



# Configuring T1/E1 Controllers

This chapter provides information about configuring the T1/E1 controllers on Cisco ASR 901 router.

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## Configuring the Card Type

Perform a basic card type configuration by enabling the router, enabling an interface, and specifying the card type as described below. You might also need to enter other configuration commands, depending on the requirements for your system configuration and the protocols you plan to route on the interface.



**Note** In the following procedure, press the Return key after each step unless otherwise noted. At any time, you can exit the privileged level and return to the user level by entering `disable` at the `Router#` prompt.

To select and configure a card type, complete the following steps:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> <pre>Router&gt; enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> <pre>Router# configure terminal</pre>	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 3</b>	<p><b>card type</b> {e1   t1} slot subslot</p> <p><b>Example:</b></p> <pre>Router(config)# card type e1 0 0</pre>	<p>Sets the card type. The command has the following syntax:</p> <ul style="list-style-type: none"> <li>• <i>slot</i>—Slot number of the interface.</li> <li>• <i>subslot</i>—Sub slot number of the interface.</li> </ul> <p>When the command is used for the first time, the configuration takes effect immediately. A subsequent change in the card type does not take effect unless you enter the reload command or reboot the router.</p> <p><b>Note</b> When you are using the card type command to change the configuration of an installed card, you must first enter the <b>no card type</b> {e1   t1} slot subslot command. Then enter the <b>card type</b> {e1   t1} slot subslot command for the new configuration information.</p>
<b>Step 4</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>Router(config)# exit</pre>	Exit configuration mode.

## Configuring E1 Controllers

Perform a basic E1 controller configuration by specifying the E1 controller, entering the clock source, specifying the channel-group, configuring the serial interface, configuring PPP encapsulation, and enabling keepalive packets. You might also need to enter other configuration commands, depending on the requirements for your system configuration and the protocols you plan to route on the interface.



**Note** In the following procedure, press the Return key after each step unless otherwise noted. At any time, you can exit the privileged level and return to the user level by entering disable at the Router# prompt.

To configure the E1 controllers, complete the following steps in the global configuration mode:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p><b>enable</b></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> <pre>Router# configure terminal</pre>	Enters global configuration mode.
<b>Step 3</b>	<b>controller e1 slot/port</b> <b>Example:</b> <pre>Router(config)# controller e1 0/0 Router(config-controller)#</pre>	Specifies the controller that you want to configure.
<b>Step 4</b>	<b>framing {crc4   no-crc4}</b> <b>Example:</b> <pre>Router(config-controller)# framing crc4</pre>	Specifies the framing type.
<b>Step 5</b>	<b>linecode hdb3</b> <b>Example:</b> <pre>Router(config-controller)# linecode hdb3</pre>	Specifies the line code format.
<b>Step 6</b>	<b>channel-group channel-no timeslots timeslot-list speed {64}</b> <b>Example:</b> <pre>Router(config-controller)# channel-group 0 timeslots 1-31 speed 64</pre>	<p>Specifies the channel-group and time slots to be mapped. After you configure a channel-group, the serial interface is automatically created. The syntax is:</p> <ul style="list-style-type: none"> <li>• <i>channel-no</i>—ID number to identify the channel group. The valid range is from 0–30.</li> <li>• <i>timeslot-list</i>—Timeslots (DS0s) to include in this channel-group. The valid time slots are from 1–31.</li> <li>• <b>speed {64}</b>—The speed of the DS0.</li> </ul> <p>The example configures the channel-group and time slots for the E1 controller:</p> <p><b>Note</b> When you are using the channel-group channel-no timeslots timeslot-list {64} command to change the configuration of an installed card, you must enter the no channel-group channel-no timeslots timeslot-list speed {64} command first. Then enter the channel-group channel-no timeslots timeslot-list {64} command for the new configuration information.</p>

	Command or Action	Purpose
<b>Step 7</b>	<b>exit</b> <b>Example:</b> <pre>Router(config)# exit</pre>	Exits controller configuration mode.
<b>Step 8</b>	<b>interface serial <i>slot/port:channel</i></b> <b>Example:</b> <pre>Router(config)# interface serial 0/0:1 Router(config-if)#</pre>	Configures the serial interface. Specify the E1 slot, port number, and channel-group.  When the prompt changes to Router(config-if), you have entered interface configuration mode.  <b>Note</b> To see a list of the configuration commands available to you, enter ? at the prompt or press the Help key while in the configuration mode.
<b>Step 9</b>	<b>encapsulation ppp</b> <b>Example:</b> <pre>Router(config-if)# encapsulation ppp</pre>	Specifies PPP encapsulation on the interface.
<b>Step 10</b>	<b>keepalive [period [retries]]</b> <b>Example:</b> <pre>Router(config-if)# keepalive [period [retries]]</pre>	Enables keepalive packets on the interface and specifies the number of times keepalive packets are sent without a response before the router disables the interface.
<b>Step 11</b>	<b>end</b> <b>Example:</b> <pre>Router# end</pre>	Exits interface configuration mode.

