



1-Port and 2-Port HWIC data/voice, 4-Port T1/E1 HWIC, and 8-Port T1/E1 Network Module

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This document describes the following Cisco products:

- Cisco 1-Port and 2-Port Channelized T1/E1 and ISDN PRI High-Speed WAN Interface Cards (HWICs)
 - 1-port part number: HWIC-1CE1T1-PRI
 - 2-port part number: HWIC-2CE1T1-PRI
 - Provides channelized T1 or E1 connections or ISDN PRI connections
 - Supported on Cisco 2821, Cisco 2851, Cisco 3800, Cisco 2900, and Cisco 3900 series routers
- Cisco 4-Port T1/E1 HWIC
 - Part number: HWIC-4T1/E1
 - Provides clear channel T1 or E1 connections
 - Supported on Cisco 2821, Cisco 2851, Cisco 3800, Cisco 2900, and Cisco 3900 series routers
- Cisco 8-Port Channelized T1/E1 and ISDN PRI High-Speed WAN Network Module
 - Part number: NM-8CE1T1-PRI
 - Provides channelized T1 or E1 connections or ISDN PRI connection
 - Supported on Cisco 3800, Cisco 2900, and Cisco 3900 series routers



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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the [“Feature Information for T1/E1 HWICs and Network Modules”](#) section on page 29.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

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Restrictions for T1/E1 HWICs and Network Module

- Cisco 2811 does not support the HWIC-4T1/E1 module.
- Voice feature is supported on the 1-Port and 2-Port T1/E1 HWICs. For more information, see [“Feature Information for T1/E1 HWICs and Network Modules”](#) section on page 29.
- Voice feature is not supported on the 4-Port HWIC and network module.
- Wetting current is not supported on the HWICs or the network module.
- V54 loop up/down code recognition is not supported on the HWICs or the network module.
- The 1-port and 2-port HWICs support up to 32 channels per port (up to 64 channels total on the 2-port HWIC).
- The 4-port clear channel HWIC supports 1 channel per port or 4 channels total for the HWIC.
- The 8-port network module is supported only on Cisco 3800 series routers (the Cisco 3825 and Cisco 3845 routers).
- The 8-port network module supports a maximum of 128 channels.
- Bit error rate tester (BERT) runs on the entire controller and not on specific channel groups. Because of this, only a limited number of patterns are supported. See the [“Configuring the T1/E1 HWICs or Network Module”](#) section on page 8 for more details.

Information About T1/E1 HWICs and Network Module

To configure the T1/E1 HWICs and network module, you should understand the following:

- [Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers](#), page 3
- [Independent Clocking Mode](#), page 4

Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers

[Table 1](#) summarizes the interface numbering on Cisco 2811, 2821, and 2851 routers and on Cisco 3800 series routers. [Table 2](#) gives the port numbering for the T1/E1 HWICs and network module.

Table 1 *Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers*

Router	HWIC Interfaces	Network Module Interfaces
2811, 2821, and 2851	0/HWIC slot/port ¹	No support for the 8-port T1/E1 network module.
3825	0/HWIC slot/port ¹	Network module slot/port ²
3845	0/HWIC slot/port ¹	Network module slot/port ³

1. Interface numbering for HWIC interfaces on all routers begins with 0. Then, each router has four HWIC slots that are numbered from 0 to 3.
2. The 3825 router has two network module slots, numbered 1 to 2.
3. The 3845 router has four network module slots, numbered 1 to 4.

For illustrations of HWIC slots in the Cisco 2811, 2821, and 2851 routers, see [Overview of Cisco 2800 Series Routers](#).

For illustrations of HWIC and network module slots in the Cisco 3825 and 3845 routers, see [Overview of Cisco 3800 Series Routers](#).

Table 2 *Port Numbering on T1/E1 HWICs and Network Module*

Interface	Port Numbering
1-port T1/E1 HWIC	0
2-port T1/E1 HWIC	0 to 1
4-port T1/E1 HWIC	0 to 3
8-port T1/E1 network module	0 to 7

Some examples are as follows:

- Port 0 of an HWIC in HWIC slot 0: 0/0/0
- Port 1 of a 2- or 4-port HWIC in HWIC slot 1: 0/1/1
- Port 3 of the 4-port HWIC in HWIC slot 2: 0/2/3
- Port 6 of the 8-port network module in network module slot 2: 2/6

Independent Clocking Mode

To enable independent clocking mode, use the **clock source line independent** command to specify that the port can operate on an independent clocking domain. Prior to the addition of the **independent** keyword, port 0 was the default primary clock source and port 1/2/3 was loop-timed. With independent clocking enabled, this dependency no longer exists, so the **independent** keyword means that the specific port is independent from the HWIC controller clocking domain.

