3 Configuring CT1 and CE1 Interfaces

Use the procedures described in this chapter to configure CT1 and CE1 interfaces.

Overview

The CT1 and CE1 modules support channelized T1 and channelized E1 signalling. You can use a combination of CT1 and CE1 modules in the system.

Each CT1 I/O module has 24 RJ-48C ports. Each CE1 I/O module has either 20 RJ-48C ports or 20 pairs of BNC connectors.

Support for the J1 (Japan) variant of framing is provided as a subset of CT1 commands.

ERX Models

The ERX-700 series and the ERX-1410 system support the CT1 and CE1 line modules and associated I/O modules. The ERX-1440 system does not support the CT1 and CE1 line modules and I/O modules.

Features

The CT1 and CE1 modules support the following:

- Clocking
- Redundancy
- Up to 24 fractional T1 lines on a CT1 port and up to 31 fractional E1 lines on a CE1 port
- Up to 576 fractional T1 lines on a CT1 module and 620 fractional E1 lines on a CE1 module
- Up to 576 High-Speed Data Link Control (HDLC) data channels on a CT1 module and 620 HDLC channels on a CE1 module

Interface Stack

Figure 3-1 shows the stack for CT1 and CE1 interfaces. You must configure fractional T1 on a CT1 interface; however, you can configure fractional CE1 or an unframed E1 line for the CE1 interface. The top layer of a CT1 or CE1 interface is HDLC.

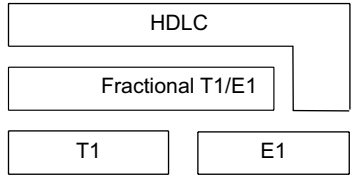

Figure 3-1 Stack for CT1 and CE1 interfaces

Note: *For a detailed discussion of interface types and specifiers, see ERX Command Reference Guide, About This Guide. For a discussion about interfaces, see ERX System Basics Configuration Guide, Chapter 1, Planning Your Network.*

Whole T1 and E1 Lines

To configure a whole T1 line, assign 24 timeslots to a channel group. To configure a whole E1 line, use the **unframed e1** command. See *Configuring an Unframed E1 Line*. In unframed mode, the system creates a single channel group that comprises all timeslots.

Higher-Level Protocols

See the release notes for information about the higher-level protocols that CT1 and CE1 interfaces support.

References

CT1 and CE1 interfaces meet the following specifications:

- RFC 1661 – The Point-to-Point Protocol (PPP) (July 1994)
- RFC 2495 – Definitions of Managed Objects for the DS1, E1, DS2 and E2 Interface Types (January 1999)
- ANSI T1.403-1989 Standard for Telecommunications - Network and Customer Installation Interfaces – DS1 Metallic Interface – Robbed-bit Signaling State Definitions (1989)

Numbering Scheme

This section describes how to identify each layer in the CT1 and CE1 interface stacks.

T1/E1 Controllers

A T1/E1 controller in a CT1/CE1 interface stack is identified using *slot/port* format where:

- *slot* – number of the slot in which the line module resides in the chassis. In the ERX-700 series, line module slots are numbered 2–6 (slots 0 and 1 are reserved for SRP modules). In an ERX-1410 system, line module slots are numbered 0–5 and 8–13 (slots 6 and 7 are reserved for SRP modules).
- *port* – number of the port on the I/O module. CT1 ports are numbered 0–23, and CE1 ports are numbered 0–19.

See Figure 3-2 and Figure 3-3.

