Chapter 11

Use Loopback Testing for ATM Interfaces

This chapter describes the steps for using loopback testing to isolate Asynchronous Transfer Mode (ATM) interface problems. The steps for loopback testing apply to both ATM1 and ATM2 intelligent queuing (IQ) interfaces. (See Table 21.)

Table 21: Checklist for Using Loopback Testing for ATM Interfaces

ATM Interface Loopback Testing Tasks	Command or Action
Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 106	
1. Create a Loopback on page 106	
a. Create a Physical Loopback on page 106	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 107	[edit interfaces *interface-name* (sonet-options | t3-options)] set loopback local show commit
2. Set Clocking to Internal on page 108	[edit interfaces *interface-name*] set clocking internal show commit
3. Verify That the ATM Interface Is Up on page 109	show interfaces at-*fpc/port/pic*
4. Clear ATM Interface Statistics on page 111	clear interfaces statistics at-*fpc/port/pic*
5. Ping the ATM Interface on page 112	ping interface at-*fpc/port/pic local-IP-address* bypass-routing count 1000 rapid
6. Check for ATM Interface Error Statistics on page 112	show interfaces at-*fpc/port/pic* extensive
Diagnose a Suspected Circuit Problem on page 116	
1. Create a Loop from the Router to the Network on page 116	[edit interfaces *interface-name* (sonet-options | t3-options)] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 117	Perform Steps 2 through 6 from “Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 106.

Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface

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

Steps To Take To diagnose a suspected hardware problem with an ATM1 or ATM2 IQ interface, follow these steps:

1. Create a Loopback on page 106
2. Set Clocking to Internal on page 108
3. Verify That the ATM Interface Is Up on page 109
4. Clear ATM Interface Statistics on page 111
5. Ping the ATM Interface on page 112
6. Check for ATM Interface Error Statistics on page 112

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

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

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

What It Means When you create and 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.

Configure a Local Loopback

Purpose Because ATM interfaces can be either SONET or T3, you use the sonet-options or t3-options statements to configure a local loopback. Figure 9 illustrates a local loopback configured for an ATM interface.

Figure 9: 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 (sonet-options | t3-options)
   ```

2. Configure the loopback:

   ```
   [edit interfaces interface-name (sonet-options | t3-options)]
   user@host# set loopback local
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces (t3-1/0/0 t3-options)]
   user@host# show
   loopback local;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t3-1/0/0 t3-options]
   user@host# commit
   commit complete
   ```

What It Means 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: Set Clocking to Internal

Purpose Clocking is set to internal because there is no external clock source in a loopback connection.

Action To configure clocking to internal, follow these steps:

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

   ```
   [edit]
   user@host# edit interfaces interface-name
   ```

2. Configure the clocking to internal:

   ```
   user@host# set clocking internal
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-1/0/0]
   user@host# show
   clocking internal;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t3-1/0/0]
   user@host# commit
   commit complete
   ```

What It Means The clock source for the interface is set to the internal Stratum 3 clock.

Step 3: Verify That the ATM Interface Is Up

Purpose Displaying the status of the ATM interface provides the information you need to determine whether the physical link is up or down.

Action To verify that the status of the ATM interface is up, use the following JUNOS CLI operational mode command:

```
user@host> show interfaces at-fpc/pic/port
```

Sample Output 1 The following sample output is for an OC-3 ATM interface:

```
user@host> show interfaces at-2/0/0
Physical interface: at-2/0/0, Enabled, Physical link is Up
  Interface index: 22, SNMP ifIndex: 42
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed: OC3, Loopback: Local, Payload
scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None

  Logical interface at-2/0/0.0 (Index 29) (SNMP ifIndex 49)
    Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.1.0/30, Local: 192.168.1.1
    VCI 1.100
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
       Input  packets:                 0
       Output packets:                 0
```

Sample Output 2 The following sample output is for a T3 ATM interface:

```
user@host> show interfaces at-0/1/0
Physical interface: at-0/1/0, Enabled, Physical link is Up
  Interface index: 90, SNMP ifIndex: 18
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3, Loopback: None, Payload scrambler: Enabled,
  Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
  Device flags   : Present Running
  Link flags     : None
  Current address: 00:90:69:0c:c0:1f
  Last flapped   : 2002-08-14 16:25:07 UTC (00:00:42 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
```

Sample Output 3 The following sample output is for an OC-3 ATM interface:

```
user@host> show interfaces at-2/0/1
Physical interface: at-2/0/1, Enabled, Physical link is Down
  Interface index: 23, SNMP ifIndex: 43
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed: OC3, Loopback: None, Payload
scrambler: Enabled
  Device flags   : Present Running Down
  Link flags     : None
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : LOL, LOS
  SONET defects  : LOL, LOF, LOS, SEF, AIS-L, AIS-P, RDI-P, PLM-P

  Logical interface at-2/0/1.10 (Index 30) (SNMP ifIndex 65)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 192.168.100.0/30, Local: 192.168.100.1
    VCI 2.100
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
       Input  packets:                 0
       Output packets:                 0
```

Sample Output 4 The following sample output is for a T3 ATM interface:

```
user@host> show interfaces at-0/1/0
Physical interface: at-0/1/0, Enabled, Physical link is Down
  Interface index: 90, SNMP ifIndex: 18
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3, Loopback: None, Payload scrambler: Enabled,
  Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
  Device flags   : Present Running Down
  Link flags     : None
  Current address: 00:90:69:0c:c0:1f
  Last flapped   : 2002-08-09 11:36:15 UTC (5d 04:14 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : PLL, LOF, LOS
  Active defects : PLL, LOF, LOS
```

What It Means Sample output 1 shows that the physical link is up and there are no SONET alarms or defects.

Sample output 2 shows that the physical link is up and there are no active alarms or defects.

Sample output 3 shows that the physical link, the device flags, and interface flags are down, and that there are SONET alarms and defects. When you see that the physical link is down, there may be a problem with the port.

Sample output 4 shows that the physical link, the device flags, and interface flags are down, and that there are active alarms and defects. When you see that the physical link is down, there may be a problem with the port.

For more information about problem situations and actions to take for a physical link that is down, see Table 22.

Table 22: Problems and Solutions for a Physical Link That Is Down

Problem	Actions
Cable mismatch	Verify that the cable connection is correct.
Damaged fiber or coax cable or dirty fiber cable	Verify that the cable can successfully loop a known good port of the same type.
Too much or too little optical attenuation (for an OC-3 or OC-12 ATM interface)	Verify that the attenuation is correct per the PIC optical specification.
The transmit port is not transmitting within the dBm optical range per the specifications (for an OC-3 or OC-12 ATM interface)	Verify that the Tx power of the optics is within range of the PIC optical specification.

Step 4: Clear ATM Interface Statistics

Purpose You must reset ATM interface statistics before you initiate the ping test. Resetting the statistics provides a clean start so that previous input or output errors and packet statistics do not interfere with the current investigation.

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

```
user@host> clear interfaces statistics at-fpc/pic/port
```

Sample Output

```
user@host> clear interfaces statistics at-4/0/2
user@host>
```

What It Means This command clears the interface statistics counters for interface at-4/0/2 only.

Step 5: Ping the ATM Interface

Action After you have put the port in a local loopback, run the ping test using the following JUNOS CLI operational mode command:

user@host> **ping interface at-***fpc***/***pic***/***port-IP-address* **bypass-routing count 1000 rapid**

Sample Output

```
user@host> ping interface at-2/0/0.0 192.168.1.1 bypass-routing count 1000 rapid
PING 192.168.1.1 (192.168.1.1): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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--- 192.168.1.1 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.423/0.740/26.822/0.829 ms
```

What It Means This command sends 1000 ping packets out of the interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, 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).

Step 6: Check for ATM Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with JTAC.

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

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

Sample Output The following sample output is for an OC-3 ATM interface:

```
user@host> show interfaces at-2/0/0 extensive
Physical interface: at-2/0/0, Enabled, Physical link is Up
  Interface index: 22, SNMP ifIndex: 42, Generation: 21
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed: OC3, Loopback: None, Payload
scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Statistics last cleared: 2002-07-29 14:28:14 EDT (00:00:26 ago)
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  SONET alarms   : None
  SONET defects  : None
```

```
SONET PHY:          Seconds       Count  State
  PLL Lock              0           0  OK
  PHY Light             0           0  OK
SONET section:
  BIP-B1                0           0
  SEF                   0           0  OK
  LOS                   0           0  OK
  LOF                   0           0  OK
  ES-S                  0
  SES-S                 0
  SEFS-S                0
SONET line:
  BIP-B2                0           0
  REI-L                 0           0
  RDI-L                 0           0  OK
  AIS-L                 0           0  OK
  BERR-SF               0           0  OK
  BERR-SD               0           0  OK
  ES-L                  0
  SES-L                 0
  UAS-L                 0
  ES-LFE                0
  SES-LFE               0
  UAS-LFE               0
SONET path:
  BIP-B3                0           0
  REI-P                 0           0
  LOP-P                 0           0  OK
  AIS-P                 0           0  OK
  RDI-P                 0           0  OK
  UNEQ-P                0           0  OK
  PLM-P                 0           0  OK
  ES-P                  0
  SES-P                 0
  UAS-P                 0
  ES-PFE                0
  SES-PFE               0
  UAS-PFE               0
Received SONET overhead:
  F1     : 0x00, J0     : 0x00, K1     : 0x00, K2     : 0x00
  S1     : 0x00, C2     : 0x13, C2(cmp) : 0x13, F2     : 0x00
  Z3     : 0x00, Z4     : 0x00, S1(cmp) : 0x00, V5     : 0x00
  V5(cmp) : 0x00
Transmitted SONET overhead:
  F1     : 0x00, J0     : 0x01, K1     : 0x00, K2     : 0x00
  S1     : 0x00, C2     : 0x13, F2     : 0x00, Z3     : 0x00
  Z4     : 0x00, V5     : 0x00
ATM status:
  HCS state:     Sync
  LOC     :      OK
ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,
  Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 8830024, Output idle cell count: 8830026,
  Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid VCs: 0,
  Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
  Destination slot: 2
  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 at-2/0/0.0 (Index 29) (SNMP ifIndex 49) (Generation 28)
  Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Traffic statistics:
   Input  bytes  :                 0
   Output bytes  :                 0
   Input  packets:                 0
   Output packets:                 0
  Local statistics:
   Input  bytes  :                 0
   Output bytes  :                 0
   Input  packets:                 0
   Output packets:                 0
  Transit statistics:
   Input  bytes  :                 0                 0 bps
   Output bytes  :                 0                 0 bps
   Input  packets:                 0                 0 pps
   Output packets:                 0                 0 pps
  Protocol inet, MTU: 4470, Flags: None, Generation: 31 Route table: 0
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 192.168.1.0/30, Local: 192.168.1.1, Broadcast: Unspecified, Generation: 59
  VCI 1.100
    Flags: Active
    Total down time: 0 sec, Last down: Never
    ATM per-VC transmit statistics:
     Tail queue packet drops: 0
    Traffic statistics:
     Input  bytes  :                 0
     Output bytes  :                 0
     Input  packets:                 0
     Output packets:                 0
```

Sample Output The following sample output is for a T3 ATM interface:

```
user@host> show interfaces at-0/1/0 extensive
Physical interface: at-0/1/0, Enabled, Physical link is Up
  Interface index: 90, SNMP ifIndex: 18, Generation: 89
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3, Loopback: None, Payload scrambler: Enabled,
  Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
  Device flags   : Present Running
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:90:69:0c:c0:1f
  Last flapped   : 2002-08-14 16:25:07 UTC (00:00:21 ago)
  Statistics last cleared: 2002-08-14 16:25:26 UTC (00:00:02 ago)
  Traffic statistics:
   Input  bytes  :                 0                 0 bps
   Output bytes  :                 0                 0 bps
   Input  packets:                 0                 0 pps
   Output packets:                 0                 0 pps
  Input errors:
    Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  Active alarms  : None
  Active defects : None
  DS3 media:          Seconds       Count  State
    PLL Lock                0           0  OK
    Reframing               0           0  OK
    AIS                     0           0  OK
    LOF                     0           0  OK
```

```
  LOS                 0          0  OK
  YELLOW              0          0  OK
  EXZ                 0          0
  LCV                 0          0
  PCV                 0          0
  FERR                0          0
  LES                 0
  PES                 0
  PSES                0
  SEFS                0
  UAS                 0
PLCP defects:         Seconds       Count  State
  LOF                 0          0
  YELLOW              0          0
ATM defects:          Seconds       Count  State
  LCD                 0          0
ATM status:
  HCS state:     Sync
  LOC     :      OK
PLCP statistics (errored seconds):
  Framing errors              : 0(0)
  Bit interleaved parity errors: 0(0)
  Far end block errors        : 0(0)
ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,
  Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 96041, Output idle cell count: 96040,
  Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid VCs: 0,
  Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
  Destination slot: 0
  CoS transmit queue            Bandwidth          Buffer Priority   Limit
                          %        bps   %        bytes
  0 best-effort          95     42499200  95          0     low    none
  3 network-control       5      2236800   5          0     low    none
```

What It Means Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with the 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 ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

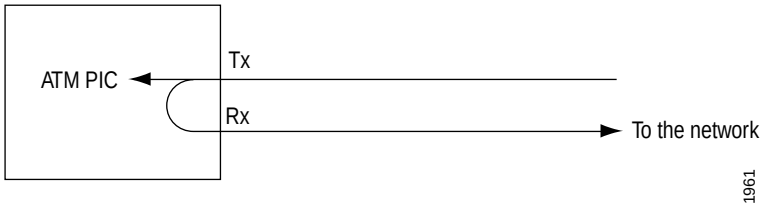
Steps To Take To diagnose a suspected circuit problem, follow these steps:

1. Create a Loop from the Router to the Network on page 116
2. Create a Loop to the Router from Various Points in the Network on page 117

Step 1: Create a Loop from the Router to the Network

Purpose Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem might be located. Figure 10 illustrates a loop from a router to the network.

Figure 10: Loop from the Router to the Network



Action To create a loop from the router to the network, follow these steps:

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

   ```
   [edit]
   user@host# edit interfaces interface-name (sonet-options | t3-options)
   ```

2. Configure the remote loopback:

   ```
   [edit interfaces interface-name (sonet-options | t3-options)]
   user@host# set loopback remote
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-1/0/0 t3-options]
   user@host# show
   loopback remote;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t3-1/0/0 t3-options]
   user@host# commit
   commit complete
   ```

What It Means This command loops any traffic from the network back into the network.

Step 2: Create a Loop to the Router from Various Points in the Network

Purpose The transport-layer engineer creates 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 Steps 2 through 6 in “Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 106. 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.