



# Configuring the T3 or E3 CEM Interface Module

T3 or E3 interface on the 48-Port T3 or E3 Interface Module supports 48 ports. The channels on the T3 or E3 interface can be configured as either clear channel mode or channelized mode.



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**Note** T3/E3 is supported only on Cisco ASR 900 RSP3 Module.

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## Information About T3/E3 Interfaces

The following sections provide information about T3/E3 interfaces.

### Overview of T3/E3 Interfaces

The T3 or E3 interface supports two modes, clear channel mode and channelized mode. You can enable 28T1 or 16E1 only in channelized mode. Each T1 or E1 channel can be configured to use the entire T1 or E1 bandwidth for data transmission.

### Benefits of T3 or E3 Interfaces

The following are the benefits of T3/E3 interfaces:

- Higher bandwidth
- Flexibility by channelization

## Restrictions for Configuring T3 or E3 Interfaces

- You can configure CEM to support serial interface configuration.
- DS0 level Channelization is *not* supported.
- The G.832 framing mode is *not* supported.
- Synchronization Status Message (SSM) is not supported on T3 ports.
- The interoperability of Maintenance Data Link (MDL) is not supported with earlier version interface modules.
- The T3 or E3 port does not support sending Alarm Indication Signal (AIS) when local loopback is configured.

## Configuring T3 or E3 Interfaces

This section provides the information about how to configure a T3 or E3 interface. The T3 or E3 interface can be configured as clear channel mode or channelized mode.

### Configuring the Mode

To enable the mode on the T3/E3 interface module, follow these steps:

```
enable
configure terminal
controller mediatype 0/4/0
mode t3
exit
```

To disable the mode use the **no mode** command.

## Configuring the Controller - Clear Channel T3 or E3 Interfaces

### Before You Begin

When the clear channel T3 or E3 interface is used for the first time, the running configuration does not show the T3 or E3 controller. You can use the **show platform** command to check whether the chassis recognizes the T3 or E3 port and initializes the card correctly. After the port is configured for the slot, the respective controller appears in the running configuration and you can configure the clear channel T3 or E3 interface.

Perform this task to configure clear channel controller as T3.

```
enable
configure terminal
controller t3 0/4/40
no channelized
clock source line
no shut
exit
```



**Note** By default, the T3 controller is in C-Bit framing mode. To configure CEM, the framing mode must be set to unframed.

Perform this task to configure clear channel controller as E3.

```
enable
configure terminal
controller e3 0/4/40
clock source line
no shut
exit
```

## Verifying Controller Configuration of Clear Channel T3 Interfaces

Use the **show controllers** command to verify the controller configuration of clear channel T3 interface:

```
Router# show controllers t3 0/4/40
T3 0/4/40 is up.
Hardware is ASR903-48T3E3-CE

Applique type is Clear Channel T3
No alarms detected.
MDL transmission is disabled

FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
BER thresholds: SF = 10e-10 SD = 10e-10
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 Path Failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations,
```

```

    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
  Near End
    0 Line Code Violations,0 Path Code Violations,
    2 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Verifying Controller Configuration of Clear Channel E3 Interfaces

Use the **show controllers** command to verify the controller configuration of clear channel E3 interface:

```

Router# show controllers e3 0/4/40
E3 0/4/40 is up.
  Hardware is ASR903-48T3E3-CE

Applique type is Clear Channel e3
No alarms detected.

```

```

MDL transmission is disabled

FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
BER thresholds: SF = 10e-10 SD = 10e-10
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
  Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    0 Unavailable Secs, 0 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    0 Severely Errored Line Secs, 0 Path Failures
    0 AIS Defect Secs, 0 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
  Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
  Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

E1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures

```

```

Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations,0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs, 0 Path Failures

```

## Configuring the Controller - Channelized T3 or E3 Interfaces

### Before You Begin

When the channelized T3 or E3 interface is used for the first time, the running configuration does not show the T3 or E3 controller. You can use the **show platform** command to check if the chassis recognizes the T3 or E3 port and initializes the card properly. After the port is configured for the slot, the respective controller appears in the running configuration and you can configure the channelized T3 or E3 interface.

Perform this task to configure channelized controller as T3.

```

enable
configure terminal
controller t3 0/4/46
channelized
clock source line
no shut
exit

```




---

**Note** The channelized mode is the default mode for T3 interface.

---

Perform this task to configure channelized controller as E3.

```

enable
configure terminal
controller e3 0/4/46
channelized mode e1
framing g751
exit

```



**Note** The clear channel mode is the default mode for E3 interface.

**Table 1: Feature History**

Feature Name	Release Information	Description
Channelize the T3 interface into E1 lines	Cisco IOS XE Bengaluru 17.6.2	Support for the T3 interface to be channelized into 21 E1 lines.

Starting with Cisco IOS XE Bengaluru 17.6.2, T3 interface can be channelized to 21 E1 lines.

To channelize the T3 interface into E1 lines, use the following commands:

```
enable
configure terminal
controller MediaType0/1/1
mode t3
controller t30/1/1
channelized mode e1
framing c-bit
exit
```

## Verifying the Controller Configuration of Channelized T3 or T1 Interfaces

Use the **show controllers** command to verify the controller configuration of channelized T3 or T1 interfaces:

```
Router# show controllers t3 0/4/46

T3 0/4/46 is down.
Hardware is ASR903-48T3E3-CE

Applique type is Channelized T3
No alarms detected.
MDL transmission is disabled

FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
BER thresholds: SF = 10e-10 SD = 10e-10
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
```

```

    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```



## Verifying the Controller Configuration of Channelized E3 or E1 Interfaces

Use the **show controllers** command to verify the controller configuration of channelized E3 or E1 interfaces:

```
Router# show controllers e3 0/4/46

E3 0/4/46 is down.
Hardware is ASR903-48T3E3-CE
  Applique type is Channelized E3
    No alarms detected.
    MDL transmission is disabled

FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
BER thresholds: SF = 10e-10 SD = 10e-10
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
  Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    0 Unavailable Secs, 0 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    0 Severely Errored Line Secs, 0 Path Failures
    0 AIS Defect Secs, 0 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
  Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
  Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
E1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
  Near End
```

```

    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Configuring SAToP - Clear Channel T3 or E3 Interfaces

### Before You Begin

Before Structure-Agnostic TDM over Packet (SAToP) is configured, the controller of clear channel T3 interface must be configured.

```

enable
configure terminal
controller t3 0/4/40
no channelized
cem-group 0 unframed
interface CEM 0/4/40
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
exit

```

### Before You Begin

Before SAToP is configured, the controller of clear channel E3 interface must be configured.

