



Siretta

Inspired Wireless M2M Technology



linkCONNECT

Cellular Wireless Cable Replacement

Software Manual

Rev 6.9

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Introduction

This document describes the simple setup procedure for the Siretta linkCONNECT range, providing serial cable replacement communication over GPRS.

Throughout this document the LC200 Series will be referred to. Please note that the setup procedures throughout this document is relevant for **all linkCONNECT modem solutions**.

About Siretta

Siretta, located in Reading, United Kingdom have been manufacturing antennas, cable assemblies and cellular terminals for over 10 years. We supply our products globally to many of the world's leading organisations.

Whether you require an off the shelf or custom solution, Siretta has a wide portfolio of antenna, RF cable assemblies and terminals to fit your application.

Our extensive knowledge and experience in the wireless market allows us to support a wide range of customer applications, focusing on frequencies typically within the 75MHz - 5.8GHz range. These encompass the HF, VHF, ISM, GSM/GPRS/3G/4G and GPS frequencies as well as industrial WLAN and VHF/UHF antenna/Wi-Fi antenna solutions.

With a heavy emphasis on design, we have a team of dedicated Application Engineers and Product Managers, backed up by Field Sales Engineers, who specialise in wireless applications.

We have made significant investments in R&D facilities which boast GPS hardware development equipment and a GSM Pico Cell on site, as well as development software and a comprehensive suite of Industrial, Scientific and Medical band, and non ISM band frequency products. We have many technology partners enabling us to keep at the forefront of the communications industry and offer class leading wireless solutions.

General Description

Siretta linkCONNECT is an RS232 to GPRS cable replacement solution (route RS232 serial data over a TCP/IP data pipe).

Siretta linkCONNECT is designed to connect remote devices together as if they were physically connected in the same location via a serial cable. The software can be configured to allow remote devices to connect into a server or a server to connect into a remote device.

linkCONNECT can be used in multiple remote access applications and is also completely configurable in the field via SMS commands, or locally using our configuration tool via RS232 serial.

Applications include:

- » Remote diagnostics of site equipment
- » Gathering of data from remote equipment
- » Vending machine administration
- » Control and monitoring of remote equipment
- » Serial cable replacement
- » Dial-in services
- » Lighting control systems
- » Temperature monitoring
- » Burglar Alarm / Fire Alarm / PIR Alarm panel trigger monitoring
- » Daily data transmission automation
- » Land-line not present / available replacement services

Features

- » Remote SMS configuration
- » Multiple Server Ping
- » Automatic reboot timer
- » Configurable connection timeout
- » GSM keepalive
- » CSD backup if GPRS fails

Ordering Information

| | LC | X000 | - | XXXX |
|--|----|------|---|------|
| Range Identifier LC = linkCONNECT software | | | | |
| Modem Identifier 200 = linkCONNECT 200 Series 300 = linkCONNECT 300 Series 400 = linkCONNECT 400 Series | | | | |
| Product Module Version GPRS = GPRS Technology with EU Coverage UMTS = UMTS Technology with Global Coverage LTE = LTE Technology with EU Coverage | | | | |

Part Numbering Examples

- » LC200-GPRS = linkCONNECT 200 series 2G / GPRS solution with EU coverage
- » LC400-LTE = linkCONNECT 400 embedded series 4G / LTE solution with EU coverage

Standard Configuration Using SMS

Configuration parameters can be set up by using the configuration utility or by sending SMS text messages. In order to update the unit via SMS, a secure password (from hereon `smspassword`) is required which can also be set by using the utility. Once the settings have been successfully changed, the unit automatically replies with a confirmation of the change. **Pages 6 - 9** describe the configuration parameters and commands used to set these parameters.

SMS Command Description

Default `smspassword`: **connect**

GPRS

Format: [`smspassword`] `gprs` [`apn`] [`username`] [`password`]

Example: `connect gprs orangeinternet user pass`

Allows setting of the GPRS `apn`, `username`, and `password` for the SIM card. These can be obtained from the SIM card provider.

Baud

Format: [`smspassword`] `baud` [`baud`]

Example: `connect baud 115200`

Allows setting of the serial port speed used to communicate with the attached serial device. Accepted values are: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

Charformat

Format: [`smspassword`] `charformat` [`charformat`]

Example: `connect charformat 8N1`

7 / 8 - Data bits

N / E / O - No / Even / Odd Parity

0 / 1 - Stop bits

Allows setting of the serial port data bits, parity, stop bits used to communicate with the attached serial device. Accepted values are 8N2, 8E1, 8O1, 8N1, 7E1, 7O1.

Mode server

Format: [`smspassword`] `mode server` [`permitted ip`] [`localport`]

Example 1: `connect mode server any 1024`

Example 2: `connect mode server 192.168.0.1 1024`

Allows setting of the software into server mode whereby it listens for connection from a remote client on a specified port (additionally a source IP can be specified, and only connections from this IP will be accepted).

