Cisco Connected Grid 4-Port Serial GRWIC Installation and Configuration Guide

This document describes how to install and configure the Cisco Connected Grid 4-port serial Grid Router WAN interface Card (GRWIC). This module enables the Cisco 2010 Connected Grid Router (CGR 2010) to connect to a Wide Area Network (WAN).

This document includes the following sections:

Information About the 4-Port Serial GRWIC

The single-slot 4-port serial GRWIC (product ID GRWIC-4T) provides serial connectivity to the CGR 2010, a ruggedized power utility substation router. The GRWIC (see Figure 1) has 4 serial ports that support V.10/V.11/V.28/V.35 signaling types and asynchronous and synchronous protocols.

Utilities commonly have legacy equipment that communicates over relatively slow serial links. The 4-port serial GRWIC helps customers to enable applications such as legacy protocol transport, console server, and dial access server. Combining a high-density serial GRWIC with the CGR 2010 enables energy networks to collect and transport data from a Supervisory and Data Acquisition (SCADA) system over an IP network.

Features

The 4-port serial GRWIC (see Figure 1) offers the following key features:

- Meets the following industry compliance standards:

    - IEEE 1613 Power Substation Networking

    - IEC 61850-3 Substation Networking

    - IEC 60870-2-2 Environmental Classification

    - IEC 60068-2-2 Environmental Testing

- Supports the following protocols:

    - EIA-232

    - EIA-449

    - EIA-530, EIA-530A

    - V.35

    - X.21

- Supports asynchronous and synchronous protocols

- Hardware support for PPP, HDLC, and Bisync protocols

- Uses the Cisco 12-in-1 Serial Cable

- Supports lead manipulation

- Supports Raw Socket and Protocol Translation between T101 and T104 and between DNP3-IP and DNP3-Serial

Figure 1　　　*The Cisco 4-Port Serial GRWIC*
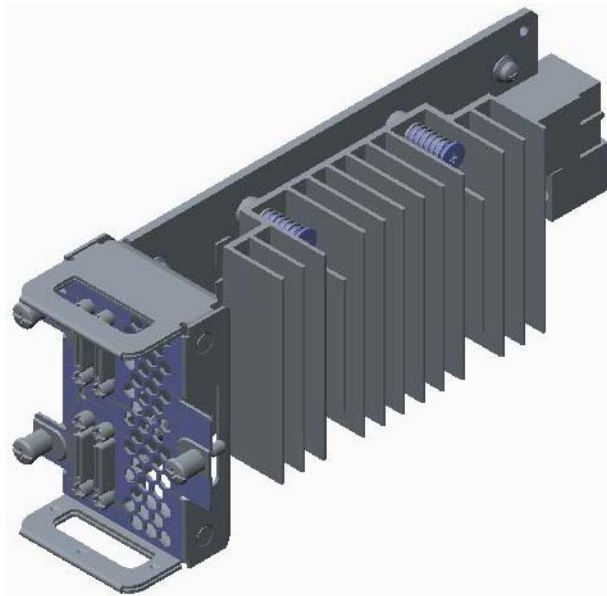
Timing Signals

The 4-port serial GRWIC interfaces support both the data terminal equipment (DTE) and data communication equipment (DCE) mode, depending on the mode of the compact serial cable attached to the port. To use a port as a DTE interface, you only need to connect a DTE compact serial cable to the port. When the system detects the DTE mode cable, it automatically uses the external timing signal. To use a port in DCE mode, you must connect a DCE compact serial cable and set the clock speed with the **clock rate** configuration command. See Configuring Basic Options, page 12 to set the clock speed.

Encapsulation Protocols

Encapsulation protocols connect the Layer 2 (link layer) protocols with the Layer 3 (network layer) protocols. When traffic crosses a WAN link, the connection needs a layer 2 protocol to encapsulate traffic. The 4-port serial GRWIC interface supports the High-Level Data Link Control (HDLC), Point-to-point (PPP), and Frame Relay encapsulation protocols. The HDLC protocol, a proprietary protocol, decodes proprietary framing used by the routers on the PPP links. The standard PPP protocol supports PPP links analyzed by HDLC and can also be utilized for Frame Relay. The standard Frame Relay encapsulation protocol is a versatile and common encapsulation protocol used with Frame Relay. See Configuring Basic Options, page 12 to set the encapsulation method.

