



CHAPTER 3

Raw Socket Transport

The Raw Socket Transport feature provides a method for placing serial data into packets and transferring the data across an IP network, using TCP connections between Cisco Connected Grid Routers (Cisco CG-OS routers or CGRs).

This chapter describes how to configure Raw Socket Transport on the Cisco Series 1000 Connected Grid Router (CGR 1000). The feature is also supported on the Cisco 2010 Connected Grid Router (CGR 2010); for more information, see [Configuring Raw Socket Protocol on the CGR 2010 Router](#).

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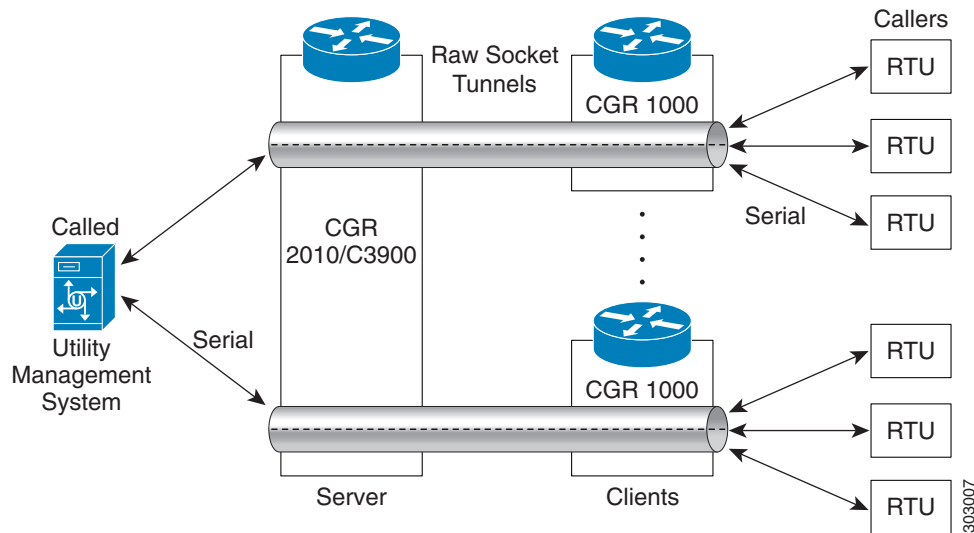
Information About Raw Socket Transport

Raw Socket is a method for transporting serial data through an IP network. The feature can be used to transport Supervisory Control and Data Acquisition (SCADA) data from Remote Terminal Units (RTUs). This method is an alternative to the Block Serial Tunnel (BSTUN) protocol.

[Figure 3-1](#) shows a sample Raw Socket configuration. In this example, serial data is transferred between RTUs and a utility management system across an IP network that includes a single CGR 2010 router and several CGR 1000 routers. The CGR 2010 router acts as a Raw Socket *server*, listening for TCP connection requests from the CGR 1000 routers, which are configured as Raw Socket *clients*.

A Raw Socket client receives streams of serial data from the RTUs and accumulates this data in its buffer, then places the data into packets, based on user-specified packetization criteria. The Raw Socket client initiates a TCP connection with the Raw Socket server and sends the packetized data across the IP network to the Raw Socket server, which retrieves the serial data from the packets and sends it to the serial interface, and on to the utility management system.

Figure 3-1 Raw Socket Transport



On the CGR 1000, an asynchronous serial line configured for Raw Socket Transport can operate in client mode, server mode, or both. In client mode, the CGR 1000 can initiate up to 32 TCP sessions to Raw Socket servers, which can be CGR 2010 routers, other CGR 1000 routers, or third-party devices.

The streams of serial data received by a Raw Socket client can be packetized based on the following criteria:

- **Packet size**—You can specify a packet size that triggers the CGR 1000 to transmit the serial data to the server. Once the CGR 1000 collects this much data in its buffer, it packetizes the accumulated data and forwards it to the Raw Socket server.
- **Packet-timer value**—The packet timer specifies the amount of time the CGR 1000 waits to receive the next character in a stream. If a character is not received by the time the packet timer expires, the data the CGR 1000 has accumulated in its buffer is packetized and forwarded to the Raw Socket server.
- **Special character**—You can specify a character that will trigger the CGR 1000 to packetize the data accumulated in its buffer and send it to the Raw Socket server. When the special character (for example, a CR/LF) is received, the CGR 1000 packetizes the accumulated data and sends it to the Raw Socket server.

