AN-018-WUK

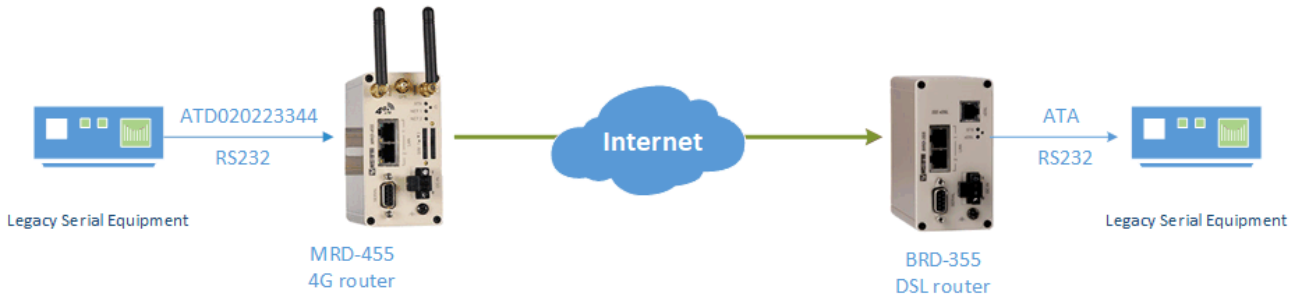
Replacing PSTN or Leased Line Modems with MRD/BRD 4G & Broadband Routers

For organisations that have legacy equipment that would normally require the use of a modem for communications.

With less support for leased lines and PSTN lines being available, Westermo has developed a range of cellular and wired broadband routers that can emulate a modem and send serial data securely over the internet.

Upgrading to Westermo routers now also ensures that organisations are prepared for when the legacy devices are upgraded to IP ready.

This application note shows the most common methods for achieving this.



Modem Emulation Mode

This method is used when the serial device is sending the dial and answer commands

Modem The modem will generate an AT command interface at the serial port. A device attached to the port can use standard AT commands to dial and receive calls.

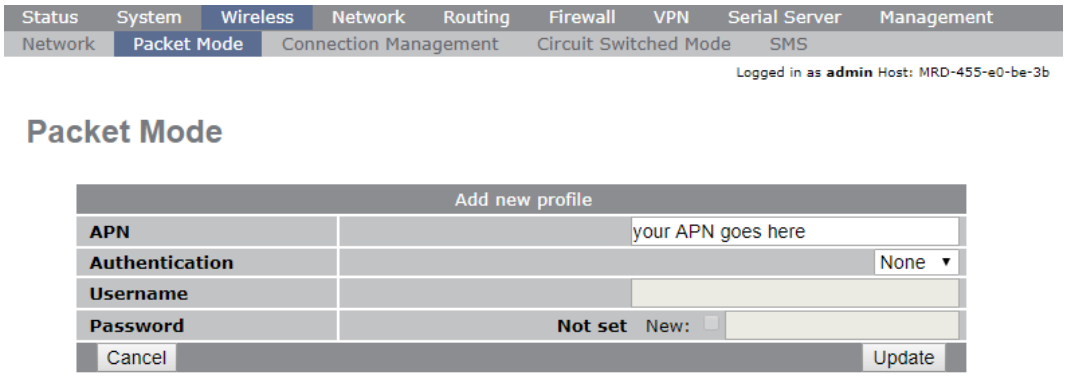
But instead of making a call over a PSTN or Leased line, the router will create a TCP connection over the xDSL/4G network to a remote IP address and port.

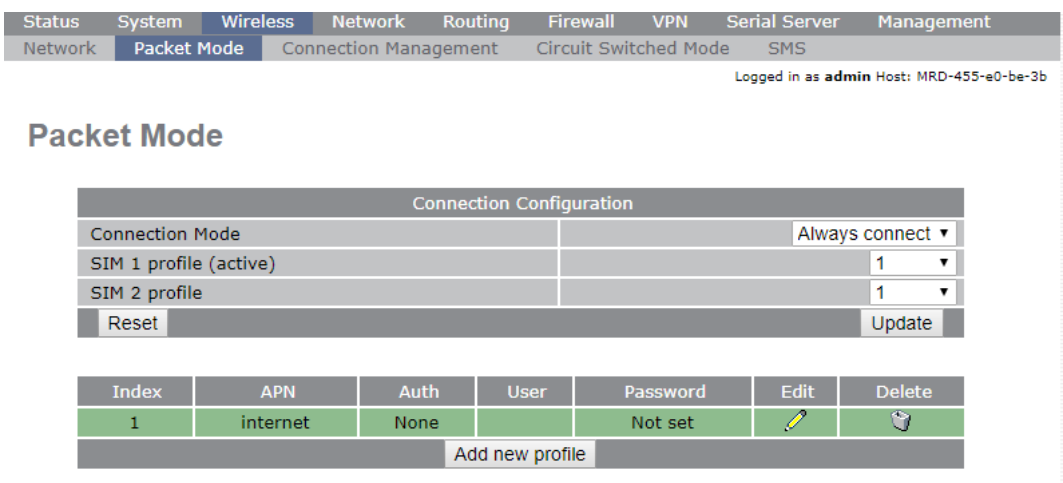
Example MRD-455 to BRD-355

Setting up the 4G Connection

Browse to **Wireless > Packet Mode**.
If there isn't already a 4G profile setup, click the **Add new profile** button.