Mode client

Format: [smspassword] mode client [server] [serverport]

Example 1: connect mode client 192.168.0.100 1024

Example 2: connect mode client 192.168.0.100 1024 maintain

Allows setting of the software info client mode whereby it remotely connects to a server at a pre specified IP address and port. It can either connect only when data is received on the serial port, or permanently maintain a connection to the specified server reconnecting if it is disconnected.

Socketsetting

Format: [smspassword] socketsetting [socket timeout] [send timeout] [packet size]

Example: connect socketsetting 300 100 0

Allows setting of timeout values, and packet size used.

Socket Timeout – Time after which the socket will be closed if no data is sent or received. Valid values are 0 - 65535 (0 = no timeout, it is specified in seconds)

Send Timeout – Time after which a packet is sent whose size is less than the default. Valid values are 0 - 255 (0 = no timeout, wait for packets to reach max size, it is specified in 100ms units, i.e. a value of “10” is 1 second)

Packet Size – Size of packets used by the TCP stack when sending data. Valid values are 0 - 512 (0 = chosen automatically by device, it is specified in bytes)

The customer is advised to set a socket timeout value which balances their need for fast detection of a network condition causing a TCP connection to improperly close (i.e. availability of the RS232 Gateway for reconnection) against the increased GPRS traffic overhead incurred as the results of a lower timeout limit meaning the server must send arbitrary data at an increased frequency to keep the connection open.

Smspassword

Format: [smspassword] smspassword [newsmspassword]

Example: connect smspassword connect2

Allows setting of a new password. The pin number is required in all SMS command messages sent to the unit. The default password is “connect”. Valid values are 1-12 characters of 0 - 9, a - z only.

Dialin

Format: [smspassword] dialin [status]

Example: connect dialin on

Allows turning on or off support for remote dial in via a CSD (Circuit Switched Data) connection. When this setting is turned on, and the unit is in server mode, inbound connections can be accepted via either GPRS or CSD. By default this setting is turned off. Regardless of the baud rate established by the CSD connection, the baud rate of the serial port will be the value configured by the “baud” SMS command message.

Config

Format: [smspassword] config

Example: connect config

On receipt this message the software will return the current active configuration settings, when in “server” mode this includes the local IP address.

Reset

Format: [smspassword] reset [reset interval]

Example: connect reset 120

Allows enabling of a periodic unit reset that will automatically reset internal software. Valid values are 0 - 1440 i.e. 24hr (0 = reset disabled). Note: This value is specified in minutes. This setting is not designed to be used in normal operation, it is designed when other avenues or fault finding the cause of a reliability issue have failed.

Ping

Format: [smspassword] ping [ping interval] [server (s)]

Example 1: conenct ping 300 google.com

Example 2: connect ping 300 google.com bbc.co.uk

Allows enabling of a periodic ping made from the gateway to a remote server. If specified the server/servers will be checked on the interval (assuming no connection is currently in progress), and if unreachable (due to e.g. GSM / software failure condition preventing access to the Internet) the unit will be rebooted. It will not be rebooted more frequently than once every 15 minutes. Interval specified in seconds. Valid values are 60 - 86400 (i.e. 24 hours). This setting is not designed to be used in normal operation, it is designed when other avenues of fault finding the cause of a reliability issue have failed.

Setup Considerations

To accept new commands via SMS message the unit must not have any active socket connections open. Active socket connections can be disconnected by closing them on the remote side or rebooting the unit.

SMS Confirmation

The unit will acknowledge the receipt of the SMS and action correctly formatted command messages with a message in the format “Confirmed: [command confirmed]”. Incorrectly formatted messages will be responded to with “Error: [error message]”.

Replies are sent to the sender of the original request. The only exception is that command messages sent with an invalid password will not be responded to.

“**socket timeout**” is specified in seconds. Valid values are 0 - 65535 (0 = no timeout)

“**send timeout**” is specified in 100ms units, i.e. a value of “10” is 1 second. Valid values are 0 - 255 (0 = no timeout, wait for packets to reach max size)

“**packet size**” is specified in bytes 0 - 512 (0 = chosen automatically by device)

“**smspassword**” must be composed of 0-9, a-z, only and 1-12 characters in length.

“**dialin**” CSD dial in default setting is off for security.

“**mode client**” – the Gateway unit is configured as a client: making outbound connections to a remote server on the specified IP address / port. If the “**maintain**” keyword is used connections will be made immediately and kept open (reconnecting if a timeout or disconnect for any other reason occurs).

Without the “**maintain**” keyword connections will only be made if data is received on the serial port, and will be closed after the socket timeout is reached.

“**mode server**” – Gateway unit is configured as a server: accepting incoming connections from a remote client with the specified source IP address on the specified local port. This mode requires a fixed IP address SIM card to operate correctly.