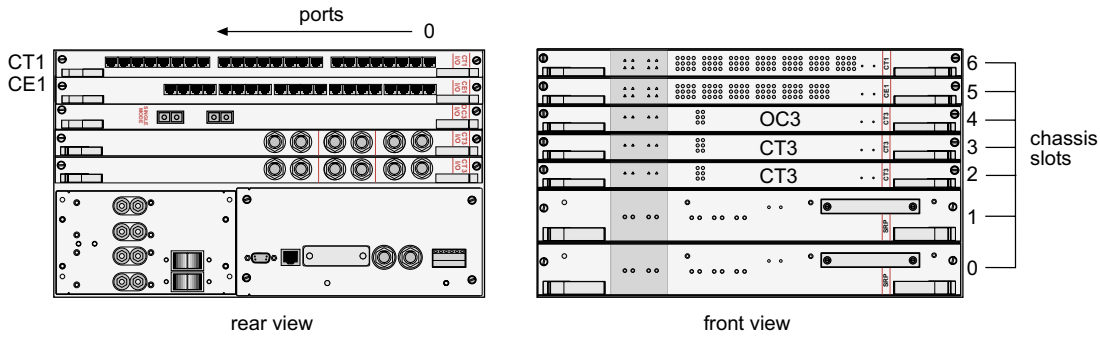

Figure 3-2 CT1 and CE1 line modules and I/O modules in the ERX-700 series

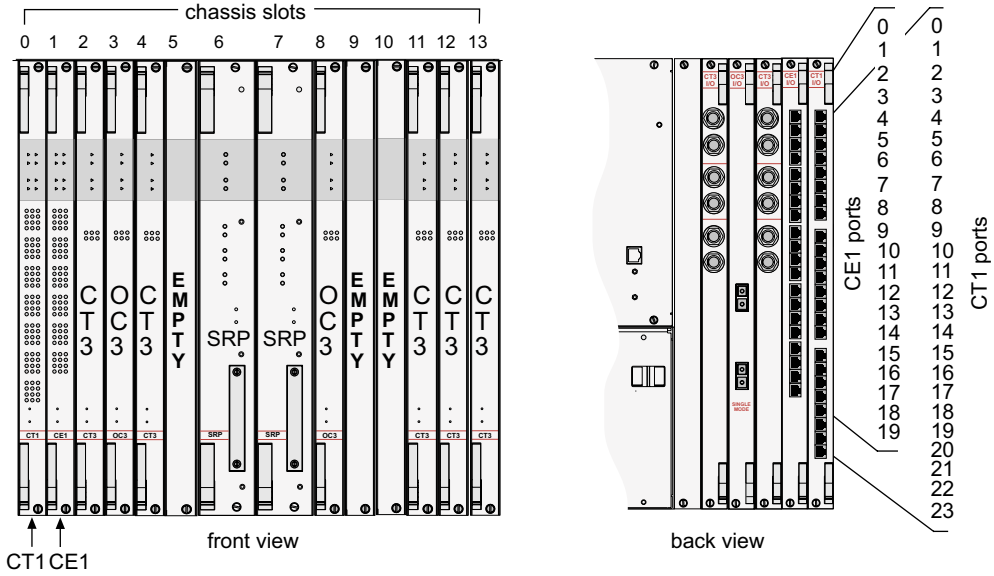

Figure 3-3 CT1 and CE1 line modules and I/O modules in ERX-1410 system

Fractional T1/E1

Fractional T1 or E1 is a portion of a T1 or an E1 line. To configure fractional T1 or E1 on a CT1 or CE1 interface, you assign *channel groups* of *timeslots*. A channel group is a fraction of the T1 or E1 line and comprises up to 24 T1 timeslots or up to 31 E1 timeslots. The default channel group speed for both T1 and E1 is 64 Kbps; 56 Kbps is also available. The maximum number of channel groups that you can assign is 576 for a CT1 module and 620 for a CE1 module.

For example, you might make the assignments shown in Table 3-1**.**

Table 3-1 Sample CT1 timeslot assignments

Channel Group	DS0 Timeslot
1	1–4, 10, 22–24
2	5–6
3	7–9
4	11
5	12–15, 20–21
6	16–19

To configure the channel groups shown in Table 3-1, use the following command to specify the CT1 controller in chassis slot 0, port 1:

```
host1(config)#controller t1 0/1
```

Then configure CT1 channels 1 to 6 with the timeslots indicated in Table 3-1:

```
host1(config-controll)#channel-group 1 timeslots
  1-4,10,22-24
host1(config-controll)#channel-group 2 timeslots 5-6
host1(config-controll)#channel-group 3 timeslots 7-9
host1(config-controll)#channel-group 4 timeslots 11
host1(config-controll)#channel-group 5 timeslots 12-15,20-21
host1(config-controll)#channel-group 6 timeslots 16-19
```

HDLC Channels

To identify an HDLC channel or the complete CT1/CE1 interface, use the format *slot*/*port*:*channel-group*. Refer to the sections above for definitions of the variables.

Before You Configure an Interface

Before you configure a CT1 or a CE1 interface, verify the following:

- You have installed the line module and the I/O module correctly.
- Each configured line can transmit data to and receive data from your switch connections.

For more information on preconfiguration and hardware diagnostic procedures, see the *ERX Installation and User Guide*.

