



Configuring 1- and 2-Port T1/E1 GRWICs

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This document describes the following Cisco Grid Router WAN Interface Card (GRWIC) products designed to fit into the rugged Cisco Connected Grid Router 2010 (Cisco CGR 2010). Cisco 1-port and 2-port channelized T1/E1 and PRI GRWICs combine multiple T1/E1 WAN connectivity and channelized T1/E1 in the same card. Applications include fractional or full T1/E1 WAN connectivity and dial access aggregation. The modules can be used in T1 or E1 networks, selectable during software configuration. The modules support balanced and unbalanced E1 connectivity and conform to the G.703 and G.704 standards for unframed and framed E1 modes.

- 1-port T1/E1 Grid Router WAN Interface Card part number: GRWIC-1CE1T1-PRI (data only)
- 2-port T1/E1 Grid Router WAN Interface Card part number: GRWIC-2CE1T1-PRI (data only)
- Provides channelized T1 or E1 connections
- Only supported on Cisco CGR2010

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the [“Feature Information for T1/E1 GRWICs” section on page 11](#).

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS 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 GRWICs

- Only the Cisco Connected Grid Router 2010 supports these rugged T1/E1 GRWICs.
- Voice features are not supported on the GRWICs.
- Wetting current is not supported on the GRWICs.
- V54 loop up/down code recognition is not supported on the GRWICs.
- The 1- and 2-port GRWICs support up to 32 channels per port (up to 64 channels total on the 2-port GRWIC).
- 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 GRWICs” section on page 5](#) for more details.

Information About T1/E1 GRWICs

Cisco Connected Grid Router 2010 supports one of the following three GRWIC module options:

- Option 1: Four single-wide GRWIC modules
- Option 2: Two double-wide GRWIC modules
- Option 3: One double-wide and two single-wide GRWIC modules
- Option 4: Two single-wide and one double-wide GRWIC modules



Note

GRWIC online insertion and removal is not supported.

[Table 1](#) shows the form factor capability of each GRWIC slot.

Table 1 GRWICs Slot Compatibility on Cisco CGR2010

Options	Slot 3	Slot 2	Slot 1	Slot 0
Option 1	Single-wide GRWIC	Single-wide GRWIC	Single-wide GRWIC	Single-wide GRWIC
Option 2	Double-wide GRWIC		Double-wide GRWIC	
Option 3	Double-wide GRWIC		Single-wide GRWIC	Single-wide GRWIC
Option 4	Single-wide GRWIC	Single-wide GRWIC	Double-wide GRWIC	

Some examples are as follows:

- Port 0 of a GRWIC in slot 0: 0/0/0
- Port 1 of a 1- or 2-port GRWIC in slot 1: 0/1/1

How to Configure T1/E1 GRWICs

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Configuring Card Type

To configure the T1/E1 GRWICs for T1 or E1 operation, complete the following steps.



Note

The T1/E1 GRWICs will not be operational until a card type is properly 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 CGR2010 Series router platform. <i>subslot</i> refers to the GRWIC slot on the platform.

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 GRWIC.
Step 4	card type {t1 e1} slot subslot Example: Router(config)# card type e1 0 2	Specifies T1 or E1 connectivity for the GRWIC.
Step 5	write Example: Router# write	Rebuilds the router configuration.
Step 6	reload Example: Router# reload	Reloads router so that changes can take affect. After this command executes, the router will go to ROM monitor (rommon) mode.

Configuring the T1/E1 GRWICs

To configure the T1/E1 GRWICs, complete the following steps:

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
pri-group timeslots *timeslot-range* [**nfas_d** | **service**]
or
tdm-group *tdm-group-no* **timeslots** *timeslot-range*
13. **national reserve** *N sa4 sa5 sa6 sa7 sa8*
14. **crc-threshold** *value*
15. **yellow** {**generation** | **detection**}
16. **bert pattern** *pattern interval time*