“**baud**” - Accepted values: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

“**config**” - Return current active configuration settings

Configuration Using Configuration Tool

Standard parameters can also be set up using the configuration tool.

Step 1. Select the COM port to which the LC200 Series modem is connected, power on the unit and press 'Connect'* as shown in figure 1 below.

Figure 1. Connecting to the LC200 Series

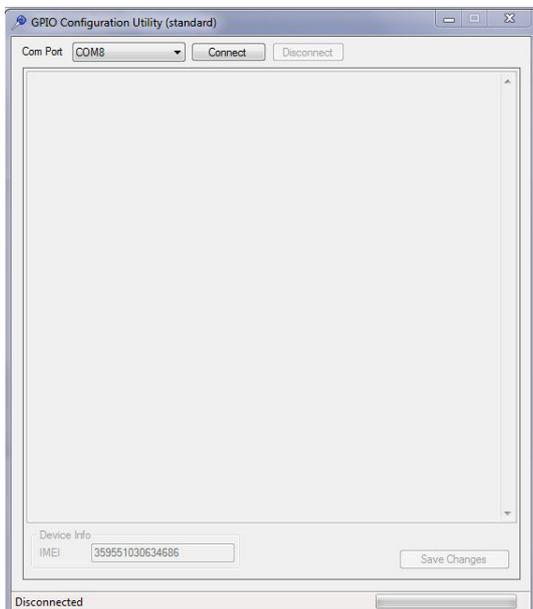
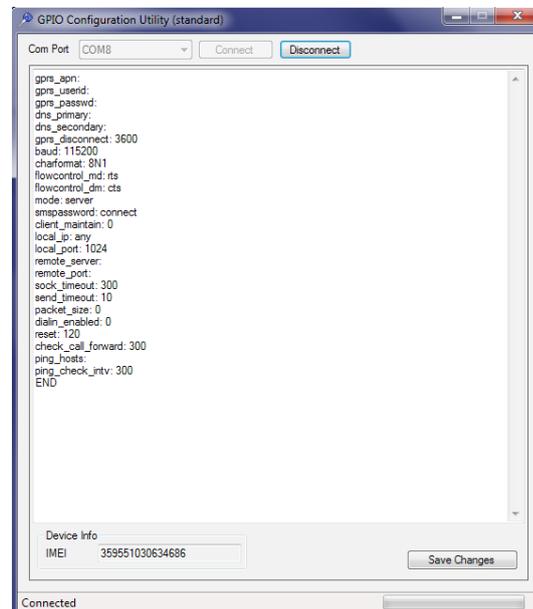


Figure 2. Setup parameters



Once the terminal is connected using the serial port, the standard setup parameters will be displayed as shown in figure 2 above.

*You must click connect within 10 seconds of powering the unit on.

Modes of Use

Client Mode

Step 1. Select the COM port to which the LC200 Series modem is connected and the required parameters.*

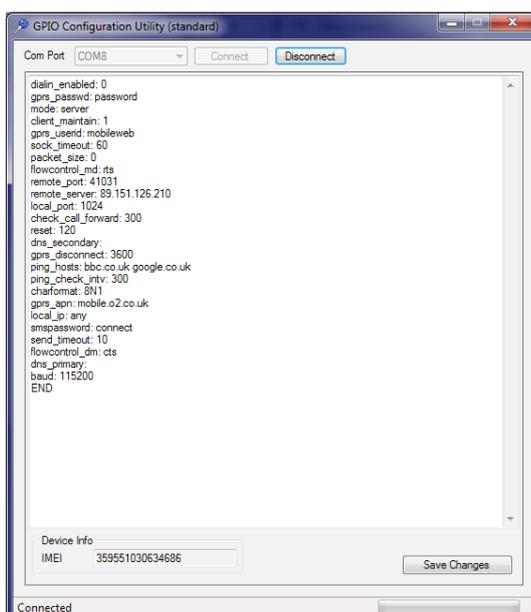
The unit is set up in client mode to connect to the Sequoia server at 89.151.126.210 on port 41031 (figure 3). The parameters on the RS232 Gateway Tester must be set accordingly on the unit as well. The settings for client mode can be set using SMS as follows:

Default smspassword: connect

- » Connect baud 115200
- » Connect charformat 8N1
- » Connect flowcontrol rts cts
- » Connect socksetting 90 10 0
- » Connect mode client 89.151.126.210 41031 maintain

To set up the same parameters using the utility, enter baud, charformat, flowcontrol_md, flowcontrol_dm, mode, client_maintain, remote port and remote server as shown in the figure below.

