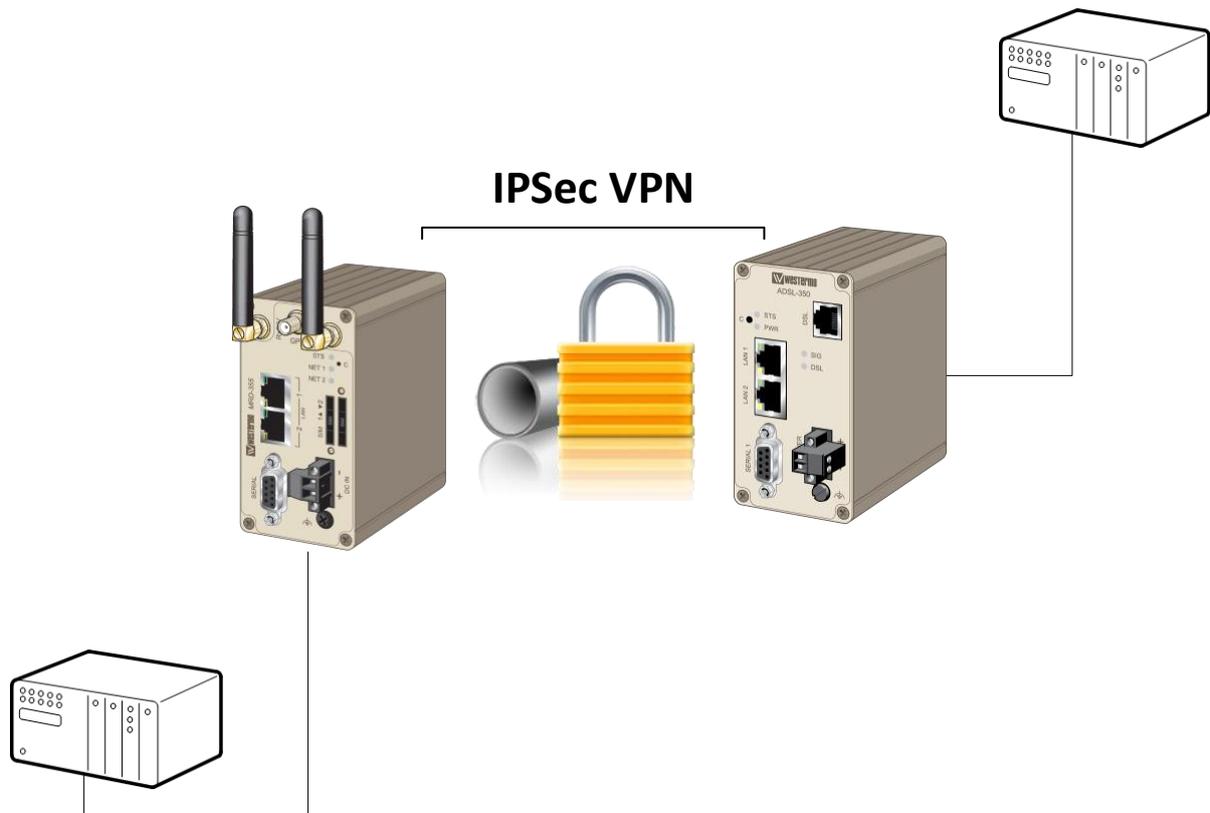


AN-008-WUK

# HOW TO SET UP SERIAL OVER IP SERIAL OVER IP USING IPsec

Serial over IPsec connection between a MRD-355 3G router and an ADSL-350 broadband router with fixed IP address



# Introduction

## Overview

The following Pages show how to implement Serial over an IPsec VPN between a pair of Westermo routers. The serial server function will create a transparent pipe between the serial port and a TCP network connection. Example uses of this mode include connecting to a remote PC running serial port redirector software with virtual COM ports or connecting two modems back-to-back to create a serial bridge.

## Assumptions

This application note applies to the following wireless routers:  
MRD-315, MRD-355 and MRD-455 router with firmware v1.7.2.0 or later

This application note also applies to the ADSL-350 router with firmware v1.6.2.0 or later and the BRD-355 router with firmware v1.7.6.11 or later

Assume that you have already configured an IPsec VPN between the MRD-x55 and ADSL-350. If you have not already set up the IPsec VPN, please refer to:

APPLICATION NOTE AN-0199-ENG VPN between MRD-455 and ADSL-350

## Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to [technical@westermo.co.uk](mailto:technical@westermo.co.uk)

Requests for new application notes can be sent to the same address.