```

enable
configure terminal
controller e3 0/4/40

```

```

no channelized
cem-group 0 unframed
interface CEM 0/4/40
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
exit

```

### Verifying the configuration



**Note** The **no channelize** is displayed in show running-configuration when cem-group 0 unframed is configured.

```

Router(config-controller)# show run
controller MediaType 0/4/40
mode e3
controller 0/4/40
threshold sd-ber 6
threshold sf-ber 3
no channelized
framing g751
cablelength short
cem-group 0 framed
controller MediaType 0/4/40
interface CEM8/1/10/4/40
no ip address
cem 0
!

```

## Verifying CEM Configuration of Clear Channel T3 or E3 Interfaces for SAToP

Use the **show run interface** command to verify the configuration of xconnect:

```

Router# show run interface cem 0/4/40

Current configuration : 96 bytes
!
interface CEM 0/4/40
no ip address
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
!
end

```

Use the **show cem circuit int cem** command to verify the CEM interface configuration of clear channel T3 or E3 interface for SAToP:

```

Router# show cem circuit int cem 0/4/40

CEM 0/4/40, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: down, T3 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 1024
Framing: Unframed
CEM Defects Set
None

Signalling: No CAS

```

```

RTP: No RTP

Ingress Pkts:    1321577      Dropped:        0
Egress Pkts:    1321577      Dropped:        0

CEM Counter Details
Input Errors:    0           Output Errors:   0
Pkts Missing:   0           Pkts Reordered: 0
Misorder Drops: 0           JitterBuf Underrun: 0
Error Sec:      0           Severly Errored Sec: 0
Unavailable Sec: 0          Failure Counts:  0
Pkts Malformed: 0          JitterBuf Overrun: 0

```

## Configuring SAToP - Channelized T3 Interfaces

### Before You Begin

Before SAToP is configured, the controller of channelized T3 interface must be configured.

```

enable
configure terminal
controller t3 0/4/12
channelized
t1 1 cem-group 0 unframed
interface CEM 0/4/12
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
exit

```

## Verifying the CEM Configuration of Channelized T3 or T1 Interfaces

Use the **show run controller** command to verify the CEM configuration of channelized T3 or T1 interface:

```
Router# show run controller t3 0/4/46
```

```

Current configuration : 109 bytes
!
Controller T3 0/4/46
framing c-bit
cablelength short
t1 1 cem-group 0 unframed
end

```

Use the **show cem circuit int cem** command to verify the CEM configuration of channelized T3 or T1 interface:

```
Router# show cem circuit int cem 0/4/46
```

```

CEM0/4/46, ID: 1, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Unframed
CEM Defects Set

```

```

None

Signalling: No CAS
RTP: No RTP

Ingress Pkts:    105043259      Dropped:        0
Egress Pkts:    105043387      Dropped:        0

CEM Counter Details
Input Errors:    0              Output Errors:   0
Pkts Missing:   0              Pkts Reordered: 0
Misorder Drops: 0              JitterBuf Underrun: 32
Error Sec:      0              Severly Errored Sec: 0
Unavailable Sec: 0             Failure Counts:  0
Pkts Malformed: 0             JitterBuf Overrun: 0
-
-
-
CEM0/4/46, ID: 28, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Unframed
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 136303 Dropped: 0
Egress Pkts: 0 Dropped: 0

CEM Counter Details
Input Errors: 0 Output Errors: 0
Pkts Missing: 135682 Pkts Reordered: 0
Misorder Drops: 0 JitterBuf Underrun: 137649
Error Sec: 0 Severly Errored Sec: 0
Unavailable Sec: 0 Failure Counts: 135
Pkts Malformed: 0 JitterBuf Overrun: 0

```

## Configuring SAToP - Channelized E3 Interfaces

### Before You Begin

Before SAToP is configured, the controller of channelized E3 interfaces must be configured.

```

enable
configure terminal
controller e3 0/4/46
channelized
e1 1 cem-group 0 unframed
interface CEM 0/4/46
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
exit

```

## Verifying the CEM Configuration of Channelized E3/E1 Interfaces

Use the **show run controller** command to verify the CEM configuration of channelized E3 or E1 interface:

```
Router# show run controller e3 0/4/46
```

```
Current configuration : 109 bytes
!
Controller E3 0/4/46
framing c-bit
clock source line
cablelength short
e1 1 cem-group 0 unframed
end
```

Use the **show cem circuit int cem** command to verify the CEM configuration of channelized E3 or E1 interface:

```
Router# show cem circuit int cem 0/4/46
```

```
CEM0/4/46, ID: 1, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 256
Framing: Unframed
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts:    105043259          Dropped:          0
Egress Pkts:    105043387          Dropped:          0

CEM Counter Details
Input Errors:    0                  Output Errors:    0
Pkts Missing:   0                  Pkts Reordered:  0
Misorder Drops: 0                  JitterBuf Underrun: 0
Error Sec:      0                  Severly Errored Sec: 0
Unavailable Sec: 0                  Failure Counts:   0
Pkts Malformed: 0                  JitterBuf Overrun: 0
```

## Configuring Framed SAToP - Channelized T3 Interfaces




---

**Note** Framing type should be maintained same in all routers end to end.

---

To configure the controller of channelized T3 interface for framed SAToP:

```
enable
configure terminal
controller t3 0/4/46
channelized mode
framing c-bit
t1 1 cem-group 0 framed
interface CEM 0/4/46
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
exit
```

## Verifying the CEM Configuration of Channelized T3 or T1 Interfaces for Framed SAToP

Use the **show run controller** command to verify the CEM configuration of channelized T3 or T1 interface for Framed SAToP:

```
Router# show run controller t3 0/4/46

Current configuration : 109 bytes
!
Controller T3 0/4/46
framing c-bit
cablelength short
t1 1 cem-group 0 framed
end
```

Use the **show cem circuit int cem** command to verify the CEM configuration of channelized T3 or T1 interface for Framed SAToP:

```
Router# show cem circuit int cem 0/4/46

CEM0/4/46, ID: 1, Line: UP, Admin: UP, Ckt: ACTIVE
Mode :Channelized-T1, T1: 1, CEM Mode: T1-SAToP
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Framed SAToP
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 27146 Dropped: 0
Egress Pkts: 27146 Dropped: 0

CEM Counter Details
Input Errors: 0 Output Errors: 0
Pkts Missing: 0 Pkts Reordered: 0
Misorder Drops: 0 JitterBuf Underrun: 0
Error Sec: 0 Severly Errored Sec: 0
Unavailable Sec: 0 Failure Counts: 0
Pkts Malformed: 0 JitterBuf Overrun: 0
Generated Lbits: 0 Received Lbits: 0
Generated Rbits: 0 Received Rbits: 0
```

## Configuring Framed SAToP - Channelized E3 Interfaces

To configure the controller of channelized E3 interfaces for Framed SAToP:

