Chapter 7

Use Loopback Testing for T3 Interfaces

This chapter describes using loopback testing to isolate T3 interface problems. (See Table 15.)

Table 15: Checklist for Using Loopback Testing for T3 Interfaces

T3 Interface Loopback Testing Tasks	Command or Action
Diagnose a Suspected Hardware Problem with a T3 Interface on page 58	
1. Create a Loopback on page 58	
a. Create a Physical Loopback on page 58	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 59	[edit interfaces *interface-name* t3-options] set loopback local show commit
2. Set Clocking to Internal on page 60	[edit interfaces *interface-name*] set clocking internal show commit
3. Verify That the T3 Interface Is Up on page 60	show interfaces t3-*fpc/pic/port*
4. Clear T3 Interface Statistics on page 62	clear interfaces statistics t3-*fpc/pic/port*
5. Force the Link Layer To Stay Up on page 62	
a. Configure Encapsulation to Cisco-HDLC on page 62	[edit interfaces *interface-name*] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 63	[edit interfaces *interface-name*] set no-keepalives show commit
6. Verify the Status of the Logical Interface on page 64	show interfaces t3-*fpc/pic/port* show interfaces *t3-fpc/pic/port* terse
7. Ping the T3 Interface on page 65	ping interface t3-*fpc/pic/port local-IP-address* bypass-routing count 1000 rapid
8. Check for T3 Interface Error Statistics on page 66	show interfaces t3-*fpc/pic/port* extensive

T3 Interface Loopback Testing Tasks	Command or Action
Diagnose a Suspected Circuit Problem on page 68	
1. Create a Loop from the Router to the Network on page 68	[edit interfaces *interface-name* t3-options] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 69	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a T3 Interface" on page 58.

Diagnose a Suspected Hardware Problem with a T3 Interface

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

Steps To Take To diagnose a suspected hardware problem with a T3 interface, follow these steps:

1. Create a Loopback on page 58
2. Set Clocking to Internal on page 60
3. Verify That the T3 Interface Is Up on page 60
4. Clear T3 Interface Statistics on page 62
5. Force the Link Layer To Stay Up on page 62
6. Verify the Status of the Logical Interface on page 64
7. Ping the T3 Interface on page 65
8. Check for T3 Interface Error Statistics on page 66

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.

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

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 t3-options
   ```

2. Configure the loopback:

   ```
   [edit interfaces interface-name 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 You set clocking 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 clocking to internal:

   ```
   [edit interfaces interface-name]
   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 T3 Interface Is Up

Purpose Display the status of the T3 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 T3 interface is up, use the following JUNOS CLI operational mode command:

```
user@host> show interfaces t3-fpc/pic/port
```

Sample Output The following output is for a T3 interface with the physical link up:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Up
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: PPP, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
```

```
  Device flags   : Present Running Loop-Detected
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive Input: 6684 (00:07:51 ago), Output: 6693 (00:06:41 ago)
  NCP state: Down, LCP state: Conf-req-sent
  Input rate     : 224 bps (2 pps), Output rate: 240 bps (2 pps)
  Active alarms  : None
  Active defects : None
  Logical interface t3-1/0/0.0 (Index 13) (SNMP ifIndex 32)
    Flags: Device-down Hardware-Down Point-To-Point SNMP-Traps
    Encapsulation: PPP
    Protocol inet, MTU: 4470, Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1
```

What It Means The sample output shows that the physical link is up, the loop is detected, and there are no T3 alarms or defects.

Sample Output If the physical link is down, there may be a problem with the port. The following output is an example of the show interfaces t3-*fpc*/*pic*/*port* command when the physical link is down:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Down
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive Input: 116 (00:02:32 ago), Output: 185 (00:00:02 ago)
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : LOF, LOS
  Active defects : LOF, LOS
  Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
    Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1
```

What It Means The sample output shows that the physical link is down, the device flags and interface flags are down, and that there are T3 alarms and defects. Verify that the fiber can successfully loop a known good port of the same type by checking for damage to the cable.

Step 4: Clear T3 Interface Statistics

Purpose You must reset T3 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 t3-fpc/pic/port
```

Sample Output

```
user@host> clear interfaces statistics t3-4/0/2
user@host>
```

What It Means This command clears the interface statistics counters for interface t3-4/0/2 only.

Step 5: Force the Link Layer To Stay Up

Purpose To complete the loopback test, the link layer must remain up. However, JUNOS software is designed to recognize that loop connections are not valid connections and to bring the link layer down. You need to force the link layer to stay up by making some configuration changes to the encapsulation and keepalives.