Figure 3. Connected to the LC200 Series

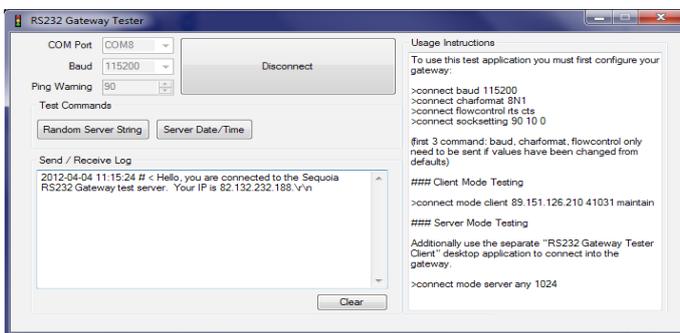


*The parameters shown in the figure above (baud rate, character formatting, flow control, socksetting) must be configured on the unit by SMS or by using the utility.

The RS232 Gateway Tester will be used to test the unit in a server environment.

Step 2. Once all the parameters have been entered correctly on the RS232 Gateway Tester, press 'Connect'. Upon successful connection to the Sequoia server, a 'Hello' message is displayed as shown in **figure 4** below.

Figure 4. Connection to Sequoia server



Once connected to the server, you will be able to send a date and time request or a random string to the server as shown in the figures below (**figures 5 & 6**).

Figure 5. Date and time response

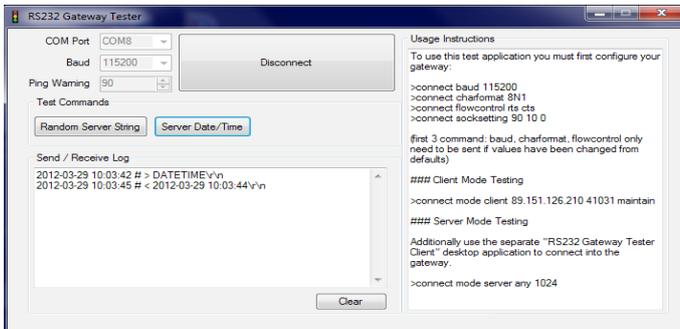
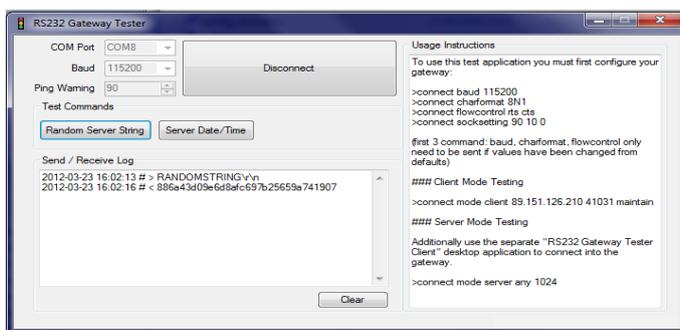


Figure 6. Sending a random string to Sequoia server



Server Mode

In order to set the unit up in server mode, it is necessary that a fixed IP address be used for a connection into the modem. Let us assume that the APN, username and password to obtain a fixed IP address are myprivateAPN, myprivateUsername, and myprivatePassword respectively.

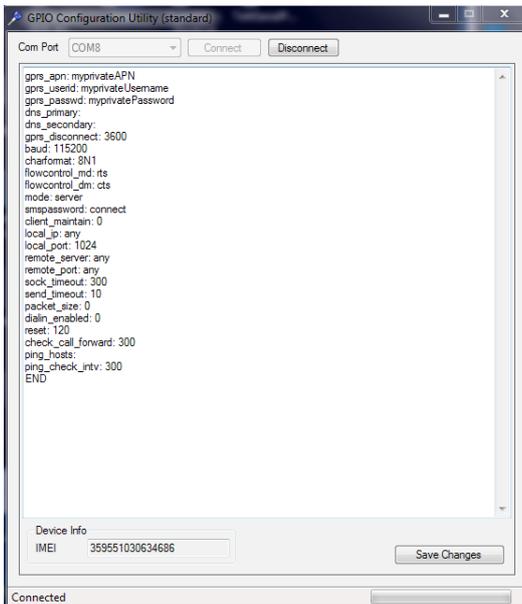
Step 1. The server mode can be set via SMS as follows:

Default smspassword: connect

- » Connect mode server any 1024
- » Connect GPRS myprivateAPN myprivateUsername myprivatePassword*

To set up the same parameters using the utility, enter mode, local IP and local port as shown in **figure 7** below.

Figure 7. Setup parameters



*In order to be able to successfully connect to the LC200 Series in server mode, you must use a SIM with fixed IP which will usually have a specific APN name, Username and Password.

The RS232 Gateway Tester Client will then be used to dial into the LC200 Series via the fixed SIM IP and set port.

Step 2. Enter the correct IP address of the unit and port. It is recommended to set the Timeout value less than that of the units to avoid any clashes. The fixed public IP address of the SIM used in this scenario is 93.93.232.71

Press '**Connect**' to communicate with the unit (**figure 8**).