```
enable
configure terminal
controller e3 0/4/46
channelized mode e1
framing g751
e1 1 cem-group 0 framed
```

```
interface CEM 0/4/46
cem 0
xconnect 10.10.2.2 204 encapsulation mpls
exit
```

## Verifying the CEM Configuration of Channelized E3 or E1 Interfaces for Framed SAToP

Use the **show run controller** command to verify the CEM configuration of channelized E3 or E1 interface for Framed SAToP:

```
Router# show run controller e3 0/4/46
```

```
Current configuration : 109 bytes
!
Controller E3 0/4/46
clock source line
cablelength short
e1 1 cem-group 0 framed
end
```

Use the **show cem circuit int cem** command to verify the CEM configuration of channelized E3 or E1 interface for Framed SAToP:

```
Router# show cem circuit int cem 0/4/46
CEM0/4/46, ID: 1, Line: UP, Admin: UP, Ckt: ACTIVE
CEM0/4/46, ID: 1, Line: UP, Admin: UP, Ckt: ACTIVE
Mode :Channelized-E1, E1: 1, CEM Mode: E1-SAToP
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Framed SAToP
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 27146 Dropped: 0
Egress Pkts: 27146 Dropped: 0

CEM Counter Details
Input Errors: 0 Output Errors: 0
Pkts Missing: 0 Pkts Reordered: 0
Misorder Drops: 0 JitterBuf Underrun: 0
Error Sec: 0 Severly Errored Sec: 0
Unavailable Sec: 0 Failure Counts: 0
Pkts Malformed: 0 JitterBuf Overrun: 0
Generated Lbits: 0 Received Lbits: 0
Generated Rbits: 0 Received Rbits: 0
```

## MDL Messages

MDL messages are used to communicate identification information between local and remote ports. The MDL message includes:

- Equipment Identification Code (EIC)
- Location Identification Code (LIC)



- Frame Identification Code (FIC)
- Unit
- Path Facility Identification (PFI)
- Port Number
- Generator Identification Number




---

**Note** MDL messages are only supported when the T3 framing is set for C-bit parity.

---

The **no mdl** command removes the configuration of mdl messages.




---

**Note** MDL configuration is *not* supported for E3 interfaces.

---

## Configuring MDL for Path Transmission

To configure MDL path transmission messages on T3 controller configuration mode, use the following commands:

```
enable
configure terminal
controller t3 0/0/17
framing c-bit
mdl string eic beic
mdl string lic beic
mdl string fic bfix
mdl string unit bunit
mdl string pfi bphi
mdl transmit path
```

## Verifying MDL for Path Transmission Configuration

For PE1 Configuration:

Use the **show controller** command to display the verification of MDL path transmission configuration.

```
Router# show controllers t3 0/0/17

T3 0/0/17 is up.
  Hardware is ASR903-48T3E3-CE

  Applique type is Channelized T3
  No alarms detected.
  MDL transmission is disabled

  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
  BER thresholds: SF = 10e-10 SD = 10e-10
  Clock Source is internal
  Equipment customer loopback
  Data in current interval (240 seconds elapsed):
  Near End
```

```

    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    0 Unavailable Secs, 0 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    0 Severely Errored Line Secs, 0 Path Failures
    0 AIS Defect Secs, 0 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations

```

```

    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

For PE2 Configuration:

Use the **show controller** command to display the verification of MDL path transmission configuration.

```

Router# show controllers t3 0/0/18

T3 0/0/18 is up.
  Hardware is ASR903-48T3E3-CE

Applique type is Channelized T3
No alarms detected.
MDL transmission is enabled

Far-End MDL Information Received
  EIC: beic, LIC: beic, FIC: bfix, UNIT: bunit
  Idle Signal PORT_NO: bport
FEAC code received: DS3 Out-Of-Frame
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
Clock Source is internal
Equipment customer loopback

Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 Path Failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):

```

```

Near End
  0 Line Code Violations, 0 P-bit Coding Violations,
  0 C-bit Coding Violations, 0 P-bit Err Secs,
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
  20 Unavailable Secs, 20 Line Errored Secs,
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 path failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
  Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Configuring MDL for Idle Signal

To configure MDL idle signal messages on T3 controller configuration mode, use the following commands:

```

enable
configure terminal
controller T3 0/0/17
framing c-bit

```

```
mdl string eic beic
mdl string lic beic
mdl string fic bfix
mdl string unit bunit
mdl string port bport
mdl transmit idle-signal
```

## Verifying MDL for Idle Signal Configuration

For PE1 Configuration:

Use the **show controller** command to display the verification of MDL for idle signal configuration.

```
Router# show controllers t3 0/0/17

T3 0/0/17 is up.
  Hardware is ASR903-48T3E3-CE

  Applique type is Channelized T3
  No alarms detected.
  MDL transmission is disabled

  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
  BER thresholds: SF = 10e-10 SD = 10e-10
  Clock Source is internal
  Equipment customer loopback
  Data in current interval (240 seconds elapsed):
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations
      0 C-bit Coding Violations, 0 P-bit Err Secs
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
      0 Unavailable Secs, 0 Line Errored Secs
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      0 Severely Errored Line Secs, 0 Path Failures
      0 AIS Defect Secs, 0 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs
  Data in Interval 1:
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations
      0 C-bit Coding Violations, 0 P-bit Err Secs
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
      20 Unavailable Secs, 20 Line Errored Secs
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      20 Severely Errored Line Secs, 1 Path Failures
      0 AIS Defect Secs, 20 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs
  Total Data (last 1 15 minute intervals):
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations,
      0 C-bit Coding Violations, 0 P-bit Err Secs,
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
      20 Unavailable Secs, 20 Line Errored Secs,
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      20 Severely Errored Line Secs, 1 path failures
      0 AIS Defect Secs, 20 LOS Defect Secs
    Far End
```

```

    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations,0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs, 0 Path Failures

```

#### For PE2 Configuration:

Use the **show controller** command to display the verification of MDL for idle signal configuration.