## MRD-355 Router Configuration

- Browse to Serial Server->Port Setup



### Serial Server

Port	Function	Serial	Network	Edit
1	Disabled			

Reset Update

- Select the dropdown function -> Raw TCP Client/Server and click update.



### Serial Server

Port	Function	Serial	Network	Edit
1	Raw TCP Client/Server	19200 8N1	Accept: 5001	

Reset Update

- Click on the pencil  to change serial port configuration

MRD-355


Status System Wireless Network Routing Firewall VPN Serial Server Management

Port Setup Phone Book

Logged in as **admin** Host: MRD-355-e0-a0-ee

## Serial Server - Port 1

Raw TCP Configuration	
Network type	Connect ▼
Connect address	192.168.2.200
Connect port	5000
Bind to Loopback	<input type="checkbox"/>
Timeout after failed connect (secs)	30
Failed connects before giving up	10
Accept port	5001
Allow new connections to replace existing	<input checked="" type="checkbox"/>
Disconnect on idle (secs)	Disable ▼ 0
Enable TCP no delay	<input type="checkbox"/>
TCP keepalive time (mins)	0
Port Configuration	
Baudrate	9600 ▼
Data bits	8 ▼
Stop bits	1 ▼
Parity	None ▼
Flow control	None ▼
Line state when disconnected	<input type="checkbox"/> RTS <input type="checkbox"/> DTR
Network congestion backoff signal	<input type="checkbox"/> RTS <input type="checkbox"/> DTR
Packet Framing	
Maximum packet size	0
Minimum size before sending	0
Timeout before sending (milliseconds, min 10)	0
Immediate send character matching	Off ▼
Match characters (hex)	<input type="text"/> <input type="text"/>
Characters to wait after match	0 ▼
Enable extended logging	<input type="checkbox"/>
Cancel	Update

- Network type “Connect”
- Connect address “192.168.2.200” (This is the LAN IP of the remote ADSL-350)
- Connect port “5000”
- Baudrate “9600” (This can be changed to suit serial device)

**Please note :** The settings above are only used as an example. Please check your Serial equipment and configure accordingly. For more details about port settings please refer to page 14.

- Navigate to Status -> Alarms

MRD-355

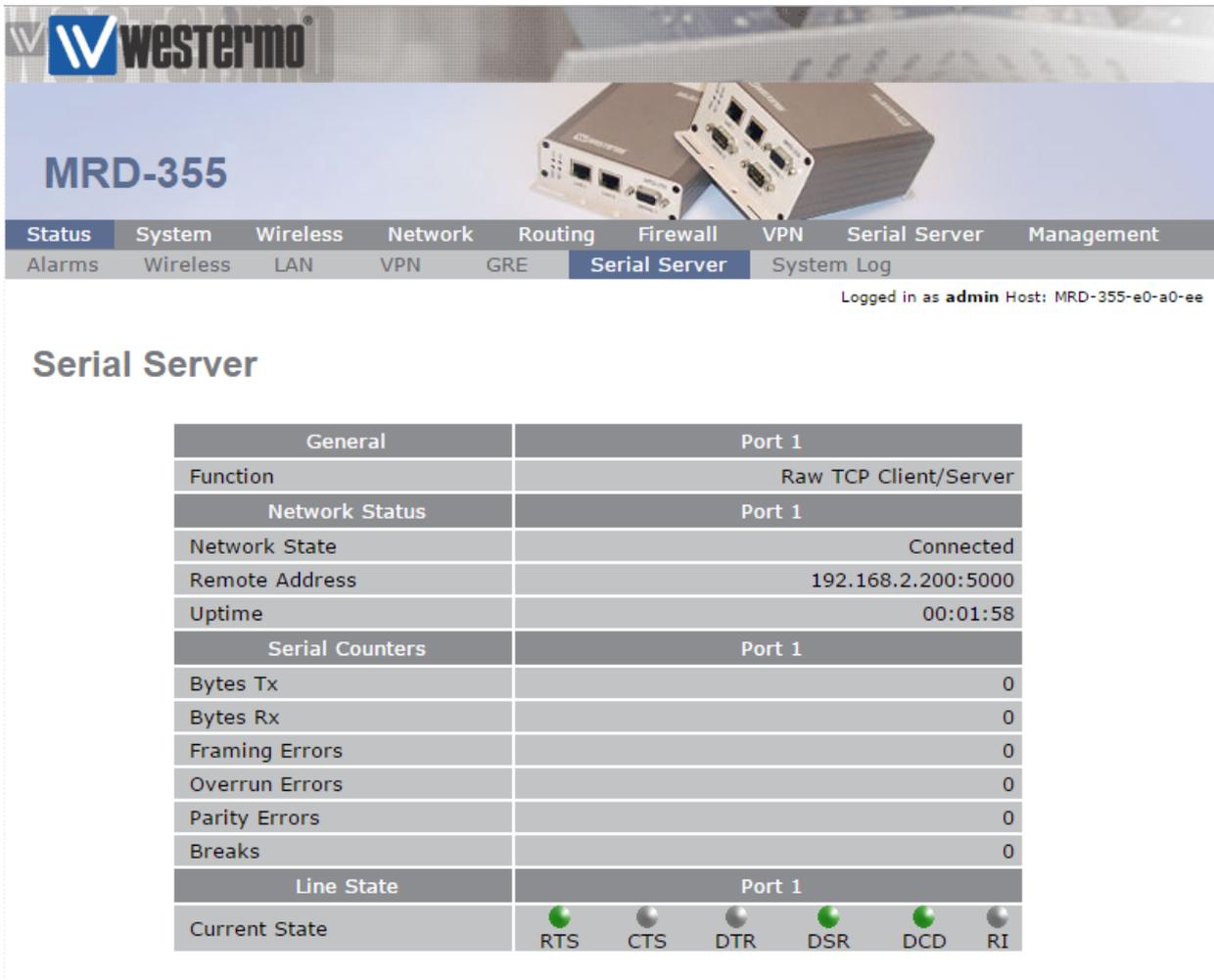
Logged in as **admin** Host: MRD-355-e0-a0-ee