Prerequisites

Before you configure Raw Socket Transport for an asynchronous serial line, you must enable the feature using the **encapsulation raw-tcp** command (CGR 2010 routers) or **encapsulation raw-socket** command (CGR 1000 routers) for the serial port. Then, you can configure the asynchronous serial lines.

Configuring Raw Socket Transport

This section includes the following topics:

- [Enabling the CGR 1000 Serial Port and Raw Socket Encapsulation, page 3-3](#)

- [Configuring an Asynchronous Serial Line for Raw Socket Transport, page 3-3](#)

Enabling the CGR 1000 Serial Port and Raw Socket Encapsulation

To enable the Raw Socket feature on the CGR 1000 router, you must first enable a serial port and enable Raw Socket encapsulation for that port.

BEFORE YOU BEGIN

Determine availability of the serial port on the CGR 1000 router.

DETAILED STEPS

	Command	Purpose
Step 1	configure terminal	Enters the global configuration mode.
Step 2	interface serial <i>slot/port</i>	Enters the interface command mode for the serial slot/port. Note The slot/port configuration for the serial port can be 1/1 or 1/2.
Step 3	no shutdown	Brings up the port, administratively.
Step 4	encapsulation raw-socket	Enables Raw Socket encapsulation for the serial port.

EXAMPLE

This example shows how to enable serial port 1/1 and how to enable Raw Socket encapsulation on that port.

```
router# configure terminal
router(config)# interface serial 1/1
router(config-if)# no shutdown
router(config-if)# encapsulation raw-socket
router(config-if)# exit
router(config)#
```

Configuring an Asynchronous Serial Line for Raw Socket Transport

After enabling Raw Socket encapsulation for a serial port, you specify Raw Socket settings for an asynchronous serial line.

BEFORE YOU BEGIN

Enable a serial port and Raw Socket encapsulation for that port, as described in the previous section.

DETAILED STEPS

Follow the steps below for each asynchronous serial line you are configuring to use Raw Socket Transport.

	Command	Purpose
Step 1	configure terminal	Enters configuration mode.
Step 2	line tty 1 2	Enters line configuration mode for a standard asynchronous line.
Step 3	raw-socket tcp client <i>dest_ip_address</i> <i>dest_port</i> [<i>local_ip_address</i>] [<i>local_port</i>]	(If configuring as a Raw Socket client) Specifies settings for Raw Socket Transport TCP client sessions. <i>dest_ip_address</i> —Destination IP address of the remote Raw Socket server. <i>dest_port</i> —Destination port number to use for the TCP connection to the remote server. <i>local_ip_address</i> —(Optional) Local IP address that the client can also bind to. <i>local_port</i> —(Optional) Local port number that the client can also bind to.
Step 4	raw-socket tcp server <i>port</i> [<i>ip_address</i>]	(If configuring as a Raw Socket server) Starts the Raw Socket Transport TCP server for an asynchronous line interface. In Raw Socket server mode, the CGR 1000 listens for incoming connection requests from Raw Socket clients. <i>port</i> —Port number the server listens on. <i>ip_address</i> —(Optional) Local IP address on which the server listens for connection requests.
Step 5	raw-socket tcp idle-timeout <i>session_timeout</i>	Sets the Raw Socket Transport TCP session timeout for the asynchronous line interface. If no data is transferred between the client and server over this interval, then the TCP session is closed. The client then automatically attempts to reestablish the TCP session with the server. This timeout setting applies to all Raw Socket Transport TCP sessions under this particular line. <i>session_timeout</i> —Currently configured session idle timeout in minutes. The default is 5 minutes.
Step 6	raw-socket packet-length <i>packet_size</i>	Specifies the packet size that triggers the CGR 1000 to transmit the data to the server. When the CGR 1000 accumulates this much data in its buffer, it packetizes the data and forwards it to the Raw Socket server. <i>packet_size</i> —Packet size in bytes (16–1400). The default is off, meaning that the maximum packet size for the interface is used.

	Command	Purpose
Step 7	raw-socket packet-timer <i>packet_timer</i>	Specifies the maximum time in milliseconds the CGR 1000 waits to receive the next character in a stream. If a character is not received by the time the packet-timer expires, the accumulated data is packetized and forwarded to the Raw Socket server. <i>packet_timer</i> —Time in milliseconds. The default is 10 milliseconds.
Step 8	raw-socket special-char <i>special_character</i>	Specifies a character that will trigger the CGR 1000 to packetize the data accumulated in its buffer and send it to the Raw Socket server. When the serial interface receives this special character, the interface packetizes the accumulated bytes into a TCP frame and sends it to the server through the Raw Socket Transport tunnel. <i>special_character</i> —Character value (0–255). By default, the special character trigger is disabled.