When independent clocking is configured, the port will only support data applications and not voice applications. However, other ports under the same controller that do not have independent clocking enabled (that is, clock still participated) are able to support voice applications on HWIC-1CE1T1-PRI and HWIC-2CE1T1-PRI.

How to Configure T1/E1 HWICs and Network Module

- [Configuring Card Type, page 5](#)
- [Changing Card Type, page 6](#)
- [Configuring the T1/E1 HWICs or Network Module, page 8](#)
- [Configuring the T1/E1 HWICs with Voice Support, page 16](#)

Configuring Card Type

To configure the T1/E1 HWICs and network module for T1 or E1 operation, perform the following tasks.

Prerequisites

The T1/E1 HWICs or network module will not be operational until a card type is configured.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **card type {t1 | e1} slot subslot**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	card type {t1 e1} slot subslot Example: Router(config)# card type t1 0 2	Specifies T1 or E1 connectivity. <i>slot</i> refers to the network module slot on the 2800 series and 3800 series platform. <i>subslot</i> refers to the HWIC slot on the platform. See the “Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers” section on page 3.

Changing Card Type

To change a card type from T1 to E1, or from E1 to T1, perform the following tasks:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **no card type {t1 | e1} slot subslot**
4. **card type {t1 | e1} slot subslot**
5. **write**
6. **reload**
7. **boot**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	no card type {t1 e1} slot subslot Example: Router(config)# no card type t1 0 2	Optional. Removes the previously configured card type for the HWIC or network module.
Step 4	card type {t1 e1} slot subslot Example: Router(config)# card type e1 0 2	Specifies T1 or E1 connectivity for the HWIC or network module.
Step 5	write Example: Router(config)# write	Rebuilds the router configuration.

	Command or Action	Purpose
Step 6	reload Example: Router(config)# reload	Reloads router so that changes can take affect. After this command executes, the router will go to ROM monitor (rommon) mode.
Step 7	boot Example: Router(rommon)# boot	Boots the router for the configuration with the newly selected card type.

Configuring the T1/E1 HWICs or Network Module

To configure the T1/E1 HWICs or network module, perform the following tasks:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **network-clock-participate** [*slot slot-number* | *wic wic-slot*]
4. **controller** {*t1* | *e1*} *slot/subslot/port*
5. **framing** {*sf* | *esf*}
or
framing {*crc4* | *no-crc4*}
6. **linecode** {*ami* | *b8zs*}
or
linecode {*ami* | *hdb3*}
7. **fdl** {*att* | *ansi* | *both*}
8. **clock source** {*line* | *internal*}
9. **line-termination** {*75-ohm* | *120-ohm*}
10. **loopback** {*diagnostic* | *local* {*payload* | *line*} | *remote* {*iboc* | *esf* {*payload* | *line*}}}
11. **cablelength long** *db-loss-value*
or
cablelength short *length*
12. **channel group** *channel-group-number* {*timeslots range* [*speed kbps*] | *unframed*}
or
tdm-group *tdm-group-no* *timeslots timeslot-range*
13. **ds0-group** *ds0-group-number* *timeslots timeslot-list* **type** {*e&m-delay-dial* | *e&m-fgd* | *e&m-immediate-start* | *e&m-wink-start* | *ext-sig* | *fgd-eana* | *fxo-ground-start* | *fxo-loop-start* | *fxs-ground-start* | *fxs-loop-start*}
14. **pri-group** *timeslots timeslot-range* [*nfas_d* | *service*][*voice-dsp*]
15. **national reserve** *N sa4 sa5 sa6 sa7 sa8*
16. **crc-threshold** *value*
17. **yellow** {*generation* | *detection*}
18. **bert pattern** *pattern interval time*