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>enable</pre> <p>Example: Router> enable </p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<pre>configure terminal</pre> <p>Example: Router# configure terminal </p>	<p>Enters global configuration mode.</p>
Step 3	<pre>network-clock-participate [slot slot-number wic wic-slot]</pre> <p>Example: Router(config)# network-clock-participate wic 0 </p>	<p>TDM group configuration only. Allows the ports on a specified GRWIC to use the network clock for timing.</p>
Step 4	<pre>controller {t1 e1} slot/subslot/port</pre> <p>Example: Router(config)# controller t1 1/0 </p>	<p>Enters controller configuration mode.</p>
Step 5	<pre>framing {sf esf}</pre> <p>OR</p> <pre>framing {crc4 no-crc4}</pre> <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	<pre>linecode {ami b8zs}</pre> <p>OR</p> <pre>linecode {ami hdb3}</pre> <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 rate 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	<pre>fdl {att ansi both}</pre> <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. You can select the ATT standard (ATT TR54016), the ANSI standard (ANSI T1.403), or both. Default is ansi. To disable fdl, enter the command no fdl.</p>

	Command or Action	Purpose
Step 8	<p><code>clock source {line [independent] internal}</code></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 domain, 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><code>line-termination {75-ohm 120-ohm}</code></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>
Step 10	<p><code>loopback {diagnostic local {payload line} remote {iboc esf {payload line}}}</code></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.
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>pri-group timeslots timeslot-range</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>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"> • <code>channel-group-number</code> 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"> • <code>channel-group-number</code> 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 for PRI for transporting ISDN data.</p> <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 command to work, it is necessary to configure network-clock-participate for the interface in global configuration mode.</p>
<p>Step 13 <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 14 <code>crc-threshold value</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
Step 15	<pre>yellow {generation detection}</pre> <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>
Step 16	<pre>bert pattern pattern interval time</pre> <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 GRWICs 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 Cisco IOS Master Commands List, Release 12.4.</p> <p>interval time is from 1 to 14,400 minutes.</p>

Configuration Example for GRWIC

To view the configuration of the GRWIC, use the **show interface serial** command.

```
Router#show interface serial 0/1/6
Serial0/1/6 is up, line protocol is up
  Hardware is GRWIC-Serial
Internet address is 5.5.5.2/8
  MTU 1500 bytes, BW 0 Kbit/sec, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SLIP, loopback not set
  Keepalive not set
  DTR is pulsed for 5 seconds on reset
  Last input 00:00:09, output 00:00:09, output hang never
  Last clearing of "show interface" counters 00:30:04
  Input queue: 1/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/16 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
    Available Bandwidth 0 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    119 packets input, 30084 bytes, 0 no buffer
    Received 0 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    1 input errors, 0 CRC, 1 frame, 0 overrun, 0 ignored, 0 abort
    120 packets output, 30510 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 unknown protocol drops
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
```

To view the IOS software version, use the **show version** command.

```
Router#show version
Cisco IOS Software, cgr2010 Software (cgr2010-UNIVERSALK9-M), Experimental Version
15.1(20091110:120837) [dyip-flow 110]
Copyright (c) 1986-2009 by Cisco Systems, Inc.
Compiled Tue 10-Nov-09 07:16 by dyip

ROM: System Bootstrap, Version 12.4(20091028:224958) [ypatel-3gorgrm1 141], DEVELOPMENT
SOFTWARE

Router uptime is 32 minutes
System returned to ROM by reload at 09:09:57 PST Wed Nov 11 2009
System restarted at 09:11:07 PST Wed Nov 11 2009
System image file is "flash0:cgr2010-universalk9-mz.SSA.cflow"
Last reload reason: Reload Command
```

Command Reference

This section documents only commands that are modified.

controller

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

```
controller {t1 | e1 | j1} slot/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>lt3-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.

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.
show controllers j1	Displays information about the E1 link.
show controllers t1	Displays the total number of calls and call durations on a T1 controller.

Feature Information for T1/E1 GRWICs

Table 2 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS 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 2 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 2 Feature Information for T1/E1 GRWICs

Feature Name	Releases	Feature Information
T1/E1 GRWICs	15.1(1)T	<p>T1/E1 GRWICs are available as follows:</p> <ul style="list-style-type: none"> Channelized 1-port T1/E1 GRWIC Channelized 2-port T1/E1 GRWIC <p>T1/E1 GRWICs are supported on Cisco CGR2010.</p>

Additional References

The following sections provide references related to the T1/E1 GRWIC features.

Related Documents

Related Topic	Document Title
Hardware installation of network modules	See the Cisco CGR 2010 Router Hardware Installation Guide
CLI Commands Reference	Cisco IOS Master Commands List, Release 15

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

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/techsupport</p>

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