```

Router# show controllers t3 0/0/18

T3 0/0/18 is up.
Hardware is ASR903-48T3E3-CE

Applique type is Channelized T3
No alarms detected.
MDL transmission is enabled

Far-End MDL Information Received
  EIC: beic, LIC: beic, FIC: bfix, UNIT: bunit
  Idle Signal PORT_NO: bport
FEAC code received: DS3 Out-Of-Frame
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft

```

```

Clock Source is internal
Equipment customer loopback

Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 Path Failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations,
  0 C-bit Coding Violations, 0 P-bit Err Secs,
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
  20 Unavailable Secs, 20 Line Errored Secs,
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 path failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins

```

```

    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Configuring MDL for Test Signal

To configure MDL test signal messages on T3 controller configuration mode, use the following commands:

```

enable
configure terminal
controller t3 0/0/17
framing c-bit
mdl string eic beic
mdl string lic beic
mdl string fic bfix
mdl string unit bunit
mdl string generator bgen
mdl transmit test-signal

```

## Verifying MDL for Test Signal Configuration

For PE1 Configuration:

Use the **show controller** command to display the verification of MDL for test signal configuration.

```

Router# show controllers t3 0/0/17
T3 0/0/17 is up.
Hardware is ASR903-48T3E3-CE

Applique type is Channelized T3
No alarms detected.
MDL transmission is enabled
  EIC: beic, LIC: beic, FIC: bfix, UNIT: bunit
  Test Signal GEN_NO: bgen
FEAC code received: DS3 Out-Of-Frame
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs

```



```

    0 Severely Errored Line Secs, 0 Path Failures
    0 AIS Defect Secs, 0 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End

```

```

    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

For PE2 Configuration:

Use the **show controller** command to display the verification of MDL for test signal configuration.

```

Router# show controllers t3 0/0/18
T3 0/0/18 is up.
Hardware is ASR903-48T3E3-CE

Applique type is Channelized T3
No alarms detected.
MDL transmission is disabled

Far-End MDL Information Received
  EIC: beic, LIC: beic, FIC: bfix, UNIT: bunit
  Test Signal GEN_NO: bgen
FEAC code received: DS3 Out-Of-Frame
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 Path Failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations,
  0 C-bit Coding Violations, 0 P-bit Err Secs,
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
  20 Unavailable Secs, 20 Line Errored Secs,
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 path failures

```

```

    0 AIS Defect Secs, 20 LOS Defect Secs
  Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
  FDL per AT&T 54016 spec.
  No alarms detected.
  Framing is ESF, Clock Source is Internal
  Data in current interval (250 seconds elapsed):
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
  Data in Interval 1:
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
  Total Data (last 1 15 minute intervals):
  Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Performance Monitoring

You can view the statistics or error count generated on the TDM lines for T3 interfaces.

```

enable
configure terminal
controller MediaType 0/0/0
mode t3
controller t3 0/0/0
framing c-bit
cablelength
long 224-450 ft
short 0-224 ft
controller MediaType 0/0/15
mode t3

```

```

controller T3 0/0/15
framing c-bit
cablelength short

```

To view the statistics or error count generated on the TDM lines for T3 interfaces, use the **show controller** command:

```

Router# show controller T3 0/0/0
T3 0/0/0 is up.
  Hardware is ASR900-48T3E3-CE

  Applique type is Channelized T3
  No alarms detected.
  MDL transmission is disabled

  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
  BER thresholds: SF = 10e-10 SD = 10e-10
  Clock Source is internal
  Equipment customer loopback
  Data in current interval (240 seconds elapsed):
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations
      0 C-bit Coding Violations, 0 P-bit Err Secs
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
      0 Unavailable Secs, 0 Line Errored Secs
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      0 Severely Errored Line Secs, 0 Path Failures
      0 AIS Defect Secs, 0 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs
  Data in Interval 1:
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations
      0 C-bit Coding Violations, 0 P-bit Err Secs
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
      20 Unavailable Secs, 20 Line Errored Secs
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      20 Severely Errored Line Secs, 1 Path Failures
      0 AIS Defect Secs, 20 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs
  Total Data (last 1 15 minute intervals):
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations,
      0 C-bit Coding Violations, 0 P-bit Err Secs,
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
      20 Unavailable Secs, 20 Line Errored Secs,
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      20 Severely Errored Line Secs, 1 path failures
      0 AIS Defect Secs, 20 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs

  T1 1 is up
  timeslots:
  FDL per AT&T 54016 spec.
  No alarms detected.

```

```

Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations,0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs, 0 Path Failures

```

### Use Case 1

If your configuration is as follows:

- T3 is up
- No Alarms
- Framing is unframed
- Clock Source is Internal

This performance monitoring result is displayed:

```

T3 is up
No alarms detected.
Framing is unframed, Clock Source is Internal
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs

```

```

Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 Path Failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations,
  0 C-bit Coding Violations, 0 P-bit Err Secs,
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
  20 Unavailable Secs, 20 Line Errored Secs,
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 path failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,

```

```

    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Use Case 2

If your configuration is as follows:

- T1 28 is up or E1 16 is up
- No alarm received
- Framing is unframed
- Clock Source is Internal

This performance monitoring result is displayed:

```

T1 28 is up
No alarms detected.
Framing is unframed, Clock Source is Internal
Data in current interval (240 seconds elapsed):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    0 Unavailable Secs, 0 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    0 Severely Errored Line Secs, 0 Path Failures
    0 AIS Defect Secs, 0 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures

```

```

0 Code Violations, 0 Service Affecting Secs

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations,0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs, 0 Path Failures

```

To view the statistics or error count generated on the TDM lines for T3 interfaces, use the **show controller** command is:

```

Router# show controllers t3 0/0/0
T3 0/0/0 is down.
Hardware is ASR900-48T3E3-CE

Applique type is Channelized T3
Receiver has loss of signal.
Framing is Unknown, Line Code is B3ZS, Cablelength Short less than 225ft
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures

```



```

    0 AIS Defect Secs, 0 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
    0 Line Code Violations, 0 P-bit Coding Violations
    0 C-bit Coding Violations, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    20 Unavailable Secs, 20 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

Tl 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations,0 Path Code Violations,

```

```

0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
0 Unavailable Secs, 0 Stuffed Secs
1 Path Failures, 2 SEF/AIS Secs
Far End
0 Line Code Violations,0 Path Code Violations
0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
0 Unavailable Secs, 0 Path Failures

```

The performance monitoring result displays the statistics TDM lines for DS1.

**Table 2: Feature History Table**

Feature Name	Release Information	Description
GR-820-CORE Performance Monitoring	Cisco IOS XE Bengaluru 17.5.1	The <b>show controller tabular</b> command enables you to view the performance monitoring details in tabular form as per GR-820-Core standards.

To view the performance monitoring details on T3 controller, use the **show controller t3 tabular** command:

```

Router#show controllers t3 0/2/0 tabular
T3 0/2/0 is up.
Hardware is ASR900-48T3E3-CE