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><code>enable</code></p> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<p><code>configure terminal</code></p> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 3	<p><code>network-clock-participate [slot slot-number wic wic-slot]</code></p> <p>Example: Router(config)# network-clock-participate wic 0</p>	<p>TDM group configuration only. Allows the ports on a specified network module or interface card to use the network clock for timing.</p>
Step 4	<p><code>controller {t1 e1} slot/subslot/port</code></p> <p>Example: Router(config)# controller t1 1/0</p>	<p>Enters controller configuration mode. For interface numbering conventions on the Cisco 2800 and 3800 series routers, see the “Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers” section on page 3.</p>
Step 5	<p><code>framing {sf esf}</code></p> <p>OR</p> <p><code>framing {crc4 no-crc4}</code></p> <p>Example: Router(config-controller)# framing esf</p>	<p>In T1 configurations, specifies super frame (sf) or extended super frame (esf) as the frame type for data lines. Default is esf.</p> <p>In E1 configurations, specifies cyclic redundancy check 4 (crc4) or no-crc4 as the frame type for data lines. Default is crc4.</p>
Step 6	<p><code>linecode {ami b8zs}</code></p> <p>OR</p> <p><code>linecode {ami hdb3}</code></p> <p>Example: Router(config-controller)# linecode b8zs</p>	<p>In T1 configurations, specifies alternate mark inversion (AMI) or b8zs as the linecode. Default is b8zs.</p> <p>In E1 configurations, specifies AMI or high-density bipolar 3 (hdb3) as the linecode. Default is hdb3.</p> <p>Note When using linecode AMI, the user is advised to select 56 kbps as the speed or make sure that the channel groups created do not contain all the timeslots. See Step 12. This is to avoid exceeding the “15 zeroes” threshold specified by standards.</p>
Step 7	<p><code>fdl {att ansi both}</code></p> <p>Example: Router(config-controller)# fdl both</p>	<p>T1 only. Sets the facility data link (fdl) exchange standard for T1 interfaces using esf framing. Can select the ATT standard (ATT TR54016), the ANSI standard (ANSI T1.403), or both standards. Default is ansi. To disable fdl, enter the command no fdl.</p>

	Command or Action	Purpose
Step 8	<p>clock source {line [independent] internal}</p> <p>Example: Router(config-controller)# clock source line</p>	<p>line specifies that the clocking on this controller is derived from an external source, generally the telephone central office. line independent configures the port to be independent in the TDM docmain, which is when network-clock-participate is configured on the card.</p> <p>internal specifies that the clock is generated by internal controller circuitry.</p> <p>Default is line.</p>
Step 9	<p>line-termination {75-ohm 120-ohm}</p> <p>Example: Router(config-controller)# line-termination 75-ohm</p>	<p>E1 only. Sets the line termination on an E1 controller.</p> <ul style="list-style-type: none"> • 75-ohm specifies the 75 ohm unbalanced termination. • 120-ohm specifies the 120 ohm balanced termination. <p>Default is 120-ohm.</p> <p>Note On the 4-port HWIC and 8-port network module, line impedance will be set to the same value for each port in a two-port slice automatically. That is, on the 4-port HWIC, ports 0 and 1 will be set to the same value, and ports 2 and 3 will be set to the same value. On the 8-port network module, ports 0 and 1 will be set to the same value, as will ports 2 and 3, ports 4 and 5, and ports 6 and 7. In these cases, a message will be displayed. The example shows the message displayed when the line termination on port 0 is changed:</p> <pre>Router(config)# controller e1 0/1/0 Router(config-controller)#line-termination 75-ohm Changing the line termination for ports 0 and 1 to 75</pre>
Step 10	<p>loopback {diagnostic local {payload line} remote {iboc esf {payload line}}}</p> <p>Example: Router(config-controller)# loopback remote esf line</p>	<p>Sets the loopback method for testing the interface. Options are:</p> <ul style="list-style-type: none"> • diagnostic loops transmit signal back to receive • local puts the interface into local loopback mode at the payload or line level • remote puts the interface into remote loopback mode through an inband bit oriented code (iboc) or, for T1 only, remote esf, which uses fdl codes to set payload or line levels.

