interfaces fe-1/0/0 fastether-options]
   user@host# commit
   commit complete
   ```

When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.

NOTE: Remember to delete the loopback statement after completing the test.

Step 2: Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up

Purpose Display the status of the Fast Ethernet or Gigabit Ethernet interface to provide the information you need to determine whether the physical link is up or down.

Action To verify that the status of the Fast Ethernet or Gigabit Ethernet interface is up, use the following JUNOS command-line interface (CLI) operational mode command:

user@host> **show interfaces** (**fe-***fpc*/*pic*/*port* | **ge-***fpc*/*pic*/*port*)

Sample Output

```
user@host# show interfaces fe-1/3/0
Physical interface: fe-1/3/0, Enabled, Physical link is Up
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  MAC statistics:
    Input octets: 0, Input packets: 0, Output octets: 0, Output packets: 0
  Filter statistics:
    Filtered packets: 0, Padded packets: 0, Output packet errors: 0
  Autonegotiation information:
    Negotiation status: Incomplete, Link partner status: OK
```

```
  Link partner: Full-duplex, Flow control: None
```

What It Means The sample output shows that the link is up and there are no alarms in this loopback configuration. When an internal loopback is configured, the physical loopback should come up without an alarm.

Sample Output When you see that the physical link is down, there may be a problem with the port. The following output is an example of the show interfaces fe-*fpc*/*pic*/*port* command when the physical link is down:

```
user@router> show interfaces fe-1/3/0
Physical interface: fe-1/3/0, Enabled, Physical link is Down
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : LINK
  Active defects : LINK
  MAC statistics:
    Input octets: 0, Input packets: 0, Output octets: 0, Output packets: 0
  Filter statistics:
    Filtered packets: 0, Padded packets: 0, Output packet errors: 0
  Autonegotiation information:
    Negotiation status: Incomplete, Link partner status: Down
    Reason: Link partner autonegotiation failure
    Link partner: Half-duplex, Flow control: None
```

What It Means The sample output shows that the physical link is down and there are active alarms and defects.

Table 44 presents problem situations and actions for a physical link that is down.

Table 44: Problems and Solutions for a Physical Link That Is Down

Problem	Action
Cable mismatch	Verify that the fiber connection is correct.
Damaged and/or dirty cable	Verify that the fiber can successfully loop a known good port of the same type.
Too much or too little optical attenuation	Verify that the attenuation is correct per the PIC optical specifications.
The transmit port is not transmitting within the dBm optical range per the specifications	Verify that the Tx power of the optics is within range of the PIC optical specification.
Mismatch between the cable type and the port	Verify that a single-mode fiber cable is connected to a single-mode interface and that a multimode fiber cable is connected to a multimode interface. (This problem does not always cause the physical link to go down; errors and dropped packets are sometimes the result.)

Step 3: Configure a Static Address Resolution Protocol Table Entry

Purpose Configure a static Address Resolution Protocol (ARP) entry to allow a packet to be sent out of a looped Ethernet interface.

NOTE: Remove the static ARP entry at the end of the loop test after you have completed the ping test, checked interface statistics, and monitored interface traffic.

Action To configure a static ARP table entry for a Gigabit Ethernet interface, follow these steps. You can follow the same procedure to configure a static ARP entry for a Fast Ethernet interface.

1. Find the Media Access Control (MAC) address for the Gigabit Ethernet interface:

   user@host> **show interfaces ge-***fpc*/*pic*/*port*

2. In configuration mode, go to the following hierarchy level:

   [edit]
   user@host# **edit interfaces** *interface-name* **unit** *logical-unit-number* **family inet address** *address*

3. Configure the static ARP entry:

   user@host# **set arp** *ip-address* **mac** *mac-address*

NOTE: The MAC address used should be the same as the physical address of the port being tested because this allows the port to receive the frames when you run the ping test.

4. Verify the configuration:

   user@host# **show**

5. Commit the configuration:

   user@host# **commit**

6. Verify that the static ARP entry is installed:

   user@host# **run show arp no-resolve**

Sample Output

```
user@host> show interfaces ge-7/2/1
Physical interface: ge-7/2/1, Enabled, Physical link is Down
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)

[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]
```

```
user@host# set arp 10.108.120.2 mac 00:90:69:8d:2c:db

[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]
user@host# show
arp 10.108.120.2 mac 00:90:69:8d:2c:db;

[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]
user@host# commit
commit complete

[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]
user@host# run show arp no-resolve
MAC Address       Address         Interface     Flags
00:90:69:8d:2c:db 10.108.120.2    ge-7/2/1.0    permanent
00:e0:34:bb:8c:40 209.211.135.1   fxp0.0        none
00:a0:a5:28:0c:70 209.211.135.8   fxp0.0        none
00:a0:a5:12:12:c7 209.211.135.10  fxp0.0        none
00:90:ab:3c:68:a0 209.211.135.31  fxp0.0        none
08:00:20:a1:53:15 209.211.135.65  fxp0.0        none
00:a0:cc:66:3e:85 209.211.135.98  fxp0.0        none
Total entries: 7
```

What It Means The sample output is for Steps 1 through 6 and shows that a static ARP entry was configured on Gigabit Ethernet interface ge-7/2/1. The MAC address used is the same as the physical address of the port being tested because this allows the port to receive the frames when you run the ping test. The port is working as expected if you see that the time to live (TTL) expired; if you do not receive a response to your ping test, it indicates a hardware problem.

Step 4: Clear Fast Ethernet or Gigabit Ethernet Interface Statistics

Purpose You must reset the Fast Ethernet and Gigabit Ethernet interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/output errors and packet statistics do not interfere with the current diagnostics.

Action To clear all statistics for the interface, use the following JUNOS CLI operational mode command:

user@host> **clear interfaces statistics** (**fe-***fpc*/*pic*/*port* | **ge-***fpc*/*pic*/*port*)

Sample Output