You should also have the following information available:

- Framing type, clock source, cable length, and the loopback method for each controller
- Framing type, line code, and clock source for each T1 or E1 channel
- Timeslot mapping and line speed for each fractional T1 or E1 channel
- HDLC channel information, such as data inversion information, cyclic redundancy check (CRC) type, maximum transmission unit (MTU), and maximum receive unit (MRU).

Configuration Tasks

Configure a CT1 or CE1 interface by entering Global Configuration mode and performing the following tasks:

1. Configure a fractional T1, a fractional E1 line, or an unframed E1 line.
2. Configure HDLC channels.
3. Use the appropriate **show** commands to verify your configuration.

Configuring Fractional T1 and E1 Lines

To configure fractional CT1 and CE1 lines, complete the following tasks:

1. Access Controller Configuration mode by specifying the CT1 or CE1 controller.

```
host1(config)#controller t1 0/1
host1(config)#controller e1 1/0
```

2. Enable the CT1 or CE1 controller. CT1 and CE1 controllers are disabled by default.

```
host1(config-controll)#no shutdown
```

3. (Optional) Specify J1 framing. (This step applies only to CT1.)

```
host1(config-controll)#j1
```

4. Configure a channel group by creating a range of timeslots. For example, configure channel group 2 into the following range of timeslots: 1, 3–8, and 10, leaving timeslots 2, 9, and 11–24 available for other channel groups.

```
host1(config-controll)#channel-group 2 timeslots 1,3-8,10
```

Optional Tasks

The following configuration tasks are optional for the T1 controller.

- Set a cable length.
- Change the clock source.
- Change the framing format.
- Change the line coding type.
- Enable or disable SNMP link status processing.

channel-group shutdown

- Use to disable a channel group.
- The **no** version restarts a disabled channel group.
- Example

```
host1 (config-controll)#channel-group 2 shutdown
```

j1

- Use to specify the J1 variant (Japan) of the T1 framing.
- Example

```
host1(config-controll)#j1
```

- Use the **no** version to disable the feature.

channel-group snmp trap link-status

- Use to enable SNMP link status processing for a channel group.
- Example

```
host1(config-controll)#channel-group snmp trap link-status
```

- Use the **no** version to disable SNMP link status processing for a channel group.

channel-group timeslots

- Use to assign a range of DS0 timeslots to a channel group as a single data stream.
- To configure a channel group, specify a CT1 or CE1 channel group number and assign a range of timeslots.
- You can apply a line speed of 56 Kbps to all DS0 timeslots in a channel group. The default speed is 64 Kbps.
- Example

```
host1(config-controll)#channel-group 2 timeslots 1,3-8,10
```

- Use the **no** version to remove the channel group.

cablelength short

- Use to configure the cable length for a CT1 interface.
- Specify a cable length in the range 0–660 feet.
- Example

```
#host1(config-controll)#cablelength short 200
```

- Use the **no** version to restore the default value, 0.

clock source

- Use to configure the transmit clock source for the line.
- Use a transmit clock on the line's receive data stream, except in rare cases such as back-to-back router tests. When performing back-to-back router tests, configure one end of the line as **internal** and the other end as **line**.
- Specify the keyword **line** to use a transmit clock on the line's receive data stream.
- Specify the keywords **internal module** to use the line module's internal clock.
- Specify the keywords **internal chassis** to use the system's clock.
- Example

```
host1(config-controll)#clock source internal module
```

- Use the **no** version to revert to the default, **line**.

controller e1

- Use to specify a CE1 controller in *slot/port* format.
  - *slot* – number of the slot in which the line module resides in the chassis
  - *number* – number of the port on the I/O module
- Example

```
host1(config)#controller e1 4/4
```

- There is no **no** version.

controller t1

- Use to specify a CT1 controller in *slot/port* format.
  - *slot* – number of the slot in which the line module resides in the chassis
  - *number* – number of the port on the I/O module
- Example

```
host1(config)#controller t1 3/0
```

- There is no **no** version.

framing

- Use to configure the framing format for a CT1 or CE1 interface.
- For a CT1 interface, specify either **esf** (extended superframe) or **sf** (superframe) framing. The default is **esf**.
- The HDLC idle code differs from non-ERX implementations. For CT1 interfaces, configuring the framing used by a specific channel to **sf** sets the HDLC idle code to 0xFF. If you configure the framing to **esf**, the HDLC idle code is set to 0x7E.
- For a CE1 interface, specify either **crc4** or **no-crc4** framing. The default is **crc4**.
- The framing format you choose must be compatible with the framing format at the other end of the line.
- Example

```
host1(config-controll)#framing sf
```