### Alarms 16:11:02 31/05/2017

System	
Power On Self Test	Passed
Temperature (°C)	now: 34.50, min: 31.50, max: 35.25
Uptime	03:15:17
Wireless	
Network Status	No Fault
Connection Status	No Fault
Network	
LAN	No Fault
Loopback	No Fault
Services	
DHCP Server	Disabled
VPN	No Fault
Serial Server	No Fault

- Serial Server should be Green with No Faults

- Navigate to Status -> Serial Server



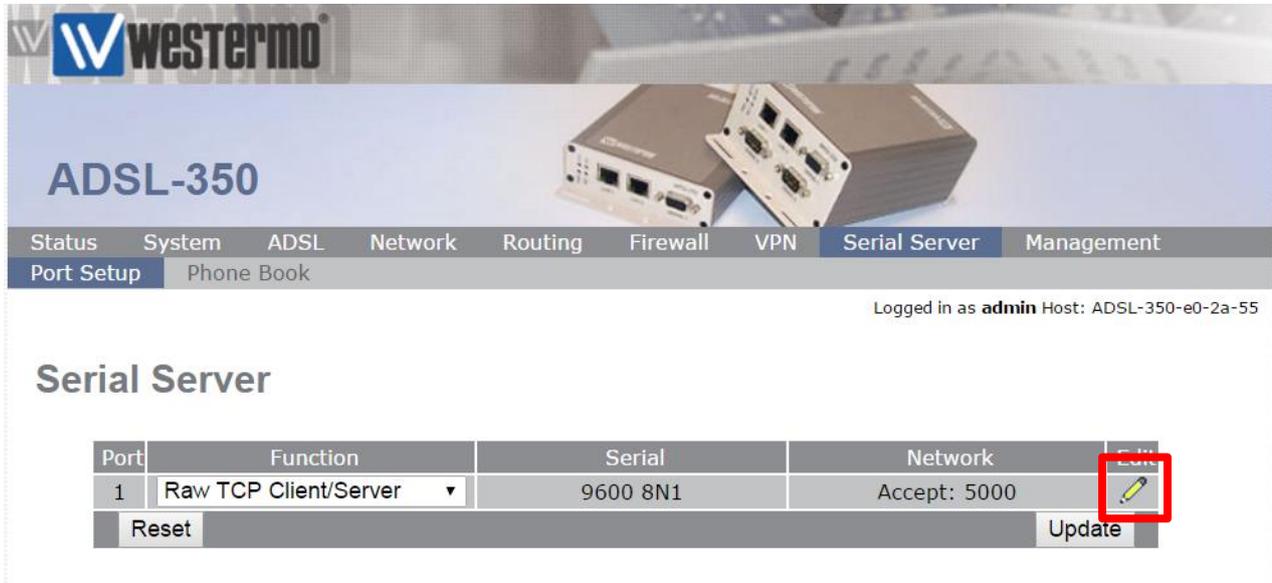
The screenshot shows the Westermo MRD-355 web interface. At the top, there is a navigation menu with tabs for Status, System, Wireless, Network, Routing, Firewall, VPN, Serial Server, and Management. The 'Serial Server' tab is selected. Below the navigation menu, there is a sub-menu with 'Serial Server' and 'System Log'. The main content area displays the 'Serial Server' status for 'Port 1'. The status is 'Connected' with a remote address of '192.168.2.200:5000' and an uptime of '00:01:58'. Below this, there are 'Serial Counters' and 'Line State' sections. The 'Line State' section shows the current status of various control signals: RTS (green), CTS (grey), DTR (grey), DSR (green), DCD (green), and RI (grey).