Figure 8. Client mode used to dial into the LC200 Series

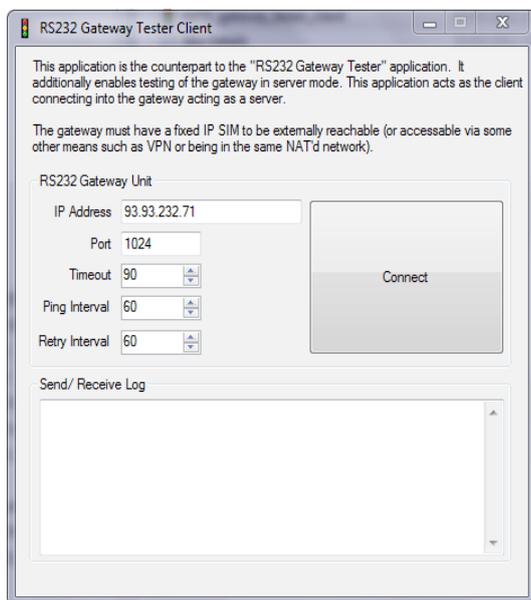
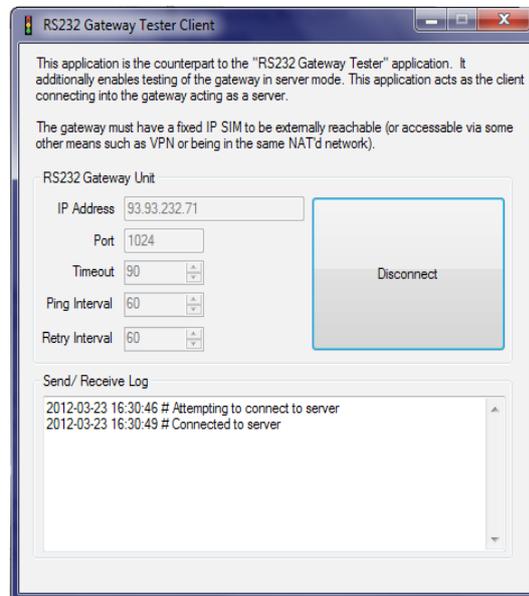


Figure 9. Parameter selection



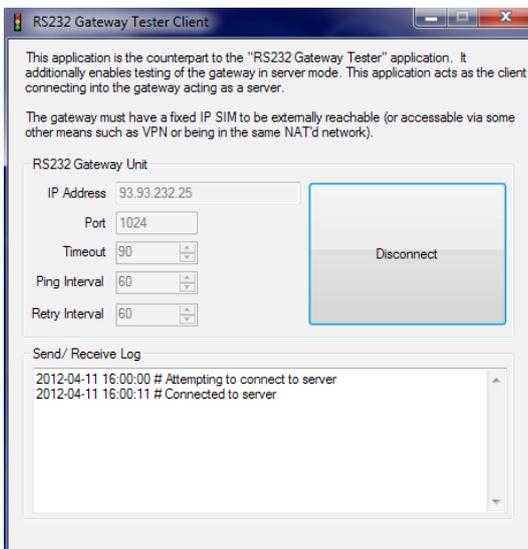
The Client tester will display a prompt as shown in **figure 9** above once connected to the LC200 Series server.

Client / Server Communications Test

In this scenario we will test the client / server communications using both the RS232 Gateway Tester and the RS232 Gateway Tester Client.

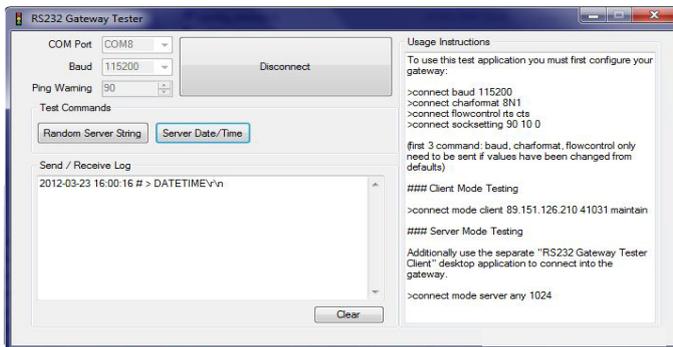
Step 1. Use the RS232 Gateway Tester Client to connect to the unit as explained in 'Server Mode' (see page 13). You will be prompted upon successful connection to the unit. The fixed IP address of the SIM used here is 93.93.232.25 (see figure 10 below).