APN: enter the APN given by your mobile provider for your SIM card.
Click **Update**.





Setting up the DSL Connection

As the BRD-355 is terminating the call/connection, the broadband router will require fixed broadband IP address.

NB: If the router's are connected to the Westermo WeConnect cloud network then fixed public IP addresses are not required.

Browse to **DSL > VDSL** (or **ADSL** according to the type of broadband you have).

VDSL Configuration

Connection Configuration	
Connection Mode	Disabled
Selected Profile	----
Reset	Update

Index	Type	Auth	User / Address	Gateway	Edit	Delete
No profiles configured.						
Add new profile						

Username: Enter your broadband username.
Password: Enter your broadband password.
Click **Update**.

VDSL Configuration

Editing profile 1	
VDSL Configuration Settings	
VLAN Enabled	☑
VLAN ID	101
Connection Settings	
Connection Type	PPPoE
Authentication	Auto
Username	your broadband username goes here
Password	**Set** New: ☑ your broadband password
Service	BT
MTU	1492
Cancel	Update

ATD DIAL STRING TO FIXED DESTINATION

This method is used when the legacy serial devices are expecting to be sending dial strings and answering strings to modems that would be connected to their serial ports.

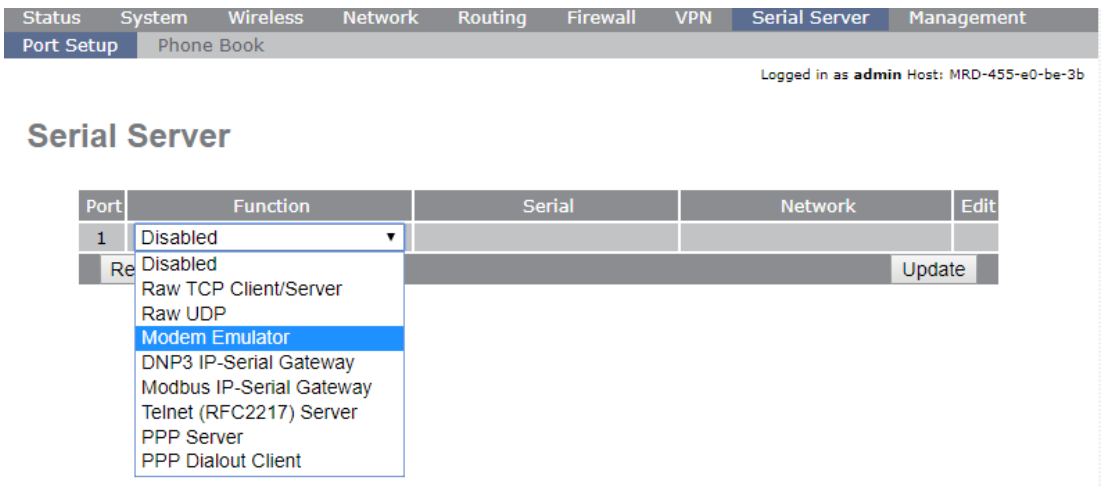
An AT command interface will be generated at the serial port. The legacy serial equipment making the call will send an ATD dial string as if it was connected to a modem. But instead of making a dial up connection over a PSTN line, the MRD-455 will create a transparent TCP data pipe to a fixed destination IP address to a BRD-355 DSL router.

When the TCP connection has been established, the BRD-355 will send a series of 'RING' alerts out of it's serial port until the legacy equipment sends an ATA command to pick up the 'call'. Once the 'call' has been answered, serial data can be sent transparently between the two legacy devices over an TCP/IP connection as if it was over a PSTN line.

This MRD-455 Modem Emulation Configuration

Browse to Serial **Server > Port Setup**.