EXAMPLE

This example shows how to configure the Raw Socket Transport feature for an asynchronous serial line. The CGR 1000 is configured as a Raw Socket client that initiates TCP sessions with two Raw Socket servers and forwards packetized serial data to them. The CGR 1000 collects streams of serial data in its buffer; when it accumulates 827 bytes in its buffer, the CGR 1000 packetizes the data and forwards it to the Raw Socket servers. In the event that no data is exchanged between the CGR 1000 and one of the Raw Socket servers for 10 minutes, then the TCP session with the Raw Socket server is closed, and the CGR 1000 attempts to reestablish the session with the Raw Socket server.

```
router# configure terminal
router(config)# line tty 1
router(config-tty)# raw-socket tcp client 10.0.0.1 4000
router(config-tty)# raw-socket tcp client 20.0.0.1 4000
router(config-tty)# raw-socket packet-length 827
router(config-tty)# raw-socket tcp idle-timeout 10
router(config-tty)# exit
router(config)#
```

Verifying Configuration

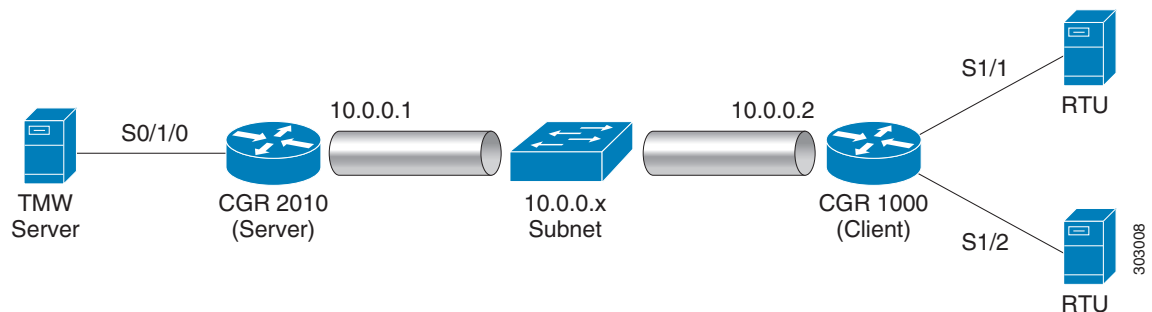
Command	Purpose
show running-config	Shows the configuration of the router including those features that are active and their settings.
show raw-socket tcp detail	Displays information about Raw Socket Transport TCP activity.
show raw-socket tcp sessions	Displays information about Raw Socket Transport TCP sessions.

Command	Purpose
show raw-socket tcp statistic	Displays Raw Socket Transport TCP statistics for each asynchronous serial line.
clear raw-socket tcp	Clears Raw Socket Transport TCP statistics for a specific TTY interface or for all asynchronous serial lines.

Configuration Example

The following example shows a Raw Socket transport configuration in which a CGR 2010 router acts as the server, and a CGR 1000 router acts as the client.

Figure 3-2 Raw Socket Transport Configuration Example



The following are the configurations of the Raw Socket server and client CGRs shown in the example in [Figure 3-2](#).

CGR 2010 Server Configuration	CGR 1000 Client Configuration
<pre> ... interface Serial0/1/0 physical-layer async no ip address encapsulation raw-tcp ! ... line 0/1/0 raw-socket tcp server 5000 10.0.0.1 raw-socket packet-timer 3 raw-socket tcp idle-timeout 5 ... </pre>	<pre> ... interface serial 1/1 no shutdown no ip address encapsulation raw-socket ! interface serial 1/2 no shutdown no ip address encapsulation raw-socket ! ... line tty 1 raw-socket tcp client 10.0.0.1 5000 10.0.0.2 9000 raw-socket packet-length 32 raw-socket tcp idle-timeout 5 line tty 2 raw-socket tcp client 10.0.0.1 5000 10.0.0.2 9001 raw-socket packet-length 32 raw-socket tcp idle-timeout 5 </pre>

Feature History

Feature Name	Release	Feature Information
Raw socket transport	Cisco CG-OS Release CG3(1)	Initial support of the feature on the CGR 1000 Series Routers.