General	Port 1
Function	Raw TCP Client/Server
Network Status	Port 1
Network State	Connected
Remote Address	192.168.2.200:5000
Uptime	00:01:58
Serial Counters	Port 1
Bytes Tx	0
Bytes Rx	0
Framing Errors	0
Overrun Errors	0
Parity Errors	0
Breaks	0
Line State	Port 1
Current State	<span style="color: green;">●</span> RTS <span style="color: grey;">●</span> CTS <span style="color: grey;">●</span> DTR <span style="color: green;">●</span> DSR <span style="color: green;">●</span> DCD <span style="color: grey;">●</span> RI

- This page displays the Current status of the Serial Port including the Uptime and data Transmitted/Received.

## ADSL-350 Router Configuration

- Navigate to Serial Server -> Port Setup



The screenshot shows the Westermo ADSL-350 configuration web interface. The top navigation bar includes: Status, System, ADSL, Network, Routing, Firewall, VPN, Serial Server (selected), and Management. Below this, there are sub-tabs for Port Setup and Phone Book. The user is logged in as 'admin' on host 'ADSL-350-e0-2a-55'. The main heading is 'Serial Server'. A table displays the configuration for port 1:

Port	Function	Serial	Network	
1	Raw TCP Client/Server	9600 8N1	Accept: 5000	

Buttons for 'Reset' and 'Update' are located at the bottom of the table.

- Select the function Raw TCP/Client/Server
- Click on the pencil  to change serial port configuration

# ADSL-350



Status System ADSL Network Routing Firewall VPN **Serial Server** Management

Port Setup Phone Book

Logged in as **admin** Host: ADSL-350-e0-2a-55

## Serial Server - Port 1

Raw TCP Configuration	
Network type	Accept
Connect address	
Connect port	5000
Bind to Loopback	<input type="checkbox"/>
Timeout after failed connect (secs)	30
Failed connects before giving up	10
Accept port	5000
Drop current if new accept	<input checked="" type="checkbox"/>
Enable TCP no delay	<input type="checkbox"/>
TCP keepalive time (mins)	0

Port Configuration	
Baudrate	9600
Data bits	8
Stop bits	1
Parity	None
Flow control	None
Line state when disconnected	<input type="checkbox"/> RTS <input type="checkbox"/> DTR
Network congestion backoff signal	<input type="checkbox"/> RTS <input type="checkbox"/> DTR

Packet Framing	
Maximum packet size	0
Minimum size before sending	0
Timeout before sending (milliseconds, min 10)	0
Immediate send character matching	Off
Match characters (hex)	
Characters to wait after match	0
Enable extended logging	<input type="checkbox"/>

Cancel Update

- Network type "Accept"
- Baudrate "9600"

**Please note :** The settings above are only used as an example. Please check your Serial equipment and configure accordingly.