- Use the **no** version restores the default value.

lineCoding

- Use to configure the line code type for a CT1 or CE1 interface.
- For a CT1 interface, specify either **ami** or **b8zs** line coding. The default is **b8zs**.
- For a CE1 interface, specify either **ami** or **hdb3** line coding. The default is **hbd3**.
- Example

```
host1(config-controll)#lineCoding ami
```

- Use the **no** version restores the default value.

shutdown

- Use to disable a CT1 or CE1 interface.
- CT1 and CE1 interfaces are disabled by default.
- Example

```
host1 (config-controll)#shutdown
```

- Use the **no** version to restart a disabled interface.

snmp trap link-status

- Use to enable SNMP link status processing for a CT1 or CE1 interface.
- Example

```
host1(config-controll)#snmp trap link-status
```

- Use the **no** version to disable SNMP link status processing for a CT1 or CE1 interface.

Configuring an Unframed E1 Line

You can configure a CE1 interface in clear channel mode, also known as unframed mode. Before configuring unframed mode, you must first delete any channel groups configured on the interface.

In unframed mode, the system creates a single channel group that comprises all time slots. While in unframed mode, the system rejects any commands to create or delete channel groups or to set the framing mode.

unframed

- Use to configure an unframed E1 line.
- Example

```
host1(config-controll)#unframed
```

- Use the **no** version to switch the interface to the default crc4 framing mode and delete channel group 1.

Configuring an HDLC Channel

You must configure an HDLC channel for each group of fractional T1/E1 lines and each whole T1/E1 line.

To configure an HDLC channel, configure a serial interface (for example, HDLC channel in slot 0, port 1, channel 1).

```
host1(config)#interface serial 0/1:1
```

Optional Tasks

The following configuration tasks are optional when you configure an HDLC channel on a CT1/CE1 interface:

- Configure the CRC.
- Enable data inversion on the interface.
- Set the time interval for monitoring bit and packet rates.
- Set the MRU.
- Set the MTU.

crc

- Use to configure the size of the CRC.
- The CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data.
- When you enable CRC, you must enter the number of bits per frame (16 or 32) that are used to calculate the frame check sequence (FCS). Both the sender and receiver must use the same setting.

- A 32-bit CRC should be used to protect longer streams at faster rates and, therefore, provides better ongoing error detection.
- Example

```
host1(config-if)#crc 32
```

- Use the **no** version to restore the default value, 16.

interface serial

- Use to configure a serial interface in the *slot/port:channel* format.
  - *slot* – number of the slot in which the line module resides in the chassis
  - *port* – number of the port on the I/O module
  - *channel* – channel in the range 1–24 or an E1 channel in the range 1–31.
- Example

```
host1(config)#interface serial 0/1:1
```

- Use the **no** version to disable the interface.

invert data

- Use to enable data stream inversion for the interface.
- Enable data stream inversion only if it is turned on at the other end of the line.
- Example

```
host1(config-if)#invert data
```

- Use the **no** version to disable data inversion.

load-interval

- Use to set the time interval at which the system calculates bit and packet rate counters.
- Choose an interval in the range 30–300 seconds in multiples of 30 seconds.
- Example

```
host1(config-if)#load-interval 100
```

- Use the **no** version to restore the default value, 300 seconds.

mru

- Use to configure the MRU size for the interface.
- Coordinate this value with the network administrator on the other end of the line.
- If you set this value with a different value for another protocol, such as IP, the system uses the lower value. This difference could produce unexpected behavior in your network.
- Example

```
host1(config-if)#mru 1600
```

- Use the **no** version to restore the default, 1600 bytes.

mtu

- Use to configure the MTU size for the interface.
- Coordinate this value with the network administrator on the other end of the line.
- You can set a different MTU value in higher-level protocols, such as IP. If you do, the system uses the lower value. This difference could produce unexpected behavior in your network.
- The default is 1600 bytes.
- Example

```
host1(config-if)#mtu 1600
```

- Use the **no** version to restore the default, 1600 bytes.