Applique type is Subrate T3
No alarms detected.
MDL transmission is disabled

FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
BER thresholds: SF = 10e-3 SD = 10e-6
Clock Source is internal
Equipment customer loopback
Near End Data
INTERVAL      CV-L  ES-L  SES-L  LOSS-L  CVP-P  CVCP-P  ESP-P  ESCP-P  SESP-P  SESP-P  SAS-P
AISS-P  FC-P  UASP-P  UASCP-P
19:03-19:11    0    0    0    0    0    0    0    0    0    0    0
0    0    0    0
18:48-19:03    0    0    0    0    0    0    0    0    0    0    0
0    0    0    0
Total          0    0    0    0    0    0    0    0    0    0    0
0    0    0    0
Far End Data
INTERVAL      CVCP-PFE  ESCP-PFE  SESP-PFE  UASCP-PFE  FCCP-PFE  SASCP-PFE
19:03-19:11    0    0    0    0    0    0
18:48-19:03    0    0    0    0    0    0
Total          0    0    0    0    0    0

```

To view the performance monitoring details on channelised T1-T3 controller, use the **show controller t3 tabular** command:

```

Router#show controllers t3 0/2/4 tabular
T3 0/2/4 is down.
Hardware is ASR900-48T3E3-CE

Applique type is Channelized T3/T1
Receiver has loss of signal.
MDL transmission is disabled

FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft

```

```

BER thresholds: SF = 10e-3 SD = 10e-6
Clock Source is internal
Equipment customer loopback
Near End Data
INTERVAL      CV-L  ES-L  SES-L  LOSS-L  CVP-P  CVCP-P  ESP-P  ESCP-P  SESP-P  SESP-P  SAS-P
AISS-P  FC-P  UASP-P  UASCP-P
19:02-19:09    0  459  459    459      0      0      0      0      0      0      0
              0  1    459    459
Far End Data
INTERVAL      CVCP-PFE  ESCP-PFE  SESP-PFE  UASCP-PFE  FCCP-PFE  SASCP-PFE
19:02-19:09          0          0          0          0          0          0

T3 0/2/4.1 T1 is down
timeslots:
FDL per AT&T 54016 spec.
Receiver is getting AIS.
Framing is ESF, Clock Source is Internal
Near End Data
INTERVAL      CV-L  ES-L  CV-P  ES-P  SES-P  CSS-P  SAS-P  UAS-P  FC-P
19:02-19:09    0      0      0      0      0      0      0      0      1
Far End Data
INTERVAL      ES-LFE  ES-PFE  SES-PFE  SEFS-PFE  CSS-PFE  UAS-PFE  FC-PFE
19:02-19:09          0          0          0          0          0          0          0

```

## Circuit Emulation Service over Packet-Switched Network

CESoPSN is a method for encapsulating structured (NxDS0) TDM signals as pseudowires over packet switching networks.

### Restrictions for CESoPSN on T3 or E3 Controller

- The maximum number of CEM interface supported is 1344.
- The change of framing from C-bit to M13 is not supported on the T3 interface, where as the change of framing from G.751 to G.832 is supported on the E3 interface.
- CT3-E1 and CE3-T1 is not supported and only CT3-T1 and CE3-E1 is supported.
- DS0 loopback is not supported on the T3 interface.
- Alarm forwarding is not supported on the T3 interface.
- Card protection is not supported on the T3 interface.

### Configuring CESoPSN - Channelized T3 or E3 Interfaces

Before You Begin

Create CEM group for channelized T3 interface, use the following commands:

```

enable
configure terminal
controller MediaType 0/5/1
 mode t3
channelized
controller T3 0/5/1

```

```

framing c-bit
cablelength short
t1 1 cem-group 1 timeslots 10
exit

```

Create CEM group for channelized E3 interface, use the following commands:

```

enable
configure terminal
controller MediaType 0/5/1
mode e3
channelized mode e1
controller e3 0/14/0
channelized
cablelength short
e1 1 cem-group 0 timeslots 10
exit

```

Configure xconnect:

```

int cem 0/14/0
cem 0
xconnect 1.1.1.1 9999 encapsulation mpls

```

Verify the xconnect status:

```

sh xconnect all | i 9999
UP pri ac CE0/14/0:0(CESoPSN Basic) UP mpls 1.1.1.1:9999 UP

```

## Verifying CESoPSN Configurations - Channelized E3 Interface

This section includes show commands for CESoPSN:

```

Router# show controllers e3 0/14/2
E3 0/14/2 is up.
Hardware is ASR903-48T3E3-CE
Applique type is Channelized E3
No alarms detected.
Framing is E3 G751, Line Code is HDB3, Cablelength Short less than 225ft
BER thresholds: SF = 10e-10 SD = 10e-10
Clock Source is internal, National Bit 0
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs

```

```

    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 Path Failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations, 0 P-bit Coding Violations,
    0 C-bit Coding Violations, 0 P-bit Err Secs,
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
    20 Unavailable Secs, 20 Line Errored Secs,
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    20 Severely Errored Line Secs, 1 path failures
    0 AIS Defect Secs, 20 LOS Defect Secs
Far End
    0 Errored Secs, 0 Severely Errored Secs
    0 C-bit Unavailable Secs, 0 Path Failures
    0 Code Violations, 0 Service Affecting Secs

E1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is crc4, Clock Source is Internal, National bits are 0x1F.
Data in current interval (250 seconds elapsed):
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

```

router# sh mpls l2 vc interface cem 0/14/0 0
-----
Local intf      Local circuit      Dest address      VC ID      Status
-----
CE0/14/0       CESoPSN Basic 0    1.1.1.1           9999       UP

```

```

router# sh mpls l2transport vc 9090 detail
Local interface: CE0/14/2 up, line protocol up, CESoPSN Basic 0 up
Destination address: 1.1.1.1, VC ID: 9090, VC status: up
Output interface: Te0/12/0, imposed label stack {130}
Preferred path: not configured
Default path: active
Next hop: 123.123.123.1
Create time: 00:18:44, last status change time: 00:18:30
Last label FSM state change time: 00:18:30
Signaling protocol: LDP, peer 1.1.1.1:0 up
Targeted Hello: 2.2.2.2(LDP Id) -> 1.1.1.1, LDP is UP
Graceful restart: not configured and not enabled
Non stop routing: configured and not enabled
Status TLV support (local/remote) : enabled/supported
LDP route watch : enabled
Label/status state machine : established, LruRru
Last local dataplane status rcvd: No fault
Last BFD dataplane status rcvd: Not sent
Last BFD peer monitor status rcvd: No fault
Last local AC circuit status rcvd: No fault
Last local AC circuit status sent: No fault
Last local PW i/f circ status rcvd: No fault
Last local LDP TLV status sent: No fault
Last remote LDP TLV status rcvd: No fault
Last remote LDP ADJ status rcvd: No fault
MPLS VC labels: local 130, remote 130
Group ID: local 207, remote 220
MTU: local 0, remote 0
Remote interface description:
Sequencing: receive disabled, send disabled
Control Word: On (configured: autosense)
SSO Descriptor: 1.1.1.1/9090, local label: 130
Dataplane:
SSM segment/switch IDs: 1237749/557811 (used), PWID: 114
VC statistics:
transit packet totals: receive 0, send 0
transit byte totals: receive 0, send 0
transit packet drops: receive 0, seq error 0, send 0
ASR907# sh cem circuit interface cem 0/14/2 0
CEM0/14/2, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Mode :Channelized-E1, E1: 1, CEM Mode: E1-CESoP
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 160
Framing: Framed (DS0 channels: 1-20)
CEM Defects Set
None
Signalling: No CAS
RTP: No RTP
Ingress Pkts: 24005 Dropped: 0
Egress Pkts: 24005 Dropped: 0
CEM Counter Details
Input Errors: 0 Output Errors: 0
Pkts Missing: 0 Pkts Reordered: 0