	Command or Action	Purpose
Step 11	<p><code>cablelength long db-loss-value</code></p> <p>or</p> <p><code>cablelength short length</code></p> <p>Example: Router(config-controller)# cablelength short 133</p>	<p>T1 only. cablelength long attenuates the pulse from the transmitter using pulse equalization and line build-out. This command applies to cables longer than 660 feet. Loss values are:</p> <ul style="list-style-type: none"> • <i>0db</i> • <i>-7.5db</i> • <i>-15db</i> • <i>-22.5db</i> <p>Default attenuation is <i>0db</i>.</p> <p>cablelength short sets transmission attenuation for cable lengths of 660 feet or less. Cable lengths can be specified as follows:</p> <ul style="list-style-type: none"> • <i>110</i> for cable lengths from 0 to 110 feet • <i>220</i> for cable lengths from 110 to 220 feet • <i>330</i> for cable lengths from 220 to 330 feet • <i>440</i> for cable lengths from 330 to 440 feet • <i>550</i> for cable lengths from 440 to 550 feet • <i>660</i> for cable lengths from 550 to 660 feet <p>There is no default cable length.</p>

Command or Action	Purpose
<p>Step 12 <code>channel group channel-group-number {timeslots range [speed kbps] unframed}</code></p> <p>or</p> <p><code>tdm-group tdm-group-no timeslots timeslot-range</code></p> <p>Example: Router(config-controller)# channel group 1 timeslots 1-4</p>	<p>Note This step does not apply to the clear channel 4-port T1/E1 HWIC.</p> <p>Configures the serial WAN on a T1 or E1 interface by specifying channels and their timeslots.</p> <p>For T1, values are as follows:</p> <ul style="list-style-type: none"> • <i>channel-group-number</i> is from 0 to 23 • timeslots range is from 1 to 24 • Default value of speed in T1 is 64 kbps. Configuration of speed is optional. <p>For E1, values are as follows:</p> <ul style="list-style-type: none"> • <i>channel-group-number</i> is from 0 to 30 • timeslots range is from 1 to 31 • Default value of speed in E1 is 64 kbps. Configuration of speed is optional. • unframed (E1 only) specifies that all 32 timeslots are to be used for data, and that none are to be used for framing signals. <p>or</p> <p>Configures specified timeslots on T1 or E1 interfaces to create clear channel groups for time division multiplexing.</p> <p>For the tdm-group configuration to work, it is necessary to configure network-clock-participate for the interface in global configuration mode.</p>

Command or Action	Purpose
<p>Step 13</p> <pre>ds0-group ds0-group-number timeslots timeslot-list type {e&m-delay-dial e&m-fgd e&m-immediate-start e&m-wink-start ext-sig fgd-eana fxo-ground-start fxo-loop-start fxs-ground-start fxs-loop-start}</pre> <p>Example: Router(config-controller)# ds0-group 12 timeslots 1-3 type fxs-loop-start</p>	<p>(Voice only) Defines the T1 channels for use by compressed voice calls and the signaling method the router uses to connect to the PBX or central office.</p> <p>Set up DS0 groups after you have specified codec complexity in the voice-card configuration.</p> <p>For T1, values are as follow:</p> <ul style="list-style-type: none"> • <i>dso-group-number</i> is from 0 to 23 • <i>timeslot-list</i> argument is a single number, numbers separated by commas, or a pair of numbers separated by a hyphen to indicate a range of time slots. • The signaling method selection for the type keyword depends on the connection that you are making: <ul style="list-style-type: none"> – The E&M interface allows connection for PBX trunk lines (tie lines) and telephone equipment. – The Foreign Exchange Station (FXS) interface allows connection of basic telephone equipment and PBX. – The Foreign Exchange Office (FXO) interface is for connecting the Central Office (CO) to a standard PBX interface where permitted by local regulations; it is often used for off-premises extensions (OPXs). <p>For E1, values are as follow:</p> <ul style="list-style-type: none"> • <i>dso-group-number</i> is from 0 to 30 • <i>timeslot-list</i> argument is a single number, numbers separated by commas, or a pair of numbers separated by a hyphen to indicate a range of time slots. • The signaling method selection for the type keyword depends on the connection that you are making: <ul style="list-style-type: none"> – The E&M, FXS, and FXO are similar to T1. – R2 signalling. <p>The ds0-group command automatically creates a logical voice port that is numbered as follows: <i>slot/port:ds0-group-number</i>. Although only one voice port is created, applicable calls are routed to any channel in the group.</p>