Configuration Examples

The following example shows how to configure a CT1 interface:

```
host1(config)#controller t1 3/0
host1(config-controll)#no shutdown
host1(config-controll)#channel-group 2 timeslots 1,3-8,10
host1(config-controll)#framing esf
host1(config-controll)#clock source internal module
host1(config-controll)#cablelength short 220
host1#exit
```

The following example shows how to configure a CE1 interface:

```
host1(config)#controller e1 3/0
host1(config-controll)#no shutdown
host1(config-controll)#channel-group 2 timeslots 1,3-8,10
host1(config-controll)#framing no-crc4
host1(config-controll)#clock source internal module
host1(config-controll)#lineCoding ami
host1#exit
```

The following example shows how to configure an HDLC channel over a CT1 or CE1 interface.

```
host1(config)#interface serial 3/0:2
host1(config-if)#crc 32
host1(config-if)#invert data
```

Testing Interfaces

Testing interfaces allows you to troubleshoot problems and to check the quality of links at the T1/E1 layers in the interface stack. See *Interface Stack*, earlier in this chapter, for a description of the layers. The system supports the following test options:

- Transmission of bit error test (BERT) patterns to remote devices
- Receipt of BERT patterns from remote devices
- Local loopback – the ability to loop the data back toward the router and sends an alarm indication signal (AIS) out toward the network
- Network loopback – the ability to loop the data toward the network before the data reaches the frame
- Remote loopback (T1 only)
  - > The ability to request that remote devices enter into loopback
  - > The ability to be placed in loopback by remote devices

Sending BERT Patterns

The system can send BERT patterns from the T1/E1 layers. To send BERT patterns:

1 Select a controller.

```
host1(config)#controller t1 3/0
host1(config)#controller e1 4/4
```

2 Configure the controller to generate BERT patterns.

```
host1(config-controll)#bert pattern 2^11 time 10 unframed
```

bert

- Use to enable bit error rate tests using the specified pattern on an E1 or a T1 line.
- Unlike other configuration commands, **bert** is not stored in NVRAM.
- Example

  ```
  host1(config-controll)#bert pattern 2^11 time 10 unframed
  ```

- Use the **no** version to stop the test that is running.

Receiving BERT Patterns

The system can receive BERT patterns from a remote device at the T1 layer. To receive BERT patterns, configure the remote device for network line or payload loopback.

When the system is synchronized with and receiving BERT patterns from a remote device, the system records the number of bit errors an the number of bits received. To view these statistics, issue the **show controllers t1** command.

Enabling Local or Network Loopback

You can enable loopback tests on the system at the T1/E1 layers.

To enable local or network loopback:

1 Select a controller.

```
host1(config)#controller t1 3/0
host1(config)#controller e1 4/4
```

2 Configure local or network loopback at the desired layers in the interface.

```
host1(config-controll)#loopback local
```

loopback

- Use to configure a loopback.
- Specify one of the following options:
  - **local** – loops the router output data back toward the router at the T1 framer and sends an alarm indication signal (AIS) out toward the network
  - **network { line | payload }** – Specify the **line** keyword to loop the data back toward the network before the T1 framer and automatically set a local loopback at the HDLC controllers. Specify the **payload** keyword to loop the payload data back toward the network at the T1 framer and automatically set a local loopback at the HDLC controllers.
- Example

  ```
  host1(config-controll)#loopback local
  ```

  - Use the **no** version to disable loopback.

Enabling Remote Loopback Testing

You can configure the system to request that compatible devices connected at the T1 layer enter into a loopback. You can also configure the system to start loopback testing when it receives an appropriate signal from a devices connected at either of these layers.

Note: *There is no protocol that allows remote loopback on E1 links.*

To configure remote loopback:

1 Select a controller.

```
host1(config)#controller t1 3/0
host1(config)#controller e1 4/4
```

2 Request that a remote device enters into loopback.

```
host1(config-controll)#loopback remote line fdl ansi
```

3 Enable the acceptance of remote loopback requests.

```
host1(config-controll)#remote-loopback
```

loopback remote

- Use to request that a remote device enters into loopback.
- Specify one of the following options:
  - **remote line fdl ansi** (T1 only) – sends a repeating 16-bit ESF data link code word (00001110 11111111) to the remote end requesting that it enter into a network line loopback. Specify the **ansi** keyword to enable the remote line facility data link (FDL) ANSI bit loopback on the T1 line, according to the ANSI T1.403 specification.
  - **remote line fdl bellcore** (T1 only)– sends a repeating 16-bit ESF data link code word (00010010 11111111) to the remote end requesting that it enter into a network line loopback. Specify the **bellcore** keyword to enable the remote line facility data link (FDL) Bellcore bit loopback on the T1 line, per the Bellcore TR-TSY-000312 specification.
  - **remote line inband** (T1 only)– sends a repeating 5-bit inband pattern (00001) to the remote end requesting that it enter into a network line loopback
  - **remote payload [fdl] [ansi]** (T1 only) – sends a repeating 16-bit ESF data link code word (00010100 11111111) to the remote end requesting that it enter into a network payload loopback. Enables the remote payload facility data link (FDL) ANSI bit loopback on the T1 line. You can specify **fdl** and **ansi**.
- Example

  ```
  host1(config-controll)#loopback remote line fdl ansi
  ```

- Use the **no** version to send either the 16-bit ESF data link code word or 5-bit inband pattern to deactivate the loopback at the remote end, depending on the last activate request sent.

remote-loopback

- Use to enable the acceptance of remote loopback requests at the T1 layer.
- Example

  ```
  host1(config-controll)#remote-loopback
  ```

- Use the **no** version to restore the default setting, which is to reject remote loopback requests.

Monitoring Interfaces

From User Exec mode, use the following **show** commands to monitor and display the CT1 interface, CE1 interface, and HDLC channel information:

- Monitor information and statistics for a CT1 or CE1 interface on a slot/port. For example:

```
host1>show controller t1 0/1
host1>show controller e1 2/1
```

- Display all fractional T1 or E1 interfaces (channel groups) configured on a slot/port. For example:

```
host1>show controllers t1 fractional 0/1
host1>show controllers e1 fractional 2/1
```

- Display all serial interfaces configured on a slot/port. For example:

```
host1>show controller t1 serial 0/1
host1>show controller e1 serial 2/1
```

- Display information and statistics for a serial interface. For example:

```
host1>show interface serial 0/1:2
```

Setting a Baseline

You can set a statistics baseline for serial interfaces, subinterfaces, and/or circuits using the **baseline interface serial** command. Use the **delta** keyword with the **show** commands to display statistics with the baseline subtracted.

Displaying Counters and Time Intervals

The **all** option for the **show controllers E1 and show controllers T1** commands display the following information:

- T1 or E1 current interval counters – display the counters for the current interval
- T1 or E1 last-interval counters – display the counters for the previous interval
- T1 or E1 24-hour total counters – display the cumulative counters for the last 24 hours or since the interface was started
- The last 24 hours of 15-minute reporting intervals (96 intervals)

Output Filtering

You can use the output filtering feature of the **show** command to include or exclude lines of output based on a text string you specify. Refer to *show Commands* in *ERX System Basics Configuration Guide, Chapter 2, Command Line Interface,* for details.

baseline interface serial

- Use to set a statistics baseline for serial interfaces.
- The system implements the baseline by reading and storing the statistics at the time the baseline is set and then subtracting this baseline whenever baseline-relative statistics are retrieved.
- Use the **delta** keyword with the **show interface serial** commands to view the baseline statistics.
- Example

```
host1#baseline interface serial 2/0:1
```

- There is no **no** version.

show controllers t1 | e1

- Use to display MIB statistics for T1 and E1 interfaces.
- Specify the **all** option to display detailed information for all 15-minute intervals.
- For definitions of the MIB statistics, see RFC 2495 – Definitions of Managed Objects for the DS1, E1, DS2 and E2 Interface Types (January 1999).
- Field descriptions
  - ifAdminStatus – settings configured for this interface:
    - ifAdminUp – interface is enabled
    - ifAdminDown – interface is disabled
    - ifAdminTesting – interface is configured in a testing state
  - alarms detected – one of the following T1-related alarms:
    - No alarm present – no alarms present on the line
    - Rcv AIS – remote end of the line is sending an Alarm Indication Signal (AIS)
    - Xmt AIS – local end of the line is sending an AIS
    - Rcv LOF – loss of one or more frames from the remote end
    - Rcv LOS – loss of signal at the local end
    - Undefined line status – line is in an undefined state
  - ifOperStatus – physical status of the interface
    - ifOperUp – interface is functioning
    - ifOperTesting – interface is being tested
    - ifOperNotPresent – module has been removed from the chassis
    - ifOperDown – interface is not functioning
  - snmp trap link-status – enabled or disabled
  - Framing – type of framing format