```

```

Misorder Drops: 0
Error Sec: 0
Unavailable Sec: 0
Pkts Malformed: 0
Generated Lbits: 0
Generated Rbits: 0
Generated Mbits: 0
JitterBuf Underrun: 0
Severly Errored Sec: 0
Failure Counts: 0
JitterBuf Overrun: 0
Received Lbits: 0
Received Rbits: 0
Received Mbits: 0

```

## Troubleshooting the T3 or E3 Interface Module

To troubleshoot T3 or E3, you must configure the following:

- Bit Error Rate Testing (BERT)
- Loopback

### Overview of BERT

Bit Error Rate Testing (BERT) is used to test the integrity of the physical line.

The interface contains on board BERT circuitry. With this circuitry, the interface software can send and detect a programmable pattern that is compliant with CCITT/ITU O.151, O.152, O.153 pseudo-random, and repetitive test patterns. BERTs allow you to test cables and signal problems in the field.

The bit error rate (BER) is determined by comparing the erroneous bits received with the total number of bits received. You can display and analyze the total number of error bits transmitted and the total number of bits received on the link. You can retrieve error statistics anytime during the BERT.

Both the total number of bits and the error bits received are available for analysis. You can select the testing period from 1 minute to 24 hours and you can also retrieve the error statistics anytime during the BERT test.

#### Running a BERT Test

When running a BERT test, the system expects to receive the same pattern that it transmits. To help ensure this, two common options are available:

- Use a loopback somewhere in the link or network
- Configure remote testing equipment to transmit the same BERT test pattern at the same time.

The BERT runtime engine can be kept running until the interval completes or can be stopped by unconfiguring it anytime.

#### Types of BERT

BERT is supported in two directions:

- Line - supports BERT in TDM direction
- System - supports BERT in PSN direction

BERT engines uses different BERT patterns for transmission for each mode. The supported BERT patterns on each card is described.

## Restrictions for BERT

- The BERT pattern 2<sup>23</sup> is not supported until Cisco IOS XE 16.9.4 Fuji Release. Starting with Cisco IOS XE Fuji 16.9.5, the BERT pattern 2<sup>23</sup> is supported.
- If BERT is configured at Line direction at timeslot level, the initial CEM configuration must exist, and have the same timeslot value as specified in the BERT configuration until Cisco IOS XE 16.9.4 Fuji Release.
- BERT at the System direction is not supported on partial timeslots and framed SAToP until Cisco IOS XE 16.9.4 Fuji Release. Starting with Cisco IOS XE 16.9.5 Fuji, BERT is supported in the system direction for framed SAToP.

## BERT Patterns on T3/E3 Interface Module

Bit error rate testing (BERT) is supported on T3/E3 interfaces.

- You can run 16 BERTs at a time.
- The test can be either of the T1/E1 or the T3/E3 interface.

**Table 3: Feature History**

Feature Name	Release Information	Description
Support for all 0s and 1s BERT Patterns	Cisco IOS XE Bengaluru 17.4.1	Support for all 0s and 1s BERT patterns on T3 or E3 interfaces.

The BERT patterns on the 48-port T3/E3 interface module are:

**Table 4: BERT Pattern Descriptions**

Keyword	Description
<b>All 1s</b> <a href="#">1</a>	Pseudo-random binary test pattern consisting of all 1's that is used to test alternating line volt and repeaters.
<b>All 0s</b>	Pseudo-random binary test pattern consisting of all 0's that is used for test line coding.
<b>2<sup>15-1</sup> O.151</b>	Pseudo-random O.151 test pattern consisting of a maximum of 14 consecutive zeros and 15 consecutive ones. The length of this pattern is 32,768 bits.
<b>2<sup>20</sup>-O.151</b>	Pseudo-random O.151 test pattern consisting of a maximum of 19 consecutive zeros and 20 consecutive ones. The length of this pattern is 1,048,575 bits.
<b>2<sup>20</sup>-O.153</b>	Pseudo-random O.153 test pattern consisting of a maximum of 19 consecutive zeros and 20 consecutive ones. The length of this pattern is 1,048,575 bits.



Keyword	Description
<b>2^23-1 O.151</b>	Pseudo-random 0.151 test pattern consisting of a maximum of 22 consecutive zeros and 23 consecutive ones. The length of this pattern is 8,388,607 bits.
<b>2^9</b> <a href="#">2</a>	Pseudo-random binary test pattern consisting of a maximum of eight consecutive zeros and nine consecutive ones. The length of this pattern is 511 bits.
<b>2^11</b> <a href="#">3</a>	Pseudo-random binary test pattern consisting of a maximum of ten consecutive zeros and eleven consecutive ones. The length of this pattern is 2048 bits.

<sup>1</sup> Starting with Cisco IOS XE Bengaluru 17.4.1, All Is are supported on all modes.

<sup>2</sup> Starting with Cisco IOS XE Gibraltar 16.12.1, 2^9 is supported on both T3 and T1 modes.

<sup>3</sup> Starting with Cisco IOS XE Fuji 16.9.5, 2^11 is supported on both T3 and T1 modes.

## Configuring BERT - T3 or E3 Interfaces for SAToP

### Before You Begin

Before you configure BERT for clear channel T3 or E3 interfaces, ensure that controller and CEM are configured.