Command or Action	Purpose
<p>Step 14 <code>pri-group timeslots <i>timeslot-range</i> [nfas_d service][voice-dsp]</code></p> <p>Example: Router(config-controller)# pri-group timeslots 1-5</p>	<p>Specifies that the controller should be set up as ISDN PRI interface.</p> <p>Note The ‘network-clock-participate wic/slot <>’ should be configured, otherwise pri-group configuration is rejected.</p> <ul style="list-style-type: none"> • For T1, <ul style="list-style-type: none"> – timeslots range from 1 to 24 – 23rd channel is the D channel • For E1, <ul style="list-style-type: none"> – timeslots range from 1 to 31 – 15th channel is the D channel <p>Note Default is with no voice-dsp option. Current “Service” is only for voice mgcp. So, when “Service” is selected, there is no “voice-dsp” required or needed. For 1-Port and 2-Port HWIC voice support, user must select voice-dsp.</p> <p>Note The option keyword or voice-dsp is only available to the 1-Port and 2-Port HWIC on ISR-G2 (Cisco 2911, Cisco 2921, Cisco 2951, Cisco 3925, Cisco 3925E, Cisco 3945, and Cisco 3945E).</p> <ul style="list-style-type: none"> • If a controller is configured as PRI, individual channel groups cannot be configured on that controller. • The controller command must be entered before this command can be used.
<p>Step 15 <code>national reserve N sa4 sa5 sa6 sa7 sa8</code></p> <p>Example: Router(config-controller)# national reserve 0 1 1 1 1 0</p>	<p>E1 only. Sets the 6 required national bits in E1 in the G.751 frame. Default is 1 1 1 1 1 1.</p>
<p>Step 16 <code>crc-threshold <i>value</i></code></p> <p>Example: Router(config-controller)# crc-threshold 500</p>	<p>T1 only. Defines a severely errored second by specifying the number of crc errors that must occur in one second to reach the severely errored state. Default is 320.</p>

Command or Action	Purpose
<p>Step 17 <code>yellow {generation detection}</code></p> <p>Example: Router(config-controller)# no yellow detection</p>	<p>Enables generation and detection of yellow alarms. Default condition is that generation and detection of yellow alarms are enabled.</p> <p>Use the no form of the command to disable yellow alarm detection.</p>
<p>Step 18 <code>bert pattern pattern interval time</code></p> <p>Example: Router(config-controller)# bert 2^11 interval 1440</p>	<p>Optional. Activates the Bit Error Rate Tester (bert) with the chosen test pattern for a specified duration.</p> <p>Configure bert patterns on T1/E1 HWICs or network module as follows:</p> <ul style="list-style-type: none"> • When the linecode is AMI, use patterns 2^11, 2^15, or 2^20-QRSS. • When the linecode is b8zs or hdb3, use patterns 2^11, 2^15, 2^20-QRSS, or 2^20-O.153. <p>Note If any other bert pattern is chosen, an error message will appear that lists the supported patterns for the configured linecode. A complete listing of bert patterns is in the Cisco IOS Master Commands List, Release 12.4.</p> <p>interval time is from 1 to 14,400 minutes.</p>

Configuring the T1/E1 HWICs with Voice Support

Digital voice for 1-Port and 2-Port HWICs are only supported on Cisco c2911– Cisco c3945e ISR-G2 platforms.

In this example, one **voice pri-group** (a **pri-group** with **voice-dsp** option) is configured under t1 controller with one **ds0-group** under another t1 controller from the same HWIC-2CE1T1-PRI for voice support.

