Chapter 22

Use Loopback Testing For Channelized DS-3 Interfaces

This chapter describes using loopback testing to isolate Channelized DS-3 interface problems. (See Table 48.)

Table 48: Checklist for Using Loopback Testing for Channelized DS-3 Interfaces

Channelized DS-3 Loopback Testing Tasks	Command or Action
Diagnose a Suspected Hardware Problem with a Channelized DS-3 Interface on page 229	
1. Create a Loopback on page 229	
a. Create a Physical Loopback on page 229	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 229	[edit interfaces *interface name* (t3-options | t1-options)] set loopback local show commit
2. Verify That the Interface Is Up on page 231	show interfaces t1-*fpc/pic/port:channel* show interfaces t3-*fpc/pic/port:channel*
3. Clear Interface Statistics on page 232	clear interfaces statistics t1-*fpc/pic/port:channel*
4. Force the Link Layer to Stay Up on page 232	
a. Configure Encapsulation to Cisco-HDLC on page 232	[edit interfaces *interface-name*] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 234	[edit interfaces *interface-name*] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 235	show interfaces t1-*fpc/pic/port:channel*
6. Ping the Channelized Interface on page 235	ping interface t1-*fpc/pic/port:channel local-IP-address* bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 236	show interfaces t1-*fpc/pic/port:channel* extensive

Channelized DS-3 Loopback Testing Tasks	Command or Action
Diagnose a Suspected Circuit Problem on page 238	
1. Create a Loop from the Router to the Network on page 238	[edit interfaces t1-*fpc*/*pic*/*port:channel* t1-options] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 239	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Channelized DS-3 Interface” on page 229.

Diagnose a Suspected Hardware Problem with a Channelized DS-3 Interface

Steps To Take To diagnose a suspected hardware problem with a Channelized DS-3 interface, follow these steps:

1. Create a Loopback on page 229
2. Verify That the Interface Is Up on page 231
3. Clear Interface Statistics on page 232
4. Force the Link Layer to Stay Up on page 232
5. Verify the Status of the Logical Interface on page 235
6. Ping the Channelized Interface on page 235
7. Check for Interface Error Statistics on page 236

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 Channelized DS-3 port. 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, follow these steps:

1. In configuration mode, go to the following hierarchy level, depending on whether you are configuring a full T3 or T1 interface:

```
[edit]
user@host# edit interfaces interface-name (t3-options | t1-options)
```

2. Configure the local loopback:

   ```
   [edit interfaces interface-name (t3-options | t1-options]
   user@host# set loopback local
   ```

   The following is an example of the name for a T1 channel on a Channelized DS-3 port for a Channelized DS-3 to DS-1 interface:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   user@host# show
   loopback local;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0 t1-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: Verify That the Interface Is Up

Purpose Display the status of a Channelized DS-1 or DS-3 interface to determine whether the physical link is up or down.

Action To verify that the status of the Channelized DS-1 or DS-3 interface is up, use one of the following JUNOS command-line interface (CLI) operational mode commands:

```
user@host> show interfaces t1-fpc/pic/port:channel
user@host> show interfaces t3-fpc/pic/port:channel
```

Sample Output The following sample output is for a channelized DS-3 to DS-1 interface:

```
user@host# show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 39 (00:00:06 ago), Output: 0 (never)
  CoS queues     : 4 supported
  Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
  Input rate     : 16 bps (0 pps)
  Output rate    : 160 bps (0 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None

  Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.10.1.1, Local: 10.10.1.2
```

What It Means The sample output shows that the physical link is up and there are no DS-1 or DS-3 alarms or defects. You should not see any DS-1 or DS-3 alarms. You can check any interface on the Channelized DS-3 port. See “Locate Channelized DS-3 Alarms and Errors on page 241” for more information on Channelized DS-3 alarms and errors.

Step 3: Clear Interface Statistics

Purpose You must reset the Channelized DS-3 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 efforts to diagnose the problem.

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

```
user@host> clear interfaces statistics t1-fpc/pic/port:channel
```

Sample Output

```
user@host> clear interfaces statistics t1-2/1/0:20
user@host>
```

What It Means This command clears the interface statistics counters for the Channelized or T1 interface only.

Step 4: 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. If you have the Point-to-Point protocol (PPP) configured, you need to change the encapsulation to Cisco High-level Data Link Control (HDLC) and reconfigure the keepalives in order to force the link layer to stay up.