```
user@host> clear interfaces statistics ge-7/2/0
user@host>
```

What It Means This command clears the interface statistics counters for the Gigabit Ethernet interface only.

Step 5: Ping the Fast Ethernet or Gigabit Ethernet Interface

Purpose Use the ping command to verify the loopback connection.

Action To send ping packets from the Ethernet interface, use the following JUNOS CLI operational mode command:

user@host> **ping** *remote-IP-address* **bypass-routing interface** (**fe-***fpc*/*pic*/*port* | **ge-***fpc*/*pic*/*port*) **count 100 rapid**

Sample Output

```
user@router> ping 10.108.120.2 bypass-routing interface ge-7/2/1 count 100 rapid
PING 10.108.120.2 (10.108.120.2): 56 data bytes
36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e871   0 0000  01  01 cc5c 10.108.120.1  10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e874   0 0000  01  01 cc59 10.108.120.1  10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e878   0 0000  01  01 cc55 10.108.120.1  10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e87c   0 0000  01  01 cc51 10.108.120.1  10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e880   0 0000  01  01 cc4d 10.108.120.1  10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS  Len   ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e884   0 0000  01  01 cc49 10.108.120.1  10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
```

What It Means As the packet is looped over the link, you receive a series of TTL exceeded messages. These messages are received because the ping packets are looped repeatedly between the router and the physical loopback until the IP TTL expires.

Step 6: Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with the Juniper Networks Technical Assistance Center (JTAC).

Action To check the local interface for error statistics, use the following JUNOS CLI operational mode command:

user@host> **show interfaces** (**fe-***fpc*/*pic*/*port* | **ge-***fpc*/*pic*/*port*) **extensive**

Sample Output

```
user@router> show interfaces ge-7/2/1 extensive
Physical interface: ge-7/2/1, Enabled, Physical link is Up
  Interface index: 25, SNMP ifIndex: 32, Generation: 41
  Description: Test
  Link-level type: Ethernet, MTU: 4470, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:90:69:4c:17:b1, Hardware address: 00:90:69:4c:17:b1
  Statistics last cleared: 2002-01-07 17:53:19 UTC (2w2d 03:20 ago)
  Traffic statistics:
```

```
  Input  bytes :       3799515503823                 0 bps
  Output bytes :          7325566425                 0 bps
  Input  packets:         4628009535                 0 pps
  Output packets:           30678225                 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0
Output errors:
  Carrier transitions: 14, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
  FIFO errors: 0, HS link CRC errors: 0
Active alarms  : None
Active defects : None
MAC statistics:                Receive         Transmit
  Total octets            3883579444813       7880356346
  Total packets              4628009534         30678237
  Unicast packets            4627879788         29893563
  Broadcast packets                30               464
  Multicast packets            129716            784210
  CRC/Align errors                  0                 0
  FIFO errors                       0                 0
  MAC control frames                0                 0
  MAC pause frames                  0                 0
  Oversized frames                  0
  Jabber frames                     0
  Fragment frames                   0
  VLAN tagged frames                0
  Code violations                   0
Filter statistics:
  Input packet count          4628009244
  Input packet rejects              0
  Input DA rejects                  0
  Input SA rejects                  0
  Output packet count                      30678237
  Output packet pad count                    856248
  Output packet error count                       0
  CAM destination filters: 9, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete, Link partner status: Ok, Link partner: Full-duplex,
  Flow control: None
PFE configuration:
  Destination slot: 7
  CoS transmit queue          Bandwidth              Buffer     Priority   Limit
                          %         bps   %          bytes
  0 best-effort           0           0   0              0     low    none
  1 expedited-forwarding  0           0   0              0     low    none
  2 assured-forwarding    0           0   0              0     low    none
  3 network-control       0           0   0              0     low    none

Logical interface ge-7/2/1.0 (Index 23) (SNMP ifIndex 48) (Generation 38)
  Description: To Cosine Left 23/1
  Flags: SNMP-Traps Encapsulation: ENET2
  Protocol inet, MTU: 4456, Flags: None, Generation: 85 Route table: 0
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.108.120.0/30, Local: 10.108.120.1, Broadcast: 10.108.120.3,
      Generation: 81
  Protocol iso, MTU: 4453, Flags: None, Generation: 86 Route table: 0
```

What It Means Check for any error statistics. There should not be any input or output errors. If there are any persistent input or output errors, open a case with the Juniper Networks Technical Assistance Center (JTAC) at support@juniper.net, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Diagnose a Suspected Circuit Problem

Purpose When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may create a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

Action After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Step 2 through Step 8 in “Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 196. Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.