**Note**

Do not configure a **data pri-group** with a **voice pri-group** on the same HWIC.

```
informers# sh run
Building configuration...

Current configuration : 1763 bytes
!
! Last configuration change at 17:16:17 UTC Thu Jul 1 2010
!
version 15.1
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname informers
!
boot-start-marker
boot-end-marker
!
card type t1 0 0
card type e1 0 2
!
no aaa new-model
!
no network-clock-participate slot 4
no network-clock-participate wic 0
network-clock-participate wic 2
no ipv6 cef
ip source-route
!
!
ip cef
!
!
multilink bundle-name authenticated
!
!
!
!
!
isdn switch-type primary-ni
!
!
!
!
!
voice-card 0
!
voice-card 4
!
!
!
```



```
!  
!  
!  
license udi pid C3900-SPE250/K9 sn FOC13391AMK  
!  
!  
hw-module pvdm 0/0  
!  
!  
redundancy  
!  
!  
controller T1 0/0/0  
  cablelength long 0db  
!  
controller T1 0/0/1  
  cablelength long 0db  
!  
controller E1 0/2/0  
  pri-group timeslots 1-24 voice-dsp  
!  
controller E1 0/2/1  
  ds0-group 0 timeslots 1-24 type fxs-loop-start  
!  
interface GigabitEthernet0/0  
  ip address 1.2.104.7 255.255.0.0  
  duplex auto  
  speed auto  
!  
interface GigabitEthernet0/1  
  no ip address  
  shutdown  
  duplex auto  
  speed auto  
!  
interface GigabitEthernet0/2  
  no ip address  
  shutdown  
  duplex auto  
  speed auto  
!  
interface GigabitEthernet0/3  
  no ip address  
  shutdown  
  duplex auto  
  speed auto  
!  
interface Serial0/2/0:15  
  no ip address  
  encapsulation hdlc  
  isdn switch-type primary-ni  
  isdn incoming-voice voice  
  no cdp enable  
!  
ip forward-protocol nd  
!  
no ip http server  
no ip http secure-server  
!  
ip route 0.0.0.0 0.0.0.0 1.2.0.1  
ip route 223.255.254.254 255.255.255.255 1.2.0.1  
!  
!  
nls resp-timeout 1
```

```
cpd cr-id 1
!
!
control-plane
!
!
voice-port 0/2/0:15
!
voice-port 0/2/1:0
!
voice-port 0/1/0
!
voice-port 0/1/1
!
!
!
!
!
!
!
gatekeeper
 shutdown
!
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  login
  transport input all
!
exception data-corruption buffer truncate
scheduler allocate 20000 1000
end

informers#
```

Configuration Examples for T1/E1 HWICs and Network Module

This section shows configuration examples for the 4-port HWIC in both T1 and E1 configurations.

- [Example: 4-Port T1 HWIC, page 19](#)
- [Example: 4-Port E1 HWIC:, page 22](#)

Example: 4-Port T1 HWIC

In this example, the 4-port HWIC is set to card type T1 and is configured with default settings. Channel groups are defined on ports 0, 1, and 2.

```
router# show running-config
Building configuration...

Current configuration : 1454 bytes
!
! Last configuration change at 09:49:03 UTC Tue Sep 19 2006
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname router
!
boot-start-marker
boot-end-marker
!
card type t1 0 2
!
no aaa new-model
!
resource policy
!
no network-clock-participate wic 2
!
ip cef
!
!
!
voice-card 0
 no dspfarm
!
!
!
controller T1 0/2/0
 framing esf
 linecode b8zs
 cablelength long 0db
 channel-group 1 timeslots 5
!
controller T1 0/2/1
 framing esf
 linecode b8zs
 cablelength long 0db
 channel-group 2 timeslots 10
!
controller T1 0/2/2
```

```

framing esf
linecode b8zs
cablelength long 0db
channel-group 3 timeslots 15
!
controller T1 0/2/3
framing esf
linecode b8zs
cablelength long 0db
!
!
!
interface GigabitEthernet0/0
ip address 1.7.7.12 255.255.0.0
duplex auto
speed auto
media-type rj45
!
interface GigabitEthernet0/1
ip address 20.20.20.1 255.255.255.0
duplex auto
speed auto
media-type rj45
!
interface Serial0/2/0:1
no ip address
!
interface Serial0/2/1:2
no ip address
!
interface Serial0/2/2:3
no ip address
!
ip default-gateway 1.7.0.1
ip route 223.255.254.0 255.255.255.0 GigabitEthernet0/0
!
!
ip http server
no ip http secure-server
!
!
!
control-plane
!
!
!
line con 0
exec-timeout 0 0
stopbits 1
line aux 0
stopbits 1
line vty 0 4
login
!
scheduler allocate 20000 1000
!
end

router#

