

## Chapter 25

# Use Loopback Testing for Multichannel DS-3 Interfaces

This chapter describes using loopback testing to isolate Multichannel DS-3 interface problems. (See Table 53.)

**Table 53: Checklist for Using Loopback Testing for Multichannel DS-3 Interfaces**

Multichannel DS-3 Interfaces Loopback Testing Tasks	Command or Action
<b>Diagnose a Suspected Hardware Problem with a Multichannel DS-3 Interface on page 259</b>	
1. Create a Loopback on page 259	
a. Create a Physical Loopback on page 259	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 259	[edit interfaces <i>interface name</i> (t3-options   t1-options)] set loopback local show commit
2. Verify That the Interface Is Up on page 261	show interfaces (ds-fpc/pic/port:channel:channel   t1-fpc/pic/port:channel)
3. Clear Interface Statistics on page 262	clear interfaces statistics (t1-fpc/pic/port:channel   ds-fpc/pic/port:channel:channel)
4. Force the Link Layer to Stay Up on page 262	
a. Configure Encapsulation to Cisco-HDLC on page 263	[edit interfaces <i>interface-name</i> ] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 263	[edit interfaces <i>interface-name</i> ] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 264	show interfaces (ds-fpc/pic/port:channel:channel   t1-fpc/pic/port:channel)
6. Ping the Channelized Interface on page 265	ping interface (ds-fpc/pic/port:channel:channel   t1-fpc/pic/port:channel) <i>local-IP-address</i> bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 266	show interfaces (ds-fpc/pic/port:channel:channel   t1-fpc/pic/port:channel) extensive

Multichannel DS-3 Interfaces Loopback Testing Tasks	Command or Action
<b>Diagnose a Suspected Circuit Problem on page 270</b>	
1. Create a Loop from the Router to the Network on page 270	
a. Loop the Entire T3 Interface towards the Network on page 270	[edit interfaces <i>interface-name</i> t3-options] set loopback remote show commit
b. Loop a Particular T1 Channel towards the Network on page 271	[edit interfaces <i>interface-name</i> t1-options] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 272	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Multichannel DS-3 Interface” on page 259.

## Diagnose a Suspected Hardware Problem with a Multichannel DS-3 Interface

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

1. Create a Loopback on page 259
2. Verify That the Interface Is Up on page 261
3. Clear Interface Statistics on page 262
4. Force the Link Layer to Stay Up on page 262
5. Verify the Status of the Logical Interface on page 264
6. Ping the Channelized Interface on page 265
7. Check for Interface Error Statistics on page 266

### 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 Multichannel 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 0, group 0, on a Multichannel DS-3 port for a channelized DS-3 to DS-0 interface:

```
[edit interfaces ds-2/1/0:0:0 t3-options]
```



**NOTE:** In order to configure T3 options on the Multichannel DS-3, you configure the first logical interfaces: ds-2/1/0:0:0 t3-options.

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The following is an example of the name for a T1 channel on a Multichannel 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 DS-1 or DS-3 interface to determine whether the physical link is up or down.

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

```
user@host> show interfaces (ds-fpc/pic/port:channel:channel |
t1-fpc/pic/port:channel)
```

**Sample Output** The following sample output is for a channelized DS-3 to DS-0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
Interface index: 36, SNMP ifIndex: 133
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS: 16, Mode: M23,
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: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
Input rate   : 0 bps (0 pps)
Output rate  : 0 bps (0 pps)
DS1 alarms  : None
DS3 alarms  : None
DS1 defects : None
DS3 defects : None

Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.140.196/30, Local: 192.168.140.197
```

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

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
Interface index: 50, SNMP ifIndex: 59
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None, FCS: 16,
Mode: M23, 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: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
Input rate   : 741512 bps (224 pps)
Output rate  : 1266528 bps (224 pps)
DS1 alarms  : None
DS3 alarms  : None
DS1 defects : None
DS3 defects : None

Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
```

Destination: 192.168.140.196/30, Local: 192.168.140.197

**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 Multichannel DS-3 port.

### Step 3: Clear Interface Statistics

**Purpose** You must reset the Multichannel 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 (ds-fpc/pic/port:channel:channel |
t1-fpc/pic/port:channel)
```

**Sample Output** user@host> clear interfaces statistics ds-1/1/0:0  
user@host>

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

**What It Means** This command clears the interface statistics counters for the Multichannel 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. You need to force the link layer to stay up by making some configuration changes to the encapsulation and keepalives.

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

1. Configure Encapsulation to Cisco-HDLC on page 263
2. Configure No-Keepalives on page 263

#### 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
```