Figure 10. Connected to server



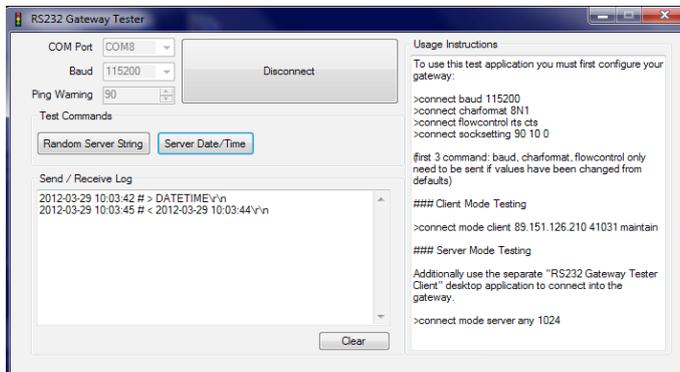
Step 2. Use the RS232 Gateway Tester utility to connect to the LC200 Series using the RS232 port as explained in 'Client Mode' (see page 11). Once connected, send a date and time request to the server (figure 11).

Figure 11. Send date and time request



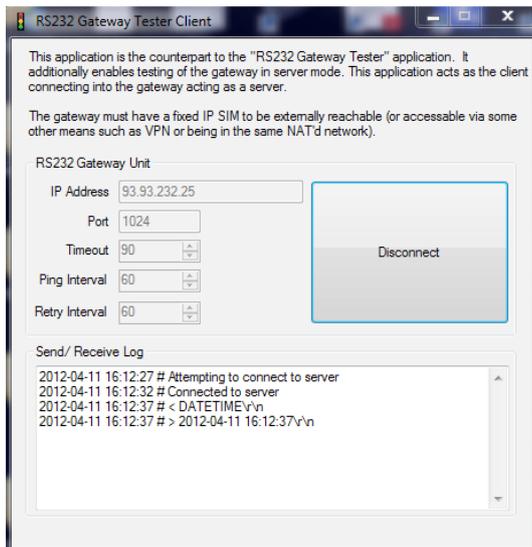
The RS232 Gateway Tester Client responds back with the requested date and time as shown in figure 12 below.

Figure 12. Server response



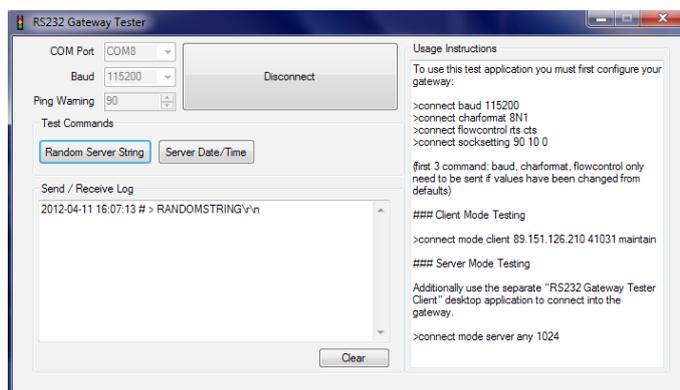
It can be observed from **figure 13** below that the RS232 Gateway Tester Client has received the date and time request and has sent the date and time back to the RS232 Gateway Tester.

Figure 13. Request and response at the LC200 Series



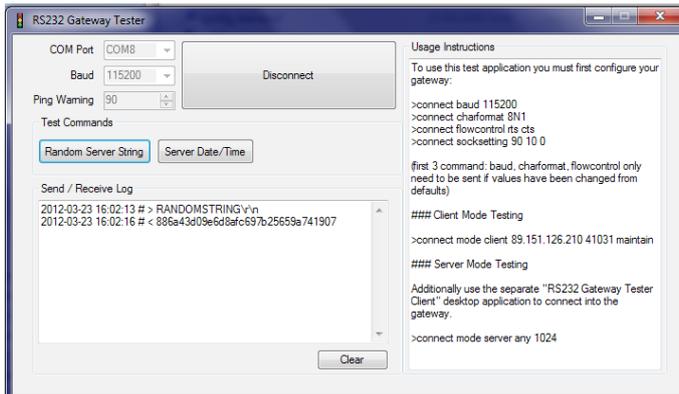
Step 3. Now send a random string to the unit. The server will respond back with the random string as shown in **figure 14** below.

Figure 14. Random string request



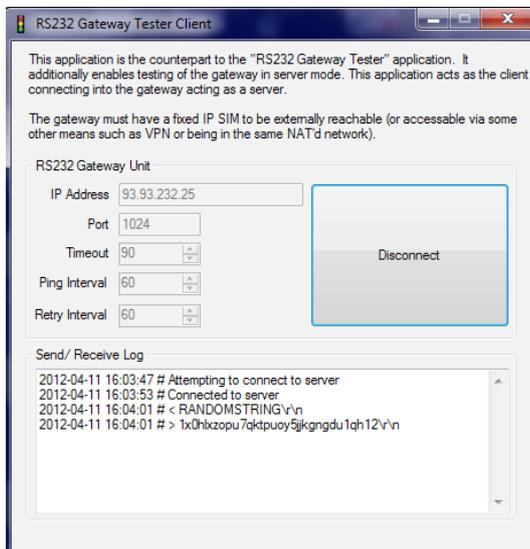
The server responds back with the requested random string see **figure 15** below.