Lead Manipulation

The lead manipulation feature allows a user to ignore input signals on the physical interface, view the state of the input signals, and monitor the transitions of the input signals. By default, Cisco IOS software requires assertion of some of the input leads on the physical interface. With lead manipulation, the user can configure the serial interface to ignore input signals. See Ignoring Input Signals, page 13.

Hardware Overview

This section includes the following topics:

Specifications

This section includes the following topics:

Hardware Specifications

Table 1 summarizes the hardware specifications of the 4-port serial GRWIC supported on the CGR 2010.

Table 1   Hardware Specifications for the 4-Port Serial GRWIC

Item	Description
Dimensions (H x W x D)	3 x 2 x 6.5 in. (7.62 x 5.08 x 16.51 cm)
Slot Restrictions	None
Number of ports	4
Connector	Cisco 12-in-1 connector
Synchronous maximum speed (per port)	8 Mbps
Asynchronous maximum speed (per port)	230.4 kbps

Environmental Specifications

Table 2 lists the environmental specifications for the 4-port serial GRWIC.

Table 2   Environmental Specification for the 4-Port Serial GRWIC

| Condition	Requirement
Operating Conditions	
Temperature	-40ºF to 140ºF (-40 to +60ºC) continuous operating temperature range
	-40ºF to 185ºF (-40 to +85ºC) type test for 100 hours at 85ºC
Relative humidity	5 to 95% non-condensing
Altitude	10,000 ft (3,048 m) Maximum operating temperature is de-rated with increasing altitude per IEEE 1613a-2008
Shock/vibration	30G @11 ms
Non-Operating Conditions	
Temperature	-40ºF to 185ºF (-40ºC to 85ºC)
Relative humidity	5 to 95% non-condensing
Altitude	16,000 ft (4,876 m) Maximum operating temperature is de-rated with increasing altitude per IEEE 1613a-2008
Shock/vibration	40-50G (3.26 m/s minimum)
Free fall drop	4 in. (100 mm) per ENG-339611
Seismic/earthquake	NEBS GR-63 (5.4.1)

Power Specifications

Typical power consumption of the 4-port serial GRWIC is approximately 4.8W.

Ports and LEDs

Figure 2 shows the front panel of the 4-port serial GRWIC.

Figure 2   4-Port Serial GRWIC Front View
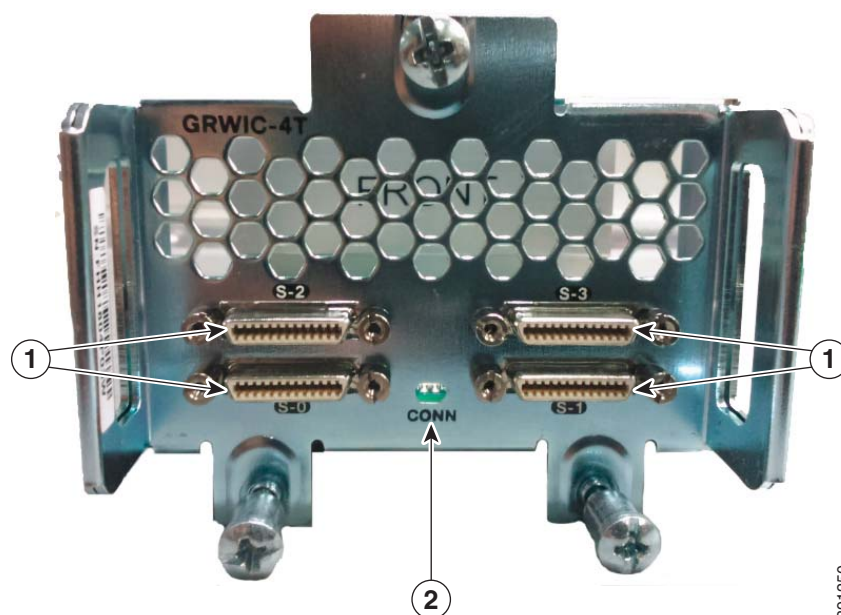
1	Serial port (4)	**2**	Bi-color LED for ports 0-3