To run a BERT on clear channel T3 or E3 interface, perform the following tasks in global configuration mode.

```
enable
configure terminal
controller t3 0/0/1
no channelized
bert pattern 0s interval 30 direction line
exit
```

To run a BERT on channelized T3 interface or channelized E3 interface, perform the following tasks in global configuration mode.

```
enable
configure terminal
controller t3 0/0/1
channelized
t1 1 bert pattern 0s interval 30 direction line
exit
```



**Note** To terminate a BERT test during the specified test period, use the **no bert** command.

You can view the results of a BERT test at the following points of time:

- After you terminate the test using the **no bert** command

- After the test runs completely
- Anytime during the test (in real time)

## Verifying the BERT for T3/E3 Interfaces

Use the **show controller** command to verify the BERT configuration for clear channel T3/E3 interfaces:

```
Router# show controllers t3 0/4/40 | sec BERT
BERT test result (running)
  Test Pattern : 2^15, Status : Not Sync, Sync Detected : 0
  DSX3 BERT direction : Line
  Interval : 5 minute(s), Time Remain : 3 minute(s)
  Bit Errors (since BERT started): 0 bits,
  Bits Received (since BERT started): 0 Kbits
  Bit Errors (since last sync): 0 bits
  Bits Received (since last sync): 0 Kbits
```

Use the **show controller** command to verify the BERT configuration of channelized T3/T1 interfaces or channelized E3/E1 interfaces:

```
Router# sh controller t3 0/3/0 | be T1 1
T1 1 is up
  timeslots:
  FDL per AT&T 54016 spec.
  Receiver is getting AIS.
  Framing is ESF, Clock Source is Internal
  BERT test result (running)
    Test Pattern : 2^23, Status : Not Sync, Sync Detected : 0
    Interval : 5 minute(s), Time Remain : 00:01:44
    Bit Errors (since BERT started): 299 Mbits,
    Bits Received (since BERT started): 299 Mbits
    Bit Errors (since last sync): 0 bits
    Bits Received (since last sync): 0 Kbits
    Direction : Line
  Data in current interval (250 seconds elapsed):
    Near End
      0 Line Code Violations, 0 Path Code Violations
      0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
      0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
      0 Unavailable Secs, 0 Stuffed Secs
      0 Path Failures, 0 SEF/AIS Secs
    Far End
      0 Line Code Violations, 0 Path Code Violations
      0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
      0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
      0 Unavailable Secs 0 Path Failures
  Data in Interval 1:
    Near End
      0 Line Code Violations, 0 Path Code Violations
      0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
      2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
      0 Unavailable Secs, 0 Stuffed Secs
      1 Path Failures, 2 SEF/AIS Secs
    Far End
      0 Line Code Violations, 0 Path Code Violations
      0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
      3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
      0 Unavailable Secs 0 Path Failures
  Total Data (last 1 15 minute intervals):
```

```

Near End
 0 Line Code Violations,0 Path Code Violations,
 0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
 2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
 0 Unavailable Secs, 0 Stuffed Secs
 1 Path Failures, 2 SEF/AIS Secs
Far End
 0 Line Code Violations,0 Path Code Violations
 0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
 3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
 0 Unavailable Secs, 0 Path Failures

```

## BERT for CESoPSN

BERT is supported at the TDM side and pseudowire side. BERT can be used either at NxDS0 or DS1 but not together.

BERT is supported on following controllers:

- T1—NxDS0, DS1
- T3—NxDS0, DS1 (channelised), clear channel DS3.
- OCX—NxDS0, DS1 (channelised),DS3(channelised), clear channel DS3,STS1,STS-nc,VT-1.5,VT1.5 T1

## Configuring BERT - T3 or E3 Interfaces for CESoPSN

### Before You Begin

Before you configure BERT for clear channel T3 or E3 interfaces, ensure that the controller and CEM are configured.

To run a BERT on the T3 interface, use the following commands:

```

configure terminal
controller t3 0/5/0
t1 1 bert timeslots 1 pattern 2^15 interval 1

```

To run a BERT on the E3 interface, use the following commands:

```

config terminal
controller e3 0/5/0
e1 1 bert timeslots 1 pattern 2^15 interval 1

```




---

**Note** To terminate a BERT test during the specified test period, use the **no bert** command.

---

You can view the results of a BERT test at the following points of time:

- After you terminate the test using the **no bert** command
- After the test runs completely

- Anytime during the test (in real time)

## Verifying BERT for CESoPSN on T3 or E3 Interface

Use the following command to verify the BERT configuration for CESoPSN on T3 interfaces:

```
Router# show controllers t3 0/5/0
T3 0/5/0 is up.
  Hardware is ASR903-48T3E3-CE

  Applique type is Channelized T3
  No alarms detected.
  MDL transmission is disabled

  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
  BER thresholds: SF = 10e-3 SD = 10e-6
  Clock Source is internal
  Equipment customer loopback
  Data in current interval (240 seconds elapsed):
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations
      0 C-bit Coding Violations, 0 P-bit Err Secs
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
      0 Unavailable Secs, 0 Line Errored Secs
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      0 Severely Errored Line Secs, 0 Path Failures
      0 AIS Defect Secs, 0 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs
  Data in Interval 1:
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations
      0 C-bit Coding Violations, 0 P-bit Err Secs
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
      20 Unavailable Secs, 20 Line Errored Secs
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      20 Severely Errored Line Secs, 1 Path Failures
      0 AIS Defect Secs, 20 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs
  Total Data (last 1 15 minute intervals):
    Near End
      0 Line Code Violations, 0 P-bit Coding Violations,
      0 C-bit Coding Violations, 0 P-bit Err Secs,
      0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
      20 Unavailable Secs, 20 Line Errored Secs,
      0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
      20 Severely Errored Line Secs, 1 path failures
      0 AIS Defect Secs, 20 LOS Defect Secs
    Far End
      0 Errored Secs, 0 Severely Errored Secs
      0 C-bit Unavailable Secs, 0 Path Failures
      0 Code Violations, 0 Service Affecting Secs

  T1 1 is down
  timeslots: 1-24
  FDL per AT&T 54016 spec.
```

```

Receiver has remote alarm.
Framing is ESF, Clock Source is Recovered 1
BERT running on timeslots 1,
BERT test result (running)
  Test Pattern : 2^15, Status : Sync, Sync Detected : 0
  Interval : 0 minute(s), Time Remain : 00:00:37
  Bit Errors (since BERT started): 0 bits,
  Bits Received (since BERT started): 137 Kbits
  Bit Errors (since last sync): 0 bits
  Bits Received (since last sync): 137 Kbits
  Direction   : Line
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations,0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs, 0 Path Failures

```

You can view the results of a BERT test at the following times:

- After you terminate the test using the **no bert** command
- After the test runs completely
- Anytime during the test (in real time)

## Loopback on T3 or E3 Interfaces

### Loopback Description

You can use the following loopback on the clear and channelized T3 or E3 interfaces.

Loopback	Description
<b>loopback local</b>	Loops the transmitting signal back to the receiver.
<b>loopback network line</b>	Loops the incoming signal back to the interface using the line loopback mode of the framer. The framer does not reclock or reframe the incoming data. All incoming data is received by the interface driver.