- Navigate to Status -> Alarms

ADSL-350

Logged in as **admin** Host: ADSL-350-e0-2a-55

### Alarms 21:14:44 15/12/2016

System	
Power On Self Test	Passed
Uptime	03:10:47
ADSL	
Line Status	No Fault
Connection Status	No Fault
Network	
LAN	No Fault
Loopback	No Fault
Services	
DHCP Server	Disabled
VPN	No Fault
Serial Server	No Fault

- Serial Server should be Green with No Fault

- Navigate to Status -> Serial Server



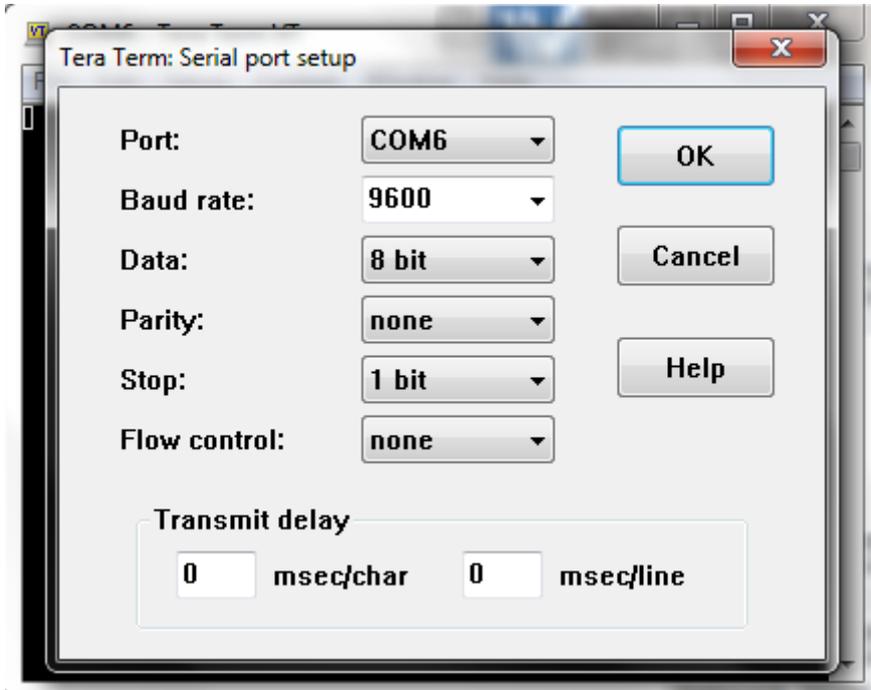
The screenshot shows the Westermo ADSL-350 web interface. The top navigation bar includes: Status, System, ADSL, Network, Routing, Firewall, VPN, Serial Server, and Management. The 'Serial Server' menu item is highlighted. Below the navigation bar, the page title is 'Serial Server'. The main content area displays a table with the following data:

General	Port 1
Function	Raw TCP Client/Server
Network Status	Port 1
Network State	Connected
Remote Address	172.30.1.2:36663
Uptime	00:02:09
Serial Counters	Port 1
Bytes Tx	0
Bytes Rx	0
Framing Errors	0
Overrun Errors	0
Parity Errors	0
Breaks	0
Line State	Port 1
Current State	     

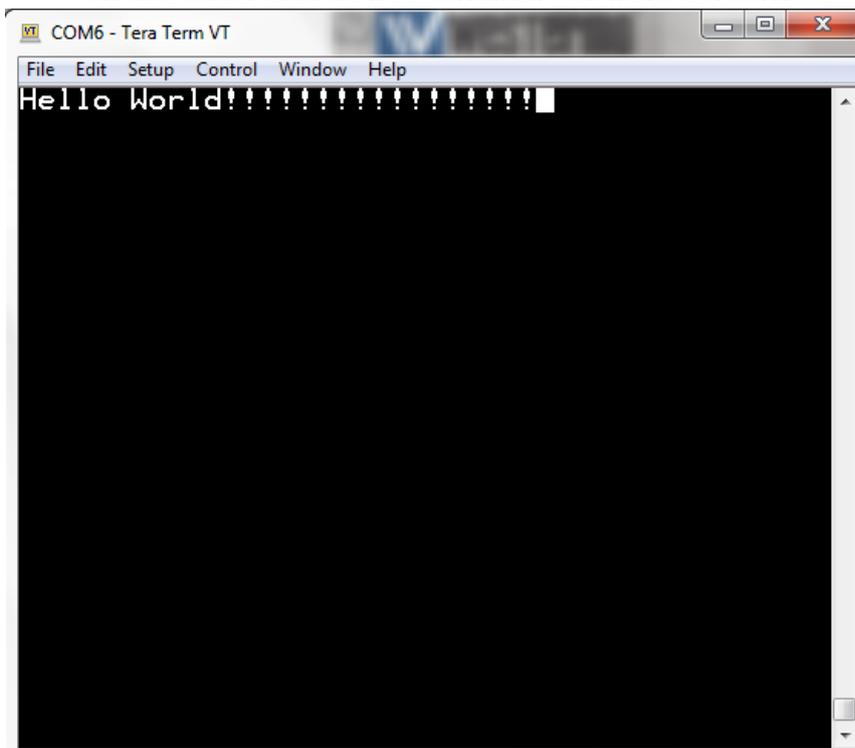
- This page displays the Current status of the Serial Port including the Uptime and data Transmitted/Received.