**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 channelized DS-3 or DS-0 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 t1-0/1/1:8]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-0/1/1:8]
```

```
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 (ds-fpc/pic/port:channel:channel |
t1-fpc/pic/port:channel)
```

**Sample Output** The following sample output is for a channelized DS-3 to DS-0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
Interface index: 36, SNMP ifIndex: 133
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS: 16, Mode: M23,
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: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
DS1 alarms : None
DS3 alarms : None
DS1 defects : None
DS3 defects : None

Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.10.10.196/30, Local: 10.10.10.197
```

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

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
Interface index: 50, SNMP ifIndex: 59
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None, FCS: 16,
Mode: M23, 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: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
Input rate : 741512 bps (224 pps)
Output rate : 1266528 bps (224 pps)
DS1 alarms : None
DS3 alarms : None
DS1 defects : None
```



```

Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS: 16, Mode: M23,
Framing: ESF
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags : Keepalives
Hold-times : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
Input : 2 (last seen 00:00:05 ago)
Output: 2 (last sent 00:00:05 ago)
Statistics last cleared: 2002-08-01 10:14:45 UTC (00:00:16 ago)
Traffic statistics:
Input bytes :          524          304 bps
Output bytes :          528          304 bps
Input packets:           8           0 pps
Output packets:          8           0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes: 0,
L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC 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
LES            0
PES            0
PSES           0
SEFS           0
UAS            0
Interface transmit queues:
  B/W WRR   Packets   Bytes   Drops   Errors
Queue0  95  95       4       336     0       0
    
```

```

Queue1  5  5      1    22    0    0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots   : 1
Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Algorithm: Unknown (0), Induced Error rate: 10e-0
DS1 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
PFE configuration:
Destination slot: 2, PLP byte: 2 (0x2f)
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 ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast: Unspecified,
  Generation: 22

```

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

```

user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
Interface index: 50, SNMP ifIndex: 59, Generation: 49
Description: Customer
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None, FCS: 16,
Mode: M23, Framing: ESF
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags    : Keepalives
Hold-times    : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
Input : 117 (last seen 00:00:08 ago)
Output: 121 (last sent 00:00:01 ago)
Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
Traffic statistics:
Input bytes :      22459734      236888 bps
Output bytes :    162288645    1322208 bps
Input packets:      201233      214 pps
Output packets:    236341      227 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, 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
LES         0
PES         0
PSES        0
SEFS        0
UAS         0
Interface transmit queues:
      B/W WRR   Packets  Bytes  Drops  Errors
Queue0 95 95   234494 162020375 0      0
Queue1  5  5     164    5808    0      0
HDLC configuration:
Giant threshold: 1514, Runt threshold: 3
Timeslots : All active
Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
BERT time period: 0 seconds, Elapsed: 0 seconds
Algorithm: Unknown (0), 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)
PFE configuration:
Destination slot: 2, PLP byte: 2 (0xab)
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 t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast: Unspecified, Generation: 44

```

**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](mailto: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 270
2. Create a Loop to the Router from Various Points in the Network on page 272

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

**Steps To Take** To create a loop from the router to the network, follow these steps:

Loop the Entire T3 Interface towards the Network on page 270

Loop a Particular T1 Channel towards the Network on page 271

#### **Loop the Entire T3 Interface towards the Network**

**Purpose** Creating a loop from the entire T3 interface to the network allows the transport-layer engineer to test the router from various points in the network and isolate the problem.

**Action** To create a loop from the entire T3 interface 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 loopback:

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

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-2/1/1:0 t3-options]
user@host# show
loopback remote;
```

4. Commit the configuration:

```
user@host# commit
```

**What It Means** The loopback remote command loops any traffic from the network back into the network.

The interface name is one of the following:

T1 channel 0, channel group 0, on the Multichannel DS-3 port for a channelized DS-3 to DS-0 interface (for example, ds-2/1/1:0:0)

T1 channel 0 on the Multichannel DS-3 port for a channelized DS-3 to DS-1 interface (for example, t1-2/1/1:0)

### Loop a Particular T1 Channel towards 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 interface-name 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 ds-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. The interface name is one of the following:

Channel group 0 for the particular T1 channel on the Multichannel DS-3 port for a channelized DS-3 to DS-3 interface (for example, ds-2/1/1:2:0)

Particular T1 channel on the Multichannel DS-3 port for a channelized DS-3 to DS-1 interface (for example, t1-2/1/1:3)

## ***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 Step 2 through Step 7 in “Diagnose a Suspected Hardware Problem with a Multichannel DS-3 Interface” on page 259. 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.