```

The **show controllers t1** command gives the following output:

```

router# show controllers t1
T1 0/2/0 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  Data in current interval (889 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
  Total Data (last 24 hours)
    1 Line Code Violations, 2 Path Code Violations,
    0 Slip Secs, 1 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins,
    1 Errored Secs, 0 Bursty Err Secs, 1 Severely Err Secs, 0 Unavail Secs
T1 0/2/1 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  Data in current interval (892 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
  Total Data (last 24 hours)
    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
T1 0/2/2 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  Data in current interval (893 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
  Total Data (last 24 hours)
    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
T1 0/2/3 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear

```

```

Version info FPGA Rev: 06080409, FPGA Type: PRK4
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
CRC Threshold is 320. Reported from firmware is 320.
Data in current interval (896 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
Total Data (last 24 hours)
  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
router#

```

Example: 4-Port E1 HWIC:

In this example, the 4-port HWIC is set to card type E1, and is configured with default settings. A channel group is defined on port 0. The **show running-config** command gives the following output:

```

router# show running-config
Building configuration...

Current configuration : 1192 bytes
!
! Last configuration change at 01:18:52 UTC Wed Sep 20 2006
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname router
!
boot-start-marker
boot-end-marker
!
card type e1 0 2
!
no aaa new-model
!
resource policy
!
no network-clock-participate wic 2
!
ip cef
!
!
!
voice-card 0
  no dspfarm
!
!
!
controller E1 0/2/0
channel-group 1 timeslots 5
national reserve 0 1 1 1 1 0
!
controller E1 0/2/1
!
controller E1 0/2/2
!
controller E1 0/2/3

```

```
!  
!  
!  
interface GigabitEthernet0/0  
  ip address 1.7.7.12 255.255.0.0  
  duplex auto  
  speed auto  
  media-type rj45  
!  
interface GigabitEthernet0/1  
  ip address 20.20.20.1 255.255.255.0  
  duplex auto  
  speed auto  
  media-type rj45  
!  
interface Serial0/2/0:1  
  no ip address  
!  
ip default-gateway 1.7.0.1  
ip route 223.255.254.0 255.255.255.0 GigabitEthernet0/0  
!  
!  
ip http server  
no ip http secure-server  
!  
!  
!  
control-plane  
!  
!  
!  
line con 0  
  exec-timeout 0 0  
  stopbits 1  
line aux 0  
  stopbits 1  
line vty 0 4  
  login  
!  
scheduler allocate 20000 1000  
!  
end  
router#
```

The **show controllers e1** command gives the following output:

```
router# show controllers e1
E1 0/2/0 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  International Bit: 0, National Bits: 11110
  Data in current interval (621 seconds elapsed):
    5 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 2 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 0/2/1 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  Data in current interval (630 seconds elapsed):
    5 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 0/2/2 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  Data in current interval (648 seconds elapsed):
    4 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 0/2/3 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Version info FPGA Rev: 06080409, FPGA Type: PRK4
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  CRC Threshold is 320. Reported from firmware is 320.
  Data in current interval (660 seconds elapsed):
    56 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
router#
```


Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Hardware installation of network modules	Cisco Network Modules Hardware Installation Guide

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards have not been modified by this feature.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs have not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs have not been modified by this feature.	—

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>	<p>http://www.cisco.com/cisco/web/support/index.html</p>

Command Reference

This section documents only commands that are modified.

- [controller](#)

controller

To configure a T1, E1, or J1 controller and enter controller configuration mode, use the **controller** command in global configuration mode.

Cisco 2600 and 3600 Series Routers

```
controller {t1 | e1 | j1} slot/port
```

Cisco 7200 Series and Cisco 7500 Series Routers

```
controller {t1 | e1} slot/port
```

Cisco AS5300 Access Servers

```
controller {t1 | e1} number
```

Cisco AS5800 Access Servers

```
controller t1 dial-shelf/slot/t3-port:t1-num
```

Cisco 2800 and 3800 Series Routers

```
controller {t1 | e1} slot/subslot/port
```

Syntax	Description
t1	T1 controller.
e1	E1 controller.
j1	J1 controller.
<i>slot/port</i>	Backplane slot number and port number on the interface. Refer to your hardware installation manual for the specific values and slot numbers.
<i>slot/subslot/port</i>	Backplane slot number, subslot number, and port number on the interface. Refer to your hardware installation guide for the specific values, and slot and subslot numbers.
<i>number</i>	Network processor module (NPM) number, in the range 0 through 2.
<i>dial-shelf</i>	Dial shelf chassis in the Cisco AS5800 access server that contains the interface card.
<i>t3-port</i>	T3 port number. The only valid value is 0.
<i>:t1-num</i>	T1 timeslot in the T3 line. The value can be from 1 to 28.