- Line code – type of line code format
- Clock source – type of clock source
- Cable length – cable length in feet
- Loopback – state of loopback for the controller: enabled or disabled. If loopback is enabled, one of the following states is displayed:
  - Diagnostic – data loops back toward the router and sends an AIS toward the network
  - Payload – data loops toward the network after the framer has processed the data
  - Line – data loops toward the network before the data reaches the framer
- BERT test – number of current test and total number of tests
  - Test interval – length of the BERT test
  - status – Sync (controller is synchronized with remote device) or NoSync (controller is not synchronized with remote device
  - Sync count – number of times the pattern detector synchronized with the incoming data pattern
  - Received bit count – number of bits received
  - Error bit count – number of bits with errors
- Number of valid intervals – number of 15-minute intervals since the CT1 or CE1 module was last powered on or reset
- Time elapse in current interval – number of seconds that have passed in the 15-minute (900-second) interval
- Errored seconds – number of errored seconds encountered by a T1 or an E1 in the current interval
- Severely errored seconds – number of severely errored seconds encountered by a T1 or an E1 in the current interval
- Severely errored frame seconds – number of severely errored framing seconds encountered by a T1 or an E1 an in the current interval
- Unavailable seconds – number of unavailable seconds encountered by a T1 or an E1 in the current interval
- Clock slip seconds – number of clock slips encountered by a T1 or an E1 in the current interval
- Path code violations – number of coding violations encountered by a T1 or an E1 in the current interval
- Line errored seconds – number of line errored seconds encountered by a T1 or an E1 in the current interval
- Bursty errored seconds – number of bursty errored seconds encountered by a T1 or an E1 in the current interval
- Degraded minutes – number of minutes that a T1 or an E1 line is degraded
- Line code violations – number of line code violations encountered by a T1 or an E1 in the current interval

- Example

```
host1>show controllers t1 2/0

DS1 2/0
ifOperStatus = ifOperUp
Yellow Alarm detection is active
Yellow Alarm generation is active
snmp trap link-status = disabled
Framing is D4, Line Code is Ami, Clock Source is Internal -
  Module
  Allocated Ds0 time slot map = 0x0
Last Remote Loopback Request Sent - Deactivate
BERT test - 2 in 23
Test Interval 1 minute(s), Complete
Sync count = 1
Received bit count = 92148912
Error bit count = 17
Number of valid interval - 90
Time elapse in current interval - 580

Ds1 Current Interval Counters
Errored seconds = 0
Severely errored second = 0
Severely errored frame seconds = 0
Unavailable seconds = 0
Clock slip seconds = 0
Path code violations = 0
Line errored seconds = 0
Bursty errored seconds = 0
Degraded minutes = 0
Line code violations = 0

Ds1 Last Interval Counters
Errored seconds = 0
Severely errored second = 0
Severely errored frame seconds = 0
Unavailable seconds = 0
Clock slip seconds = 0
Path code violations = 0
Line errored seconds = 0
Bursty errored seconds = 0
Degraded minutes = 0
Line code violations = 0

Ds1 24 Hour Total Counters
Errored seconds = 25
Severely errored second = 7
```

```
Severely errored frame seconds = 25
Unavailable seconds = 0
Clock slip seconds = 6
Path code violations = 18
Line errored seconds = 0
Bursty errored seconds = 0
Degraded minutes = 0
Line code violations = 0
```

show controllers t1 | e1 fractional

- Use to display all fractional CT1 or CE1 interfaces.
- Field descriptions
  - Fractional Interface – location of a fractional CT1 or CE1 interface
  - ifOperStatus – physical status of the interface
    - ifOperUp – interface is functioning
    - ifOperTesting – interface is being tested
    - ifOperNotPresent – module has been removed from the chassis
    - ifOperDown – interface is not functioning
    - ifOperLowerDown – lower layer in the interface stack is not functioning
  - snmp trap link-status – enabled or disabled
  - Ds0 time slot map – CT1 or CE1 timeslots allocated to the channel group associated with the fractional interface; for an unframed interface, the value is 0xffffffff
  - Ds0 mode – the speed of the channel group
    - Nx56 – line speed is 56 kbps
    - Nx64 – line speed is 64 kbps
    - 64k unframed – an unframed interface