Figure 15. Random string response



As seen in **figure 16** from the RS232 Gateway Client utility, the server receives the random string request and responds back with a random string.

Figure 16. Random string request and response



Application Development Test

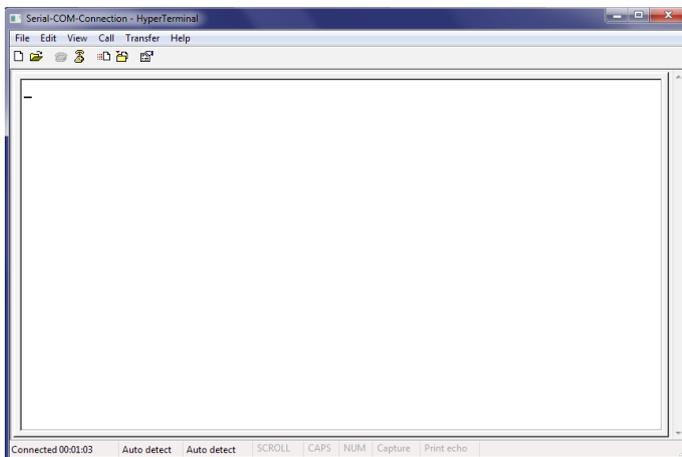
An application development tests the client / server communications using HyperTerminal. Set the unit up in server mode using the config tool as explained in 'Server Mode' (see page 13).

Step 1. Open a HyperTerminal session and connect to the LC200 Series unit by using the correct serial COM port.

Enter the settings as follows:

- » Bits per second: 115200
- » Data bits: 8
- » Parity: None
- » Stop bits: 1
- » Flow control: Hardware

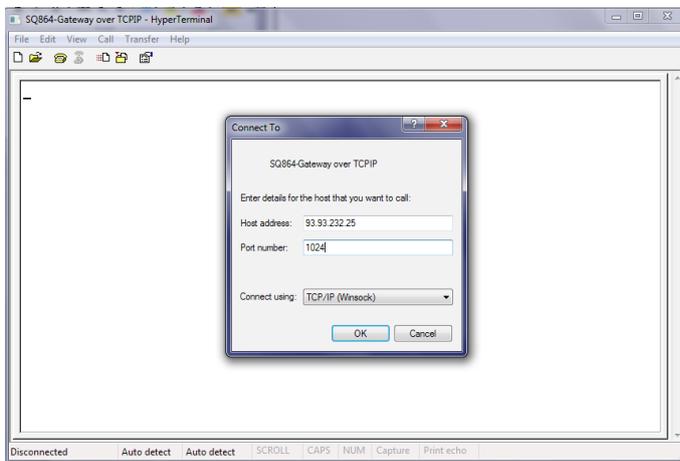
Figure 16: Connection over COM port



Step 2. Now open a new HyperTerminal session. This time, select Connect using: TCP /IP (Winsock). Enter the fixed IP address of the unit and the set local port. The fixed IP address of the SIM used in this scenario is 93.93.232.25 and the local port is 1024 (shown in figure 17).

Press 'OK' to connect to the unit over TCP / IP.

Figure 17: Connecting to the LC200 Series over TCP / IP



Upon successful connection, HyperTerminal will display 'connected' in the bottom left hand corner.

We can now test this scenario by typing in either one of the HyperTerminal windows. Any character that is typed in one of the windows should appear on the other window as shown in figures 18 - 21 below.

Figure 18: Sending a 'Hello' message from the LC200 Series COM port over TCP/IP*

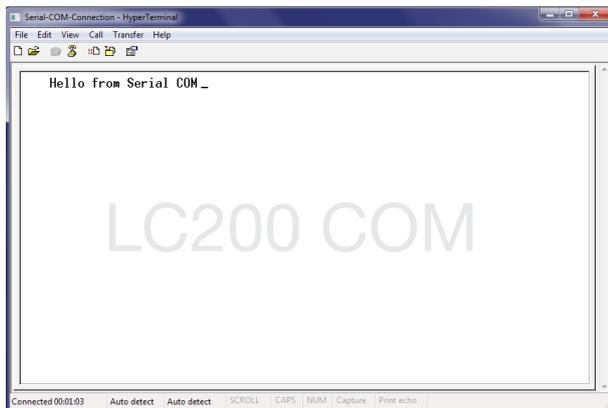


Figure 19: Message is received on the PC over TCP/IP

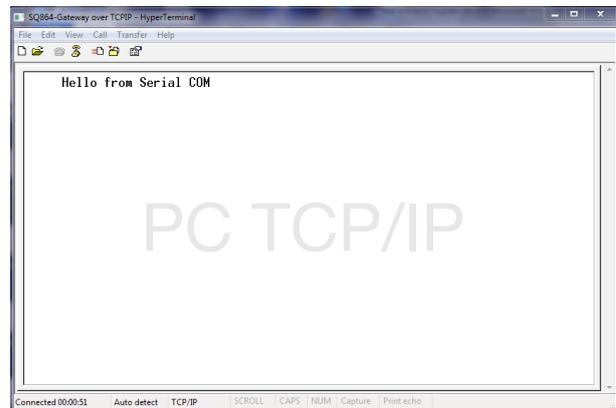


Figure 20: Reply message sent from the PC over TCP/IP to the LC200 Series COM port*