Figure 2 shows that the 4-port serial GRWIC has one LED, labeled CONN, for ports 0-3. The LED lights when the serial port is connected. When the port is in DTE mode, the CONN LED indicates that Data Send Ready (DSR), Data Carrier Detect (DCD), and Clear To Send (CTS) have been detected. When the port is in DCE mode, Data Terminal Ready (DTR) and Ready To Send (RTS) have been detected. Table 3 describes the functions of the LEDs.

Table 3   Serial GRWIC LED

LED	Description
Solid Green	The card is active (initialized without error).
Blinking Green	At least one port is passing traffic.
Yellow	At least one port is in loopback mode.
Blinking Yellow	At least one port has failed.
Off	The card is is not active or has failed to initialize.

Cables

The interface cables for the 4-port serial GRWIC are rated for -4 degrees F (-20 degrees C) to 167 degrees F (75 degrees C). At -40C (the low end of the operating temperature range of the CGR 2010), the smart serial cable will perform optimally provided that the following conditions are met:

- The cable is not bent or flexed more than 5 times the nominal diameter.

- The cable is not strained under its own weight and is properly secured to the cable management system.

- The cable is not pinched and the cable jacket is not cracked from high impact or other damage.

- The cables connect equipment within a controlled environment such as an equipment room or vented cabinet and are not used outdoors in the field.

For information about connecting the cables, see "Connecting the 4-Port Serial GRWIC to the Network" section on page 9.

Table 4 lists the serial cables for the supported serial connection types.

Table 4   Interface Cables for 12-in-1 Connector

Interface Type and description	Cisco Product Number	Protocol Type
V.35 DTE, 10 ft (3 m), Plug M34	CAB-SS-V35MT	V.35 DTE SYNC
V.35 DCE, 10 ft (3 m), Socket M34	CAB-SS-V35FC	V.35 DCE SYNC
EIA/TIA-232 DTE, 10 ft (3 m), Plug DB-25	CAB-SS-232MT	RS232 DTE, Sync/Async, Max BAUD rate=230.4 kbps
EIA/TIA-232 DCE, 10 ft (3 m), Socket DB-25	CAB-SS-232FC	RS232 DCE, Sync/Async, Max BAUD rate=230.4 kbps
EIA/TIA-449 DTE, 10 ft (3 m), Plug DB-37	CAB-SS-449MT	RS-449 DTE SYNC
EIA/TIA-449 DCE, 10 ft (3 m), Socket, DB-37	CAB-SS-449FC	RS-449 DCE SYNC
X.21 DTE, 10 ft (3 m), Plug, DB-15	CAB-SS-X21MT	X.21 DTE SYNC
X.21 DCE, 10 ft (3 m), Socket, DB-15	CAB-SS-X21FC	X.21 DCE SYNC
EIA/TIA-530 DTE, 10 ft (3 m), Plug, DB-25	CAB-SS-530MT	RS-530 DTE SYNC
EIA/TIA-530 DTE, 10 ft (3 m), Plug, DB-25	CAB-SS-530FC	RS-530 DTE SYNC
EIA/TIA-530A DTE, 10 ft (3 m), Plug, DB-25	CAB-SS-530AMT	RS-530A DTE SYNC
EIA/TIA-530A DCE, 10 ft (3 m), Plug, DB-25	CAB-SS-530AFC	RS-530A DCE SYNC

Installing and Removing the 4-Port Serial GRWIC

This section describes how to install the 4-port serial GRWIC in the CGR 2010 and includes the following topics:

- Safety Warnings, page 7
- Installing a 4-Port Serial GRWIC, page 7
- Removing a 4-Port Serial GRWIC, page 9

Safety Warnings

This section includes the basic installation warning statements for the 4-port serial GRWIC. For regulatory compliance and safety information for the CGR 2010, refer to the Connected Grid Router 2000 Series Regulatory Compliance and Safety Information document.

http://www.cisco.com/en/US/docs/routers/access/2000/CGR2010/hardware/rcsi/rcsiCGR2000series.html

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Warning **Read the installation instructions before connecting the system to the power source.** Statement 1004

Warning **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first.** Statement 1026
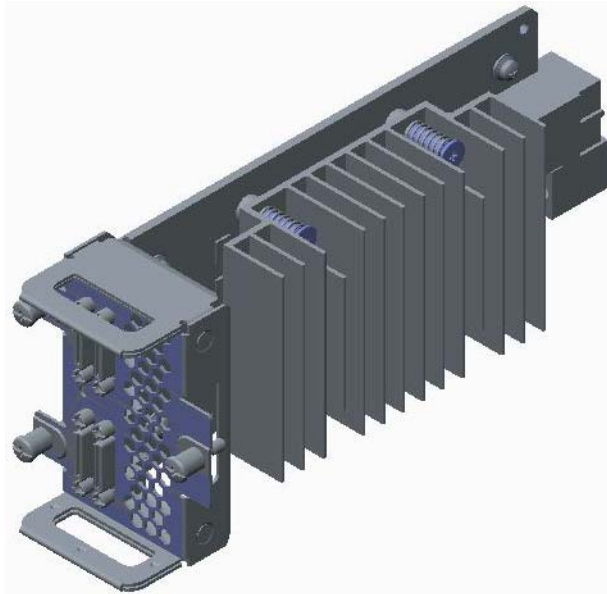
Installing a 4-Port Serial GRWIC

You can install the 4-port serial GRWIC into one of four slots on the cable side of the router.

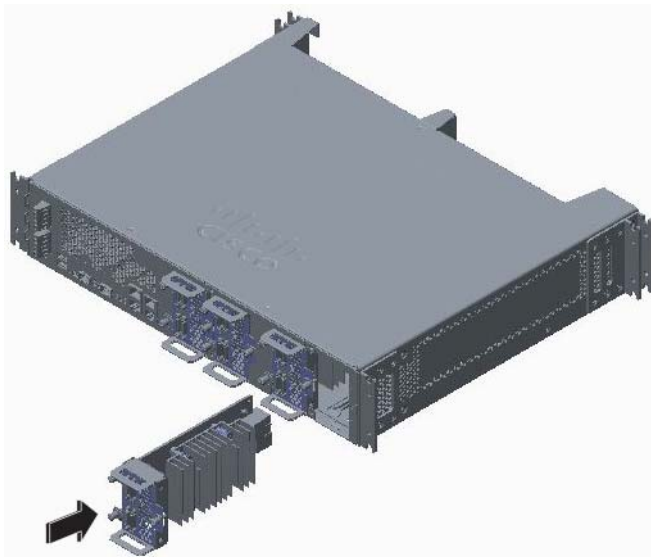Follow these steps to install a 4-port serial GRWIC in a CGR 2010:

Step 1 Stand the GRWIC on end to install into the router slot. (See Figure 3.)

Figure 3   ***GRWIC Positioning to Install into the GCR 2010 Router***

Step 2   Slide the GRWIC into the router slot. (See Figure 4.)

Figure 4   ***Proper Installation of a GRWIC***

Step 3   Tighten the three captive screws on the front of the interface card.

Removing a 4-Port Serial GRWIC

To remove a 4-port serial GRWIC from a CGR 2010, perform these steps:

Step 1   Using a screwdriver, loosen the three captive screws on the 4-port serial GRWIC.

Step 2   Gently pull the module out of the slot.