## Testing

- Open up Terminal Software program with laptop/PC connected at either end

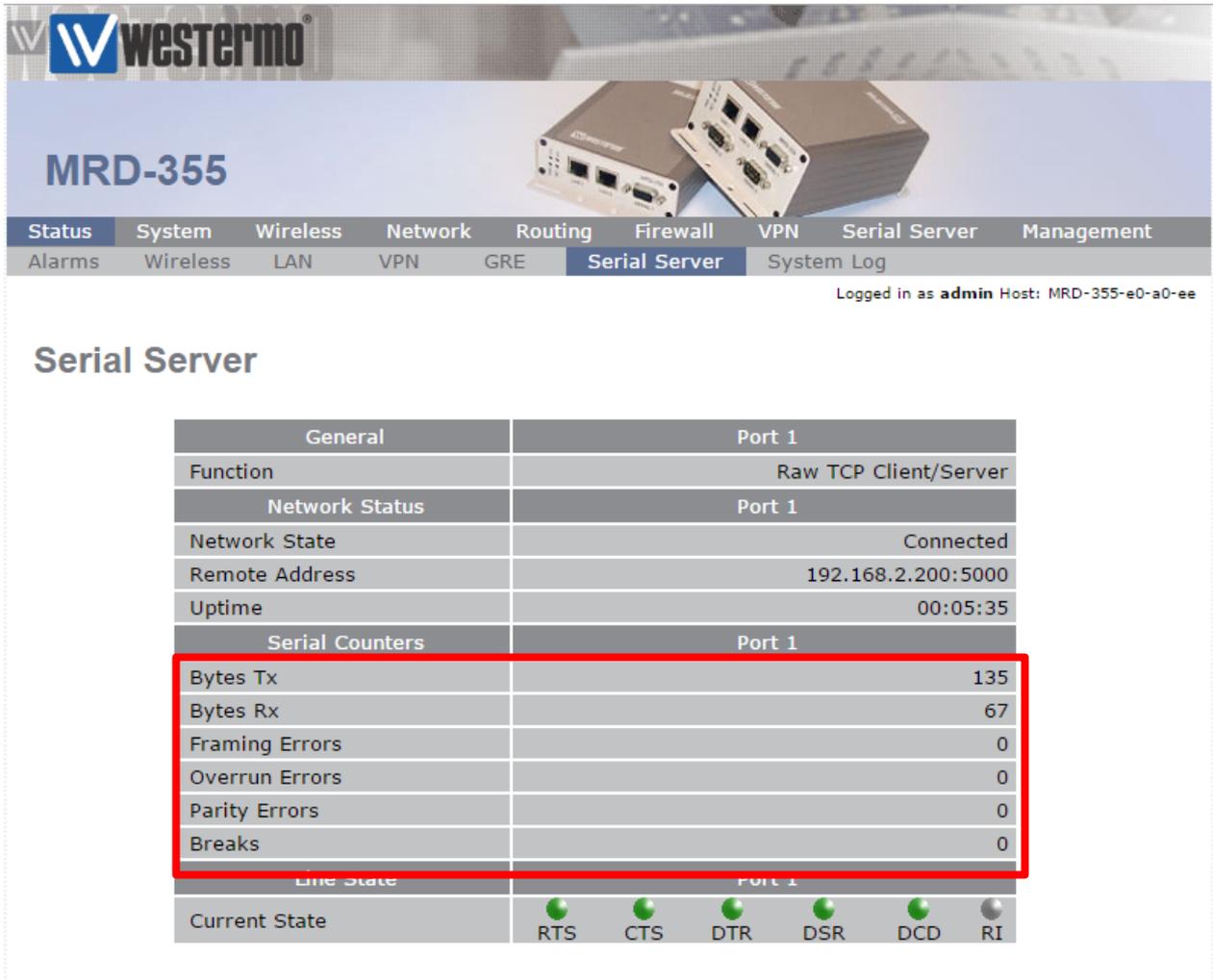


- Ensure that the correct port is selected along with the Serial configuration settings
- Then type something in the terminal window. You should see this being displayed on the other end device terminal software screen.