- Example

```
host1>show controllers e1 fractional 4/0
Fractional Interface at 4/0:1
ifOperStatus = ifOperUp
snmp trap link-status = disabled
Ds0 time slot map = 0x7fff
Ds0 mode = Nx64

Fractional Interface at 4/0:2
ifOperStatus = ifOperUp
snmp trap link-status = disabled
Ds0 time slot map = 0x7fff8000
Ds0 mode = Nx64

Found 2 Fractional Interfaces
```

show controllers t1 | e1 serial

- Use to display all T1 and E1 serial interfaces configured on a slot/port.
- Field descriptions
  - Serial Interface – location of a serial CT1 or CE1 interface
  - ifOperStatus – physical status of the interface
    - ifOperUp – interface is functioning
    - ifOperTesting – interface is being tested
    - ifOperNotPresent – module has been removed from the chassis
    - ifOperDown – interface is not functioning
    - ifOperLowerDown – lower layer in the interface stack is not functioning
  - snmp trap link-status – enabled or disabled
  - Crc type checking – size of the CRC
  - Hdlc mru – current size of the MRU
  - Hdlc mtu – current size of the MTU
  - Hdlc interface speed – current line speed of the interface in bps
  - Invert data disabled – status of the data inversion feature
  - Ds0 time slot map – CT1 or CE1 timeslots allocated to the channel-group associated with the serial interface; for an unframed interface, the value is 0xffffffff
  - Ds0 mode – line speed of the channel group
    - Nx56 – line speed is 56 kbps
    - Nx64 – line speed is 64 kbps
    - 64k unframed – an unframed interface
- Example

```
host1>show controller t1 serial

Serial Interface at 13/0:1
ifOperStatus = ifOperUp
snmp trap link-status = disabled
Crc type checking - CRC16
Hdlc mru = 1600
Hdlc mtu = 1600
Hdlc interface speed = 768000
Invert data disabled
Ds0 time slot map = 0xfff
Ds0 mode = Nx64
```

```
Serial Interface at 13/0:2
ifOperStatus = ifOperUp
snmp trap link-status = disabled
Crc type checking - CRC16
Hdlc mru = 1600
Hdlc mtu = 1600
Hdlc interface speed = 768000
Invert data disabled
Ds0 time slot map = 0xfff000
Ds0 mode = Nx64

Found 2 Serial Interfaces
```

show interfaces serial

- Displays information about the serial interfaces you specify.
- Field descriptions
  - Serial Interface – location of a CT1 or CE1 interface
  - ifOperStatus – physical status of the interface
    - ifOperUp – interface is functioning
    - ifOperTesting – interface is being tested
    - ifOperNotPresent – module has been removed from the chassis
    - ifOperDown – interface is not functioning
    - ifOperLowerDown – lower layer in the interface stack is not functioning
  - snmp trap link-status – enabled or disabled
  - Crc type checking – size of the CRC
  - Hdlc mru – current size of the MRU
  - Hdlc mtu – current size of the MTU
  - Hdlc interface speed – current line speed of the interface in bps
  - Invert data disabled – status of the data inversion feature
  - Ds0 time slot map – CT1 or CE1 channel group
  - Ds0 mode – Nx56 or Nx64
  - 5 minute input rate – data rates based on the traffic received in the last five minutes
  - 5 minute output rate – data rates based on the traffic sent in the last five minutes
  - Interface Statistics
    - Packets received – number of packets received on the interface
    - Bytes received – number of bytes received on the interface
    - Errored packets received – number of packets with errors received on the interface

- Packets sent – number of packets sent on the interface
- Bytes sent – number of bytes sent on the interface
- Errored packets sent – number of packets with errors, sent from the interface

- Example

```
host1#show interfaces serial 0/1:2

Serial Interface at 0/1:2
ifOperStatus = ifOperUp
snmp trap link-status = disabled

Crc type checking - CRC16
Hdlc mru = 1600
Hdlc mtu = 1600
Hdlc interface speed = 768000
Invert data disabled, Ds0 time slot map = 0xfff
Ds0 mode = Nx64
5 minute input rate    0 bits/sec, 0 packets/sec
5 minute output rate   0 bits/sec, 0 packets/sec

Interface Statistics
Packets received           0
Bytes received             0
Errored packets received   0
Packets sent               0
Bytes sent                 0
Errored packets sent       0
```