## Configuring Loopback for T3 or E3 Interfaces

To set a loopback local on the clear channel T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
loopback local
exit
```

To set a loopback network on the clear channel T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
loopback network line
exit
```

To set a loopback local on the channelized channel T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
channelized
t1 1 loopback local
exit
```

To set a loopback network on the channelized channel T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
channelized
t1 1 loopback network line
exit
```




---

**Note** To remove a loopback, use the **no loopback** command.

---



**Note** Network payload configuration is not supported on the port configured with SAToP. To configure loopback network payload when SAToP is configured, you need to remove the CEM configuration and then configure the loopback.

## Loopback Remote on T1 and T3 Interfaces

The remote loopback configuration attempts to put the far-end T1 or T3 into a loopback.

The remote loopback setting loops back the far-end at line or payload, using IBOC (inband bit-orientated CDE) or the ESF loopback codes to communicate the request to the far-end.

### Restrictions for Loopback Remote

- E1 and E3 loopback remote are not supported until Cisco IOS XE Fuji 16.9.4 release. Starting from Cisco IOS XE Fuji 16.9.5 release, E1 and E3 loopback remote are supported.
- IBOC loopcode configuration is not supported when CESoP or SATOP (framed or unframed) is configured.
- ESF loopcode configuration is not supported when SAToP is configured.

### Configuring Loopback Remote on T1 and T3 Interface

To set T3 loopback remote line or payload for T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
loopback remote {line | payload}
exit
```

To set T1 loopback remote iboc fac1/fac2/csu for T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
t1 1 loopback remote iboc {fac1 | fac2 | csu}
exit
```

To set T1 loopback remote iboc esf line csu/esf payload for T3 or E3 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t3 0/0/1
t1 1 loopback remote iboc esf {line csu | payload}
```

### Verifying the Loopback Remote Configuration on T1 or T3 Interfaces

Use the following command to check the loopback remote configuration on a T3 interface module:

```

router# show running-config | sec 0/0/1
controller MediaType 0/0/1
mode t3
controller T3 0/0/1
threshold sd-ber 6
threshold sf-ber 3
no channelized
framing c-bit
cablelength short
loopback remote line

```

Use the following command to verify the loopback remote configuration on a T3 interface module:

```

router(config-controller)# do show controller t3 0/0/1
T3 0/0/1 is up. (Configured for Remotely Looped)
Currently in Remotely Line Looped
Hardware is A900-48T3E3-CE
Applique type is Subrate T3
Receiver has no alarms.
MDL transmission is disabled
FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Cablelength Short less than 225ft
BER thresholds: SF = 10e-10 SD = 10e-10
Clock Source is internal
Equipment customer loopback
Data in current interval (240 seconds elapsed):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  0 Unavailable Secs, 0 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  0 Severely Errored Line Secs, 0 Path Failures
  0 AIS Defect Secs, 0 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Data in Interval 1:
Near End
  0 Line Code Violations, 0 P-bit Coding Violations
  0 C-bit Coding Violations, 0 P-bit Err Secs
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
  20 Unavailable Secs, 20 Line Errored Secs
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 Path Failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations, 0 P-bit Coding Violations,
  0 C-bit Coding Violations, 0 P-bit Err Secs,
  0 P-bit Severely Err Secs, 0 Severely Err Framing Secs,
  20 Unavailable Secs, 20 Line Errored Secs,
  0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
  20 Severely Errored Line Secs, 1 path failures
  0 AIS Defect Secs, 20 LOS Defect Secs
Far End
  0 Errored Secs, 0 Severely Errored Secs
  0 C-bit Unavailable Secs, 0 Path Failures
  0 Code Violations, 0 Service Affecting Secs

```



```

T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
  0 Unavailable Secs, 0 Stuffed Secs
  1 Path Failures, 2 SEF/AIS Secs
Far End
  0 Line Code Violations,0 Path Code Violations
  0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
  0 Unavailable Secs, 0 Path Failures

```

Use the following command to check the loopback remote configuration on a T1 interface module:

```

Router#show run | sec 0/4/15
controller MediaType 0/4/15
mode t3
controller T3 0/4/15
threshold sd-ber 6
threshold sf-ber 3
framing c-bit
cablelength short
t1 1 Loopback remote iboc fac1

```

Use the following command to verify the loopback remote configuration on a T1 interface module:

```

Router#show controller t3 0/4/15 | be T1 1
T1 1 is up
timeslots:
FDL per AT&T 54016 spec.
Configured for NIU FAC1 Line Loopback with IBOC
Currently in Inband Remotely Line Looped

```

```

Receiver has no alarms.
Framing is ESF, Clock Source is Internal
Data in current interval (250 seconds elapsed):
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    0 Path Failures, 0 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Data in Interval 1:
  Near End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs 0 Path Failures
Total Data (last 1 15 minute intervals):
  Near End
    0 Line Code Violations,0 Path Code Violations,
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    2 Errored Secs, 0 Bursty Err Secs, 2 Severely Err Secs
    0 Unavailable Secs, 0 Stuffed Secs
    1 Path Failures, 2 SEF/AIS Secs
  Far End
    0 Line Code Violations,0 Path Code Violations
    0 Slip Secs, 2 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    3 Errored Secs, 0 Bursty Err Secs, 3 Severely Err Secs
    0 Unavailable Secs, 0 Path Failures

```

## Associated Commands

The commands used to configure the interfaces.

Commands	URL
<b>controller mediatype</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp3512725718">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp3512725718</a>
<b>mode t3/e3</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-l2.html#wp5688885940">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-l2.html#wp5688885940</a>
<b>controller t1</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp1472647421">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp1472647421</a>

Commands	URL
<b>controller t3</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp1921350260">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp1921350260</a>
<b>controller e3</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp4240965734">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp4240965734</a>
<b>clock source</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp6081785140">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp6081785140</a>
<b>channelized</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp7026926390">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp7026926390</a>
<b>cem</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2184138077">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2184138077</a>
<b>cem-group</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2440628600">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2440628600</a>
<b>xconnect</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t2.html#wp8578094790">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t2.html#wp8578094790</a>
<b>t1/e1 cem-group</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t1.html#wp8472041760">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t1.html#wp8472041760</a>
<b>payload-size dejitter-buffer</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-o1.html#wp3946673156">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-o1.html#wp3946673156</a>
<b>bert pattern</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-a1.html#wp3620978929">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-a1.html#wp3620978929</a>
<b>loopback</b>	<a href="http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-l2.html#wp2513399572">http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-l2.html#wp2513399572</a>
<b>t1/e1 loopback</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t1.html#wp3852360411">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t1.html#wp3852360411</a>
<b>show controllers t3</b>	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-s3.html#wp1987423547">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-s3.html#wp1987423547</a>

# Additional References for Configuring 48-Port T3/E3 CEM Interface Module

## Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>

## Standards and RFCs

Standard/RFC	Title
—	<i>There are no standards and RFCs for this feature.</i>

## MIBs

MIB	MIBs Link
—	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:  <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>