- On the Status->Serial server you can now see that data is being transmitted and received on both MRD and ADSL-350

### MRD-355 Router



**MRD-355**

Status System Wireless Network Routing Firewall VPN Serial Server Management  
Alarms Wireless LAN VPN GRE Serial Server System Log

Logged in as **admin** Host: MRD-355-e0-a0-ee

### Serial Server

General		Port 1	
Function		Raw TCP Client/Server	
Network Status		Port 1	
Network State		Connected	
Remote Address		192.168.2.200:5000	
Uptime		00:05:35	
Serial Counters		Port 1	
Bytes Tx		135	
Bytes Rx		67	
Framing Errors		0	
Overrun Errors		0	
Parity Errors		0	
Breaks		0	
Line State		Port 1	
Current State		     	

- This page displays any errors or breaks in data, as well as Bytes Transmitted and Received.

## ADSL-350 Router



### Serial Server

General		Port 1	
Function		Raw TCP Client/Server	
Network Status		Port 1	
Network State		Connected	
Remote Address		172.30.1.2:41422	
Uptime		00:06:07	
Serial Counters		Port 1	
Bytes Tx		67	
Bytes Rx		135	
Framing Errors		0	
Overrun Errors		0	
Parity Errors		0	
Breaks		0	
Line State		Port 1	
Current State		     	

- This page displays any errors or breaks in data, as well as Bytes Transmitted and Received.

## Configuring the port function

The following options can be set for the Raw TCP Client/Server:

**Network type** The Raw TCP serial server can be configured for three different network modes:

**Accept** The serial server will listen for TCP connections on the specified port number.

**Connect** The serial server will establish a TCP connection to the specified address and port number.

**Accept and Connect** The serial server will normally listen for TCP connections on the specified port number, however, if data is received at the serial port and no connection exists, it will attempt to establish a connection to the specified address and port number.

**Connect address** For **Connect** or **Accept and Connect** network modes, this is the address the server will attempt to connect to. The address entered should be in IPv4 decimal dotted notation.

**Connect port** For **Connect** or **Accept and Connect** network modes, this is the TCP port number the server will attempt to connect to. The value entered should be a valid TCP port number.

**Bind to Loopback** Check to bind the service to the loopback port. Refer to section 8.3 for details on configuring the loopback interface.

**Timeout after failed connect** For **Connect** or **Accept and Connect** network modes, if a connection request has failed, the server will wait the amount of time (in seconds) specified in this field before attempting another connection request. While a short time-out may cause the connection to be established more quickly, it may also cause greater network traffic if the remote host is unavailable and repeated attempts fail.

**Failed connects before giving up** For **Accept and Connect** network modes, the serial server will attempt to establish a connection for the number of times specified in this field before giving up and waiting for a connection to be accepted.

**Accept port** For **Accept** or **Accept and Connect** network modes, this is the TCP port number on which the server will listen for connections.

**Drop current if new accept** For **Accept** or **Accept and Connect** network modes, if a TCP connection is currently active on the serial server, and a new connection request is accepted, this field determines the action that will be taken. If set, the new connection will become the active connection and the existing connection will be closed. If not set, the existing connection will remain active and the newly received connection will be closed.

**Enable TCP no delay** Check to enable TCP no delay. TCP normally uses Nagle's algorithm to combine a number of small outgoing messages, to be sent all at once. Specifically, as long as there is a sent packet for which the sender has not received an acknowledgement, the sender should keep buffering its output until it has a full packet's worth of output, so that output can be sent all at once. For serial communications this can introduce delays which can interfere with the operation of serial protocols. Enabling this option will decrease the efficiency of the TCP communications as the number of packets transmitted will increase. It is for these reasons that it is recommended not to enable this option unless the application requires it to be enabled. It could also be that the Raw UDP option may be more suitable.

**TCP keepalive time** When set to a value greater than 0, TCP keep-alives will be enabled for connections, with probes sent at the frequency specified (minutes). This may assist in detecting failed connections.

## Revision history for version 1.0

Revision	Rev by	Revision note	Date
00			
01			
02			
03			
04			
05			
06			
07			



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