Connecting the 4-Port Serial GRWIC to the Network

Before connecting a GRWIC to the network, ensure that the GRWIC is installed in the router and you have the proper cables for connecting the GRWIC to the network. See Table 4 on page 6 for the cable descriptions.
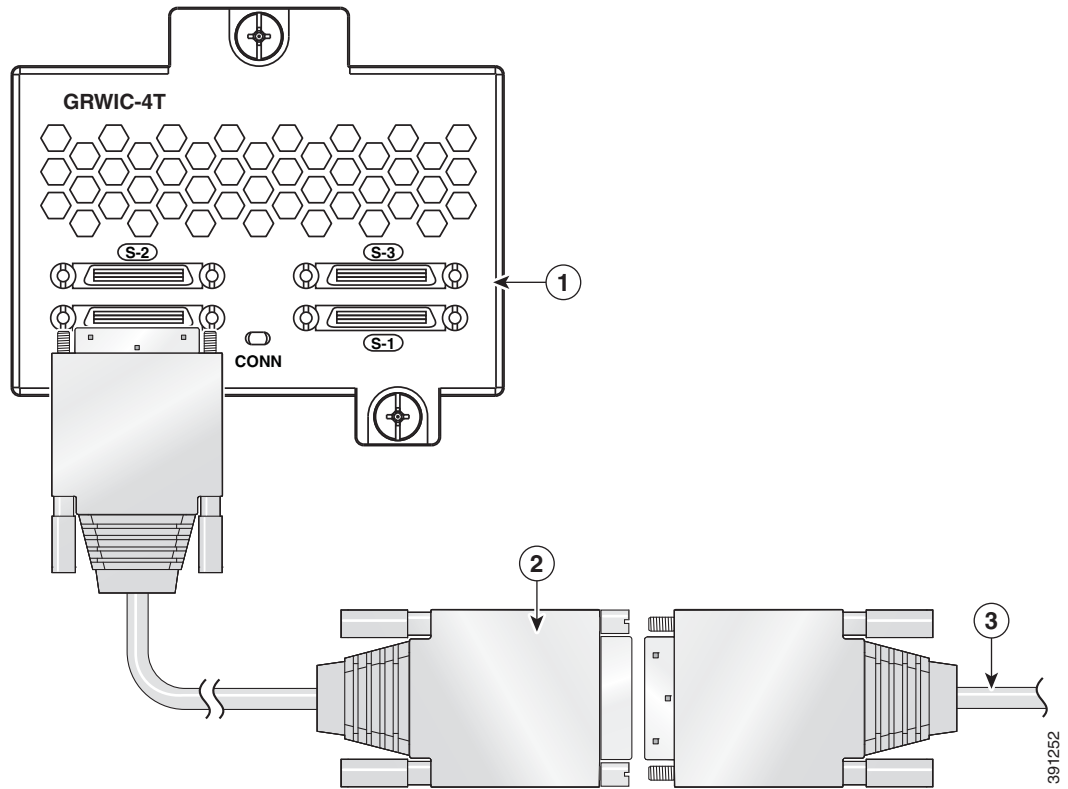
✎ **Note**   The interface cables are designed to connect equipment within a controlled environment such as an equipment room or vented cabinet and are not designed or intended to be used outdoors in the field.

To connect the 4-port serial GRWIC to the network, follow these steps:

Step 1   Connect the serial cable to the connector on the GRWIC faceplate. (See Figure 5.)

Step 2   Secure the thumb screws on the cable to the GRWIC faceplate. (See Figure 5.)

Figure 5   *Connecting the Serial GRWIC Interface*

1	Serial interface	**2**	One of the serial cable types listed in Table 4, "Interface Cables for 12-in-1 Connector" (female serial cable shown as an example)
3	Matching serial cable for type listed in Table 4, "Interface Cables for 12-in-1 Connector" (male serial cable shown as an example)		

Step 3 Route the serial cable using a cable management system, such as a vertical cable manager, to ensure that the weight of the cable is supported (see Figure 6). Allow a short length (3 to 6 inches) of the cable to exit perpendicular to the connector.