Defaults No T1, E1, or J1 controller is configured.

Command Modes Global configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The e1 keyword was added.
12.0(3)T	Support was added for dial shelves on Cisco AS5800 access servers.
12.2(7)XO	The j1 keyword was added for the Cisco 2600 and Cisco 3600 series.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(11)XW	The <i>subslot</i> argument was added for the Cisco 2800 and Cisco 3800 series.

Usage Guidelines**T1 or E1 Fractional Data Lines**

This command is used in configurations where the router or access server is intended to communicate with a T1 or E1 fractional data line. Additional parameters for the T1 or E1 line must be configured for the controller before the T1 or E1 circuits can be configured by means of the **interface** global configuration command.

To view the status of the controllers use the **show controllers** command.

Examples**Cisco 7500 Series Router As a T1 Controller**

The following example configures the MIP in slot 4, port 0 of a Cisco 7500 series router as a T1 controller:

```
Router(config)# controller t1 4/0
Router(config-controller)#
```

Cisco AS5800 Access Server with Dial Shelf

The following example configures the T1 controller in shelf 1, slot 0, port 0:

```
Router(config)# controller t1 1/0/0:1
Router(config-controller)#
```

Cisco 3660 As a J1 Controller

The following example configures the Cisco IOS interface card in slot 3, port 0 of a Cisco 3660 as a J1 controller:

```
Router(config)# controller j1 3/0
Router(config-controller)#
```

Related Commands

Command	Description
bert abort	Resets the T1 or E1 controller.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).
show controllers content-engine	Displays information about the E1 links supported by the NPM (Cisco 4000) or MIP (Cisco 7500 series).
show controllers j1	Displays information about the J1 link.
show controllers t1	Displays the total number of calls and call durations on a T1 controller.

Feature Information for T1/E1 HWICs and Network Modules

Table 3 lists the features in this module and provides links to specific configuration information.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

**Note**

Table 3 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 3 Feature Information for T1/E1 HWICs and Network Module

Feature Name	Releases	Feature Information
T1/E1 HWICs and 8-Port T1/E1 Network Module	12.4(11)XW5 12.4(20)T	<p>T1/E1 HWICs are available as follows:</p> <ul style="list-style-type: none"> • Channelized 1-port T1/E1 HWIC • Channelized 2-port T1/E1 HWIC • Clear channel 4-port T1/E1 HWIC <p>The T1/E1 network module is available as an 8-port channelized T1/E1 network module.</p> <p>T1/E1 HWICs are supported on Cisco 2811, Cisco 2821, Cisco 2851, Cisco 3800, Cisco 2900, and Cisco 3900 series routers.</p> <p>The T1/E1 network module is supported on Cisco 3800, Cisco 2900, and on Cisco 3900 series routers.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> • Information About T1/E1 HWICs and Network Module, page 3 <p>The following commands were introduced or modified: controller.</p>
Voice Support on 1-Port and 2-Port HWICs	15.0(1)M3, 15.1(1)T1, 15.1(2)T	<p>Introduces digital voice support (ds0-group and pri-group) on HWIC-1CE1T1-PRI and HWIC- 2CE1T1-PRI.</p> <p>This feature is introduced to the 1-Port and 2-Port HWIC on the following ISR-G2 platforms. Cisco 2911, Cisco 2921, Cisco 2951, Cisco 3925, Cisco 3925E, Cisco 3945, and Cisco 3945E.</p> <p>Digital voice for 1-Port and 2-Port HWICS is only supported on motherboard (MB) HWIC slots.</p> <p>The CUCM releases CUCM 7.1(5) and CUCM 8.0(2) are the minimum releases supported for voice on HWIC-1CE1T1-PRI and HWIC-2CE1T1-PRI.</p> <p>This release information only applies to MGCP configurations because H.323 and SIP configurations have no CUCM release dependency.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> • Configuring the T1/E1 HWICs or Network Module, page 8 • Configuring the T1/E1 HWICs with Voice Support, page 16