Steps To Take To force the link layer to stay up, follow these steps:

1. Configure Encapsulation to Cisco-HDLC on page 62
2. Configure No-Keepalives on page 63

Configure Encapsulation to Cisco-HDLC

Action To configure encapsulation on a T3 physical interface, follow these steps:

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

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

2. Configure Cisco-HDLC:

   ```
   [edit interfaces interface-name]
   user@host# set encapsulation cisco-hdlc
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

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

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

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

What It Means This command sets the interface encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol.

Configure No-Keepalives

Action To disable the sending of link-layer keepalives on a T3 physical interface, follow these steps:

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

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

2. Configure no-keepalives:

   ```
   [edit interfaces interface-name]
   user@host# set no-keepalives
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-1/0/0]
   user@host# show
   no-keepalives;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

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

What It Means By setting no-keepalives, the link layer is forced to stay up. If the setting remains at keepalive, the router will recognize that the same link-layer keepalives are being looped back and will bring the link layer down.

Step 6: Verify the Status of the Logical Interface

Action To verify the status of the logical interface, use the following two JUNOS CLI operational mode commands:

```
user@host# show interfaces t3-fpc/pic/port
user@host# show interfaces t3-fpc/pic/port terse
```

Sample Output The following sample output is for a T3 logical interface that is up:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 12
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback: None, FCS: 16,
  Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None

  Logical interface t3-1/0/0.0 (Index 126) (SNMP ifIndex 13)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1

user@router> show interfaces terse t3-1/0/0
Interface       Admin Link Proto Local                 Remote
t3-1/0/0        up    up
t3-1/0/0.0      up    up   inet  1.1.1.1/30
```

What It Means The sample output for the first command shows that the logical link is up because there are no flags indicating that the link layer is down. The output for the show interfaces terse command shows that logical interface t3-1/0/0 is up.

Sample Output The following sample output is for a T3 logical interface that is down:

```
user@router> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 12
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback: None, FCS: 16,
  Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 9 (00:00:04 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None

  Logical interface t3-0/2/0.0 (Index 126) (SNMP ifIndex 13)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1
```

```
user@router> show interfaces terse t3-0/2/0
Interface       Admin Link Proto Local                 Remote
t3-0/2/0        up    down
t3-0/2/0.0      up    down inet  1.1.1.1/30
```

What It Means The sample output for both commands shows that the logical interface is down. The first command shows that the link layer, device, and destination route are all down. The second command shows that logical interface t3-0/2/0 is down.

Step 7: Ping the T3 Interface

Purpose Use the ping command to verify the loopback connection.

Action To ping the local interface, use the following JUNOS CLI operational mode command:

user@host> **ping interface t3-***fpc/pic/port local-IP-address* **bypass-routing count 1000 rapid**

Sample Output

```
user@host# ping interface t3-2/2/0 10.0.2.1 bypass-routing count 1000 rapid
PING 10.0.2.1 (10.0.2.1): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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--- 10.0.2.1 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.374/0.446/9.744/0.754 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 8: Check for T3 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 t3-***fpc/pic/port* **extensive**

Sample Output

```
user@router> show interfaces t3-1/0/0 extensive
Physical interface: t3-1/0/0, Enabled, Physical link is Down
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive statistics:
    Input : 116 (last seen 00:02:59 ago)
```

```
  Output: 187 (last seen 00:00:09 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes :              2552                 0 bps
 Output bytes :              3703                 0 bps
 Input  packets:              116                 0 pps
 Output packets:              161                 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
  SRAM errors: 0, HS link CRC errors: 0
Output errors:
  Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
Active alarms  : LOF, LOS
Active defects : LOF, LOS
DS3 Media:          Seconds       Count  State
  PLL Lock              0           0  OK
  Reframing           273           2  Defect Active
  AIS                   0           0  OK
  LOF                 273           2  Defect Active
  LOS                 273           2  Defect Active
  IDLE                  0           0  OK
  YELLOW                0           0  OK
  BPV                   0           0
  EXZ                   0           0
  LCV                 275    18022125
  PCV                   0           0
  CCV                   0           0
  LES                 275
  PES                 273
  PSES                273
  CES                 273
  CSES                273
  SEFS                273
  UAS                 277
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Error rate: 10e-0
PFE configuration:
  Destination slot: 1, Stream number: 0, PLP byte: 1 (0x00)
  COS transmit queue bandwidth:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  COS weighted round robin:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
  Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 4470, Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified
```

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 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 68
2. Create a Loop to the Router from Various Points in the Network on page 69

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 is located.

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 t3-options
   ```

2. Configure the remote loopback:

   ```
   [edit interfaces interface-name 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 so that you can then perform tests to verify the connection from the router to that loopback in the network.

Action To verify the connection from the router to a loopback in the network, follow Steps 2 through 8 in “Diagnose a Suspected Hardware Problem with a T3 Interface” on page 58.

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.