Figure 6   Routing the Serial Cable

1	Vertical cable manager	**2**	Serial cable

Step 4   Connect the female end of the serial cable to the male end of the other serial cable for back-to-back connectivity. (See Figure 5.)

Step 5   Connect the other end of the cable to the DTE or DCE.

Software Configuration

This section includes the following topics:

Restrictions for the 4-Port Serial GRWIC

- Network clocking synchronization is not supported. Note that the serial protocol is terminating at the GRWIC-4T and the raw packet is forwarded across the network. Therefore, end-to-end clocking is not required for reliable data transport.

- The GRWIC-4T does not support Nx64k/56kbps baud rates.

Configuring the 4-Port Serial GRWIC

This section includes the following topics:

Configuring Basic Options

To configure basic options, including keepalive, clock rate, and encapsulation, perform the following steps:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface serial** *slot/subslot/port*	Selects the interface to configure and enters interface configuration mode. • *slot/subslot/port*—Specifies the location of the interface.
Step 3	**ip address** *address mask*	Sets the IP address and subnet mask. • *address*—IP address • *mask*—Subnet mask
Step 4	**keepalive** *period*	Integer value that represents the time interval, in seconds, of messages sent between DTE and DCE to ensure that the peer interface is active. • *period*—The valid range is from 0 to 32767. The default is 10 seconds.
Step 5	**clock rate** *bps*	Configures the clock rate on the DCE side for the DCE to send traffic at the specified rate. To remove the clock rate if you change the interface from a DCE to a DTE device, use the **no** form of this command. Using the **no** form of this command on a DCE interface sets the clock rate to the hardware-dependent default value. The default is 2016000 bps. • *bps*—value in bits per second: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 32000, 38400, 48000, 56000, 57600, 64000, 72000, 115200, 128000, 230400, 252000, 504000, 1008000, 2016000, 4032000, 8064000, <300-10000000> **Note** The RS232 cable can operate only at clock speeds of 1200 to 252000.

	Command	Purpose
Step 6	**physical-layer {sync | async}**	Specifies the mode of the serial interface as either synchronous or asynchronous. • **sync**—synchronous mode (default). • **async**—asynchronous mode.
Step 7	**encapsulation {hdlc | ppp | frame-relay | raw-tcp | raw-udp}**	Sets the encapsulation type on the interface. • **hdlc**—High-Level Data Link Control (HDLC) protocol for serial interface (default). • **ppp**—Point-to-Point Protocol (PPP). • **frame-relay**—Frame Relay. • **raw-tcp**—Raw Socket TCP for the asynchronous serial port. • **raw-udp**—Raw Socket UDP for the asynchronous serial port. Note For **raw-tcp** or **raw-udp**, the mode of the serial interface must be set to **async**.

> **Note** See *Configuring Raw Socket Protocol on the CGR 2010 Router* for more information about configuring Raw Socket.

Ignoring Input Signals

You can configure an interface operating in DCE mode to ignore incoming Data Terminal Ready (DTR) or Ready to Send (RTS) signals. When you configure the **ignore** [**dtr** | **rts**] command, a signal is automatically seen as asserted.

To configure the interface to ignore DTR and RTS signals, perform the following steps:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface serial** *slot/subslot/port*	Selects the interface to configure and enters interface configuration mode. • *slot/subslot/port*—Specifies the location of the interface.
Step 3	**ignore [dtr | rts]**	Configures the DCE to ignore the specified signal. • **dtr**—DCE ignores DTR signals. • **rts**—DCE ignores RTS signals.

Configuring Loopback Test

To configure a loopback test to test the connectivity, perform the following steps:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface serial** *slot/subslot/port*	Selects the interface to configure and enters interface configuration mode. • *slot/subslot/port*—Specifies the location of the interface.
Step 3	**loopback**	Configures the local loopback.
Step 4	**interface serial** *slot/subslot/port*	Selects the interface to configure and enters interface configuration mode. • *slot/subslot/port*—Specifies the location of the interface.
Step 5	**loopback remote payload** [**fdl**] [**ansi**]	Transmits a payload line loopback request to a remote device, which is used for testing the line and remote Data Service Unit (DSU). • **fdl ansi**—Sends a repeating, 16-bit Extended Superframe (ESF) data link code word (00010100 11111111) to the remote end requesting that it enter into a network payload loopback.