## Support for Unframed E1

Effective with Cisco IOS Release 15.4(3)S, support is available for unframed E1, enabling the use of *timeslot 0* for data to utilize the full capacity (2.048 Mbps) of E1 controllers, against the previous maximum bandwidth limit of 1.984 Mbps.

As *timeslot 0* is used for data, a few alarms are not supported. The following table provides information on supported and unsupported alarms:

**Table 1: Supported and Unsupported Alarms**

Alarm	Support
AIS	Yes
LOF	No

Alarm	Support
LOS	Yes
RAI	No



**Note** Support for Unframed E1 is available only on Cisco ASR 901 Routers using the *AdvancedMetroIPAccess* license.

## Configuring Support for Unframed E1 Controller

To configure support for an unframed E1 controller, perform this task.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>controller e1 slot port</b> <b>Example:</b> Router(config)# controller e1 0/0	Specifies an interface type and number, and places the device in interface configuration mode.
<b>Step 4</b>	<b>channel-group group-number unframed</b> <b>Example:</b> Router(config-controller)# channel-group 0 unframed	Enables support for an unframed E1 controller on the controller interface. <b>Note</b> This command is supported only on an E1 controller.

## Configuring T1 Controllers

Use the following steps to perform a basic T1 controller configuration: specifying the T1 controller, specifying the framing type, specifying the line code form, specifying the channel-group and time slots to be mapped, configuring the cable length, configuring the serial interface, configuring PPP encapsulation, and enabling keepalive packets. You might also need to enter other configuration commands, depending on the requirements for your system configuration and the protocols you plan to route on the interface.



**Note** In the following procedure, press the Return key after each step unless otherwise noted. At any time, you can exit the privileged level and return to the user level by entering `disable` at the `Router#` prompt.

To configure the T1 interfaces, complete the following steps in the global configuration mode:

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b>	Enables privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b>	Enters global configuration mode.
<b>Step 3</b>	<b>controller t1 slot/subslot</b> <b>Example:</b>  Router(config-controller)# controller t1 0/0	Specifies the controller that you want to configure. The command has the following syntax: <ul style="list-style-type: none"> <li>• <i>slot</i>—Slot number of the interface. The slot number should be 0.</li> <li>• <i>subslot</i>—Subslot number of the interface. The supported range for subslot is 0 to 15.</li> </ul>
<b>Step 4</b>	<b>framing esf</b> <b>Example:</b> Router(config-controller)# framing esf	Specifies the framing type.
<b>Step 5</b>	<b>linecode line-code</b> <b>Example:</b> Router(config-controller)# linecode b8zs	Specifies the line code format.
<b>Step 6</b>	<b>channel-group group-no timeslots 1-24 speed speed</b> <b>Example:</b> Router(config-controller)# channel-group 0 timeslots 1-24 speed 64	Specifies the channel-group and time slots to be mapped. After you configure a channel-group, the serial interface is automatically created. <ul style="list-style-type: none"> <li>• The default speed of the channel-group is 64.</li> <li>• The supported range for channel-group is 0 to 23.</li> </ul>
<b>Step 7</b>	<b>cablelength {long [-15db   -22.5db   -7.5db   0db] short [110ft   220ft   330ft   440ft   550ft   600ft]}</b>	Configures the cable length.

	Command or Action	Purpose
	<b>Example:</b> Router(config-controller)# cablelength long -15db	
<b>Step 8</b>	<b>exit</b> <b>Example:</b> Router(config-controller)# exit	Exits controller configuration mode.
<b>Step 9</b>	<b>interface serial slot/port :channel</b> <b>Example:</b> Router(config)# interface serial 0/1:0	Configures the serial interface. Specify the T1 slot (always 0), port number, and channel-group.
<b>Step 10</b>	<b>encapsulation ppp</b> <b>Example:</b> Router(config-if)# encapsulation ppp	Enters the following command to configure PPP encapsulation.
<b>Step 11</b>	<b>keepalive [period [retries ]]</b> <b>Example:</b> Router(config-if)# keepalive 5 6	Enables keepalive packets on the interface and specify the number of times that keepalive packets will be sent without a response the interface is brought down:
<b>Step 12</b>	<b>exit</b> <b>Example:</b> Router(config)# exit	Exits configuration mode.