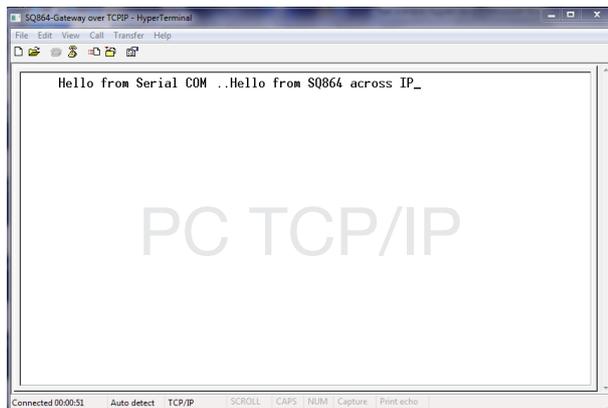
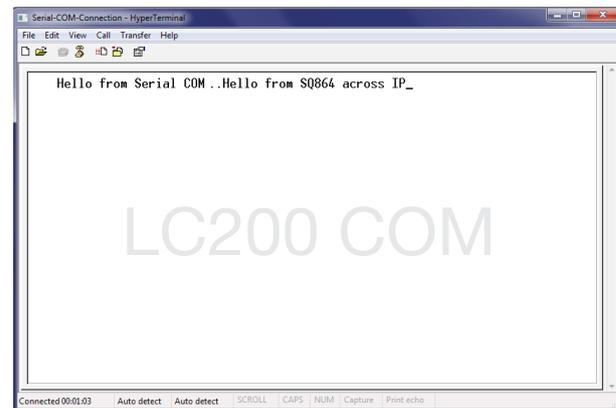


Figure 21: Message is received at the LC200 Series COM port



*Local echo is enabled for elaboration in these figures. HyperTerminal may not display characters at the Sender / Source window, however characters should be displayed at the receiving end / destination.

General Considerations

Ping Reboot

The ping is a standard ICMP echo request.

Multiple servers can be specified on the ping command, they will be tried one at a time in the order specified (having more servers specified means more potential delay e.g. when the unit is carrying out a ping rather than listening for a socket connection). If any server responds to the ping it stops checking further servers and takes the ping as successful (does not trigger a reboot). Only if all servers specified fail to respond to a ping will a reboot happen.

It is important to use both reliable servers, and servers you have control over. If an unreliable server is used this will only result in more downtime (while the unit constantly reboots). If a 3rd party server is used and that 3rd party decides at some point in the future to disable ping replies that will cause units to constantly reboot.

Network Timeouts

“It’s a very common issue, when you are behind a NAT proxy or a firewall, to be disconnected without a reason. This behaviour is caused by the connection tracking procedures implemented in proxies and firewalls, which keep track of all connections that pass through them.”

<http://tldp.org/HOWTO/TCP-Keepalive-HOWTO/overview.html>

If required, it is the servers responsibility to keep alive the TCP connection to the Gateway software. i.e. if in the normal course of usage a situation may arise where no data is sent or received within 5 minutes the server should initiate sending of arbitrary data. If the server does not do this the RS232 Gateway will close the connection and start listening for a new connection.

“Server” = Computer talking to the Gateway

General Notes

- » Software will acknowledge receipt / action of correctly formatted command messages with a message in the format “Confirmed: [command confirmed]”. Incorrectly formatted messages will be responded to with “Error: [error message]”. Replies are sent to the sending of the original request. The only exception is that command messages sent with an invalid password will not be responded to.
- » In order to use the server mode whereby the device accepts incoming connections, a special fixed public IP SIM card may be required.
- » To accept new commands via SMS the software must not have any active socket connections. Active socket connections can be disconnected via closing them on the remote side or hard rebooting the unit.
- » If the SMS password is forgotten unit software must be reloaded from the loaded utility.

Disclaimer

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Definitions

| Term | Definition |
|-------|---|
| APN | Access Point Name |
| COM | Communication |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile Communications |
| IP | Internet Protocol |
| RS232 | Radio Sector |
| SIM | Subscriber Identity Module |
| SMS | Short Message Service |
| TCP | Transmission Control Protocol |
| UMTS | Universal Mobile Telecommunications System (Same as 3G) |

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