Verifying Configuration

Command	Purpose
show running config	Shows the configuration of the CGR 2010, including active features and their settings.
show controllers serial *slot/subslot/port*	Displays serial controller statistics, including error and alarm information that is useful in troubleshooting line problems.
show interfaces serial	Shows information about the serial interface.

The following example shows output from the **show controllers serial** command:

```
UUT1#show controllers s0/0/0
Interface Serial0/0/0
Hardware is GRWIC-Serial
DCE V.35

Lead Modem Status
    DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

Lead Line Status
    DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

clock rate 2016000
idb at 0x2A5E02BC, driver data structure at 0x2A5E0F78
Stats for LED(s):
Loopback bitmask 0x0
LED1 is Green
```

```
GRWIC Register Base: 0x10000000
-----------------
GRWIC Common Registers:
--------------------
id(0x00):  0x00000001    rev(0x01): 0x00000002    status(0x02): 0x00000000
tx crc(0x01): 0x00000000  ctrl(0x06): 0x00008081


GRWIC Serial Common Registers:
---------------------------
hwic_serial_rev(0x1000): 0x08232013      hwic_serial_ctrl(0x1004): 0x00008009
intr1_enable(0x1020): 0x0000002A         intr2_enable(0x1022): 0x0000000F


GRWIC Serial SCC Registers:
--------------------------
ch_mode_cfg: 0x08019031    ch_flag_cfg: 0x0000007E    ch_floctrl_cfg: 0x00000000
ch_int_enable: 0x000009FF  ch_cmd_stat: 0x00000050    ch_tx_empty_stat: 0x00000001


GRWIC Serial DMA Registers:
-----------------------
Rx ring_start_ptr: 0x0E944C00           Rx ring_mask_index: 0x01F80060
internal_desc_stat: 0x0400060C          internal_buff_addr: 0x0E965AC8
internal_context: 0x00000013            internal_fifo_data: 0x0E969567
Tx ring_start_ptr: 0x0E946080           Tx ring_mask_index: 0x03F80060
internal_desc_stat: 0x00000000          internal_buff_addr: 0x0E94C4F1
internal_context: 0x00000441            internal_fifo_data: 0x31555554


GRWIC Serial Interface Registers:
------------------------------
intf_ctrl: 0x0019 modem_ctrl: 0x011D flow_ctrl: 0x7430 brg dvdr:0x0004


GRWIC TDM/FREQ Counter Registers:
-------------------------------
tdm_control: 0x0000 tdm_a_8k_divider: 0x0000 tdm_b_8k_divider: 0x0000
freq_count_port_sel: 0x000B freq_count: 0x14A4B6

0 input aborts on receiving flag sequence
0 throttles, 0 enables
0 overruns
0 transmitter underruns
0 transmitter CTS losts
0 aborted short frames
0 CRC short frames count
0 rxintr, 0 txintr, 0 rxerr, 0 txerr
0 rx_bogus_pkts, rx_bogus_flag FALSE
0 tx_abort, 0 tx_reset


tx_limited = 0(128) tx_count = 0
idb at 0x2A5E02BC, driver data structure at 0x2A5E0F78
Receive Ring
rxr head (12)(0x0E944C60), rxr tail (0)(0x0E944C00)
  rmd(E944C00): desc_stat_len 8400060C desc_buff_addr E964DC8
  rmd(E944C08): desc_stat_len 8400060C desc_buff_addr E9640C8
  rmd(E944C10): desc_stat_len 8400060C desc_buff_addr E967B48
.
.
.
Transmit Ring
txr head (12)(0x0E9460E0), txr tail (12)(0x0E9460E0)
  tmd(E946080): desc_stat_len 05C00000 desc_buff_addr DDA00D4
  tmd(E946088): desc_stat_len 05C00000 desc_buff_addr DDA0254
  tmd(E946090): desc_stat_len 05C00000 desc_buff_addr DDA09D4
```