## Verifying Support for Unframed E1 Controller

To verify support for an unframed E1 controller, use the following **show** command:

```
Router# show controllers e1 0/0
```

```
E1 0/0 is up.
Applique type is Channelized E1 - balanced
No alarms detected.
alarm-trigger is not set
Framing is unframed, Line Code is HDB3, Clock Source is Internal.
Data in current interval (19 seconds elapsed):
  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 Unavail Secs
Data in Interval 1:
  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 Unavail Secs
Data in Interval 2:
  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 Unavail Secs
```

# Troubleshooting Controllers

This line card supports local and network T1/E1 loopback modes, and remote T1 loopback modes for testing, network fault isolation, and agency compliance. You can test T1/E1 lines in local and network loopback modes. You can also test T1 lines in remote mode.



**Note** The ASR901 supports activating or deactivating payload and line loopback modes using FDL in ESF framing mode as defined in the T1.403 ANSI standard. The implementation conforms to ANSI T1.403-1999, sections 9.4.2.1 and 9.4.2.2. The ASR901 only accepts remotely initiated loopback requests and does not support initiation of FDL remote loopback requests.



**Note** Bit-error-rate testing and loopbacks are used to resolve problems and test the quality of T1/E1 links.

## Troubleshooting E1 Controllers

To troubleshoot the E1 line card, complete the following steps in the controller configuration mode:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Router# enable	Enables the privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Router# configure terminal	Enters the global configuration mode.
<b>Step 3</b>	<b>controller e1slot/subslot</b> <b>Example:</b> Router(config-controller)# controller e1 0/0	Sets the controller type. The command has the following syntax: <ul style="list-style-type: none"> <li>• <i>slot</i>—Slot number of the interface.</li> <li>• <i>subslot</i>—0.</li> </ul>
<b>Step 4</b>	<b>loopback {local   network {line  payload}}</b> <b>Example:</b> Router(config-controller)# loopback network line	Sends the packets from a port in local loopback to the remote end. <ul style="list-style-type: none"> <li>• <b>local</b>—Configures the line card to loop the transmitted traffic back to the line card as</li> </ul>



	Command or Action	Purpose
		<p>E1 received traffic and transmits AIS to the remote receiver.</p> <ul style="list-style-type: none"> <li>• <b>line</b>—Configures the E1 line card to loop the received traffic back to the remote device after passing them through the line loopback mode of the framer. The framer does not re-clock or reframe the incoming traffic.</li> <li>• <b>payload</b>—Configures the E1 line card to loop the received traffic back to the remote device after passing them through the payload loopback mode of the framer. The framer re-clocks and reframes the incoming traffic before sending it to the network.</li> </ul>
<b>Step 5</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>Router(config-controller)# exit</pre>	Exits the controller configuration mode.

## Troubleshooting T1 Controllers

To troubleshoot the T1 line card, complete the following steps in the controller configuration mode:

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p><b>enable</b></p> <p><b>Example:</b></p> <pre>Router# enable</pre>	Enables the privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<p><b>configure terminal</b></p> <p><b>Example:</b></p> <pre>Router# configure terminal</pre>	Enters the global configuration mode.
<b>Step 3</b>	<p><b>controller t1 slot/subslot</b></p> <p><b>Example:</b></p> <pre>Router(config-controller)# controller t1 0/0</pre>	<p>Sets the controller type. The command has the following syntax:</p> <ul style="list-style-type: none"> <li>• <i>slot</i>—Slot number of the interface.</li> <li>• <i>subslot</i>—0.</li> </ul>
<b>Step 4</b>	<p><b>loopback {diagnostic   local {line  payload}}</b></p> <p><b>Example:</b></p>	Sends the packets from a port in local loopback to the remote end.

	Command or Action	Purpose
	<pre>Router(config-controller)# loopback local line</pre>	<ul style="list-style-type: none"> <li>• <b>diagnostic</b>—Configures the line card to loop data from the transmit path to the receiver path.</li> <li>• <b>line</b>—Configures the T1 line card to loop the received traffic back to the remote device after passing them through the line loopback mode of the framer. The framer does not re-clock or reframe the incoming traffic.</li> <li>• <b>payload</b>—Configures the T1 line card to loop the received traffic back to the remote device after passing them through the payload loopback mode of the framer. The framer re-clocks and reframes the incoming traffic before sending it to the network.</li> </ul>
<b>Step 5</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>Router(config-controller)# exit</pre>	Exits the controller configuration mode.