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

1. Configure Encapsulation to Cisco-HDLC on page 232
2. Configure No-Keepalives on page 234

Configure Encapsulation to Cisco-HDLC

Action To set the encapsulation on a T1 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 t1-0/1/1:8]
   user@host# show
   encapsulation hdlc;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# commit
   commit complete
   ```

5. Check the interface configuration

   ```
   user@host# run show interfaces t1-2/1/0:20
   Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
     Interface index: 210, SNMP ifIndex: 173
     Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,
     Loopback: Local, FCS: 16,
     Mode: C/Bit parity, Framing: ESF
     Device flags   : Present Running
     Interface flags: Point-To-Point SNMP-Traps
     Link flags     : Keepalives
     Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
     Keepalive: Input: 39 (00:00:06 ago), Output: 0 (never)
     CoS queues     : 4 supported
     Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
     Input rate     : 16 bps (0 pps)
     Output rate    : 160 bps (0 pps)
     DS1   alarms   : None
     DS3   alarms   : None
     DS1   defects  : None
     DS3   defects  : None

     Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
       Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
       Protocol inet, MTU: 1500
         Flags: None
         Addresses, Flags: Is-Preferred Is-Primary
           Destination: 10.10.1.1, Local: 10.10.1.2
   ```

What It Means This command sets the interface encapsulation to the Cisco HDLC transport protocol. You must configure the interface with Cisco HDLC to ensure that the logical interface remains up in preparation for the ping test.

Configure No-Keepalives

Action To disable the sending of link-layer keepalives on a channelized DS-3 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 t1-2/1/0:20]
   user@host# show
   no-keepalives;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-2/1/0:20]
   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 5: Verify the Status of the Logical Interface

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

user@host> **show interfaces t1-***fpc*/*pic*/*port*:*channel*

Sample Output 1

```
user@host# show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 39 (00:00:06 ago), Output: 0 (never)
  CoS queues     : 4 supported
  Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
  Input rate     : 16 bps (0 pps)
  Output rate    : 160 bps (0 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None

  Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.10.1.1, Local: 10.10.1.2
```

What It Means The sample output shows that the channelized interface has the physical and logical links up.

Step 6: Ping the Channelized Interface

Purpose Use the ping command to verify the loopback connection.

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

user@host> **ping interface** *t1-fpc/pic/port:channel local-IP-address* **bypass-routing count 1000 rapid**

Sample Output

```
user@host> ping interface t1-2/1/0:20 10.10.1.2 bypass-routing count 1000 rapid
PING 10.10.1.2 (10.10.1.2): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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--- 10.10.1.2 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 2.830/3.872/9.965/0.633 ms
```

What It Means This command sends 1000 ping packets out of the channelized interface under the Channelized DS-3 port 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 7: Check for 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 t1-***fpc*/*pic*/*port*:*channel* **extensive**

Sample Output

```
user@host# show interfaces t1-2/1/0:20 extensive
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173, Generation: 93
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-20 21:46:27 UTC (00:26:47 ago)
  Statistics last cleared: 2004-05-20 22:12:03 UTC (00:01:11 ago)
  Traffic statistics:
   Input  bytes :              88680                27640 bps
   Output bytes :              88680                27640 bps
   Input  packets:              1010                   39 pps
   Output packets:              1010                   39 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1  alarms  : None
  DS3  alarms  : None
  DS1  defects : None
  DS3  defects : None
  T1  media:           Seconds       Count  State
    SEF                   0           0  OK
    BEE                   0           0  OK
    AIS                   0           0  OK
    LOF                   0           0  OK
    LOS                   0           0  OK
    YELLOW                0           0  OK
    BPV                   0           0
    EXZ                   0           0
    LCV                   0           0
    PCV                   0           0
    CS                    0           0
    LES                   0
    ES                    0
    SES                   0
    SEFS                  0
    BES                   0
    UAS                   0
```

```
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
  IDLE                  0           0  OK
  YELLOW                0           0  OK
  BPV                   0           0
  EXZ                   0           0
  LCV                   0           0
  PCV                   0           0
  CCV                   0           0
  LES                   0
  PES                   0
  PSES                  0
  CES                   0
  CSES                  0
  SEFS                  0
  UAS                   0
Interface transmit queues:
          B/W  WRR       Packets       Bytes       Drops       Errors
  Queue0    95   95             0           0           0            0
  Queue1     5    5          1010       88680           0            0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots     : All active
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 2, PLP byte: 2 (0x14)
  CoS transmit queue            Bandwidth          Buffer Priority   Limit
                          %         bps   %        bytes
  0 best-effort           95     1459200  95            0     low    none
  3 network-control        5       76800   5            0     low    none

Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213) (Generation 14)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 1500, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.10.1.1, Local: 10.10.1.2, Broadcast: Unspecified, Generation: 24
```

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 238
2. Create a Loop to the Router from Various Points in the Network on page 239

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

Purpose Creating a loop from a particular T1 interface to the network allows the transport-layer engineer to test the T1 interface from various points in the network and isolate the problem.

Action To create a loop from a particular T1 interface to the network, follow these steps:

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

   ```
   [edit]
   user@host# edit interfaces t1-fpc/pic/port:channel t1-options
   ```

2. Configure the loopback:

   ```
   [edit interfaces interface-name t1-options]
   user@host# set loopback remote
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0:0 t1-options]
   user@host# show
   loopback remote;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

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 7 in “Diagnose a Suspected Hardware Problem with a Channelized DS-3 Interface” on page 229. 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.