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```
.
.
.
buffer size 1524

UUT1#
```

This example shows the output from the **show interfaces** command for a serial interface:

```
UUT1#show int s0/0/0
Serial0/0/0 is up, line protocol is up
  Hardware is GRWIC-Serial
  MTU 1500 bytes, BW 2048 Kbit/sec, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, LCP Open, loopback not set
  Keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  Time to interface disconnect:  idle 00:59:42
  Interface is bound to Di1 (Encapsulation PPP)
  CRC checking enabled
  Last input 00:00:07, output 00:00:07, output hang never
  Last clearing of "show interface" counters 04:07:36
 Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     1852 packets input, 47678 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     2101 packets output, 50723 bytes, 0 underruns
     0 output errors, 0 collisions, 396 interface resets
     73 unknown protocol drops
     0 output buffer failures, 0 output buffers swapped out
     596 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

UUT1#
```

Configuration Example

This section includes the following topics:

Frame Relay

The following example shows a Frame Relay configuration between routers UUT-1 and UUT-2:

UUT-1:

```
interface Serial0/0/3
 no ip address
 encapsulation frame-relay
 no keepalive
!
interface Serial0/0/3.1 point-to-point
 ip address 172.16.120.105 255.255.255.0
```

```
 frame-relay interface-dlci 101
!
```

UUT-2:

```
interface Serial0/0/3
 no ip address
 encapsulation frame-relay
 no keepalive
 clock rate 64000
!
interface Serial0/0/3.1 point-to-point
 ip address 172.16.120.120 255.255.255.0
 frame-relay interface-dlci 101
!
```

Verify ping works to the other end, and verify the output of the following **show** commands:

```
UUT-1# show frame map
Serial0/0/3.1 (up): point-to-point dlci, dlci 101(0x65,0x1850), broadcast
UUT-1#
UUT-1#
UUT-1# show frame pvc

PVC Statistics for interface Serial0/0/3 (Frame Relay DTE)

               Active       Inactive      Deleted       Static
  Local          1             0             0             0
  Switched       0             0             0             0
  Unused         0             0             0             0

DLCI = 101, DLCI USAGE = LOCAL, PVC STATUS = STATIC, INTERFACE = Serial0/0/3.1

  input pkts 7           output pkts 9          in bytes 2081
  out bytes 2720         dropped pkts 0         in pkts dropped 0
  out pkts dropped 0            out bytes dropped 0
  in FECN pkts 0         in BECN pkts 0         out FECN pkts 0
  out BECN pkts 0        in DE pkts 0           out DE pkts 0
  out bcast pkts 9       out bcast bytes 2720
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
  pvc create time 00:07:36, last time pvc status changed 00:07:36
UUT-1#
```

Dial-on-Demand (DDR)

The following example shows the configuration for DDR:

```
interface Dialer1
     ip address  1.1.1.1 255.255.255.0
     encapsulation PPP
     dialer remote-name R2
     dialer string 555430
     dialer caller 555430
     dialer pool 10
     dialer group 1
     dialer-list dialer group protocol <ip> permit
interface s0/0/2
     dialer in-band
     encapsulation ppp
     dialer pool-member 10
```

Feature History

Cisco Feature Navigator provides information about platform support, software image support, including software image and their supported software release, feature set, or platform.

You can access Cisco Feature Navigator by going to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 5 lists the release history for this feature.

Note   Table 5 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 5   Feature Information for 4-Port Serial GRWIC

Feature Name	Release	Feature Information
4-port serial GRWIC module for the Connected Grid Router 2010	15.4.(1)CG1	Provides the CGR 2010 with WAN connectivity options for serial protocols and interfaces.

Related Documents

- Cisco Connected Grid Routers 2010 Hardware Installation Guide
- Configuring Raw Socket Protocol on the CGR 2010 Router

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html.

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