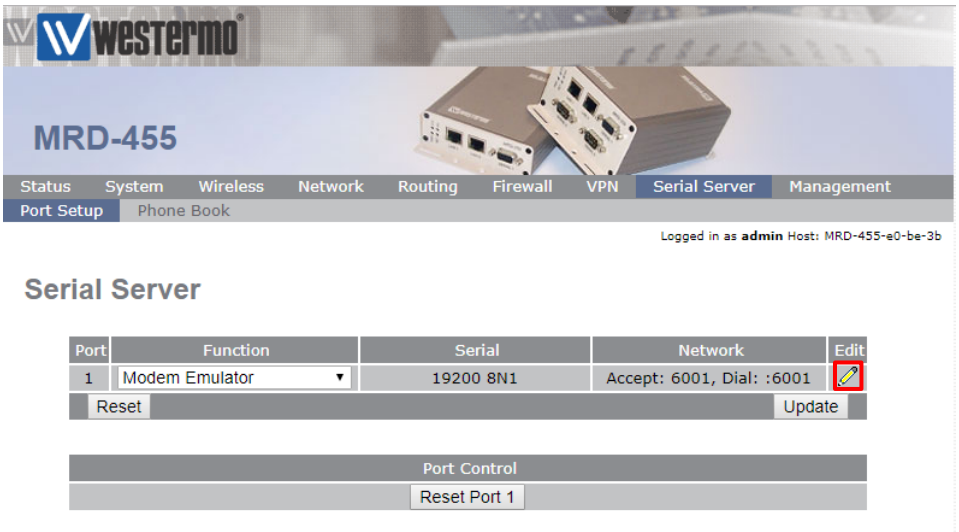
Select **Modem Emulator** from the Function dropdown list.



ATD DIAL STRING TO FIXED DESTINATION

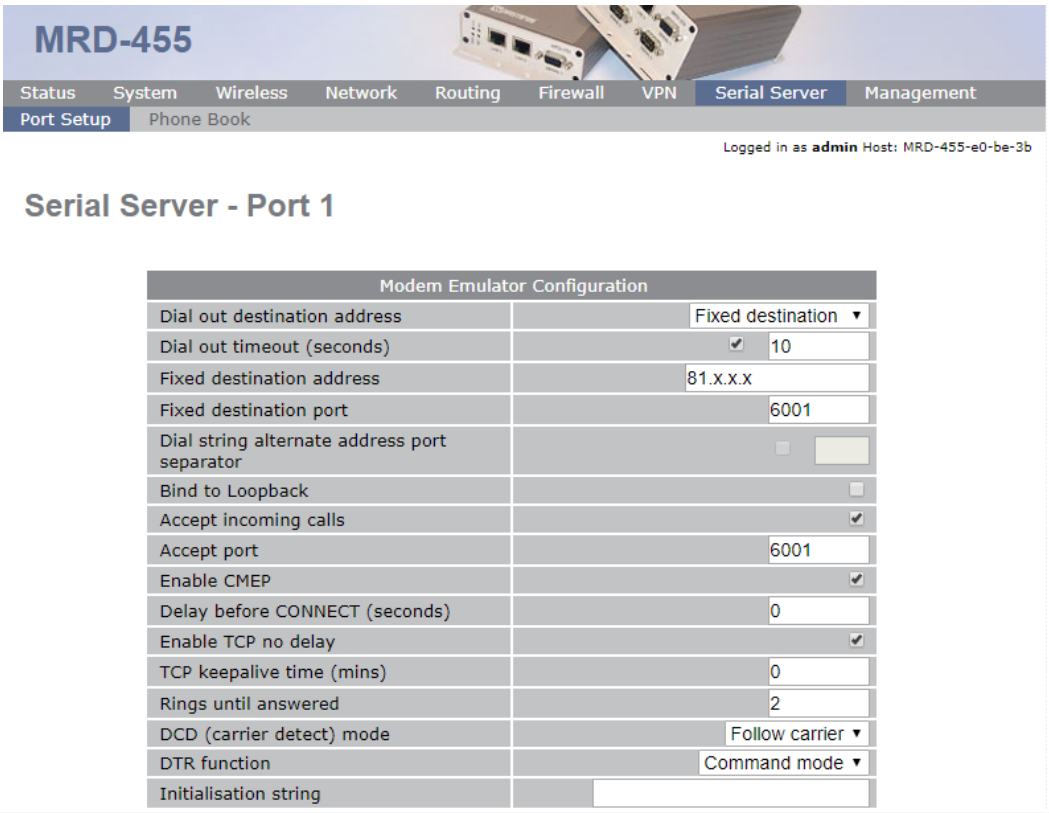
MRD-455 Modem Emulation Configuration

Click the Edit icon to configure the Modem Emulation settings.



Dial out destination address: Fixed destination
Fixed destination address: Enter the fixed broadband IP address
Fixed destination port: 6001*
Enable CMEP: ✓

* Choose an appropriate **fixed destination port**. This should be the same as the **Accept port** on the remote **BRD-355** DSL Router. If in doubt use the default Destination / Accept ports shown below.



ATD DIAL STRING TO FIXED DESTINATION

MRD-455 Port Configuration (RS232)

These settings should correspond to the RS232 port settings of your local serial equipment/PLC etc.

Baudrate: Choose the same baudrate as the local serial device.
Data bits: Enter the same data bits as the local serial device.
Stop Bits: Enter the same number of stop bits as the local serial device.
Parity: Enter the same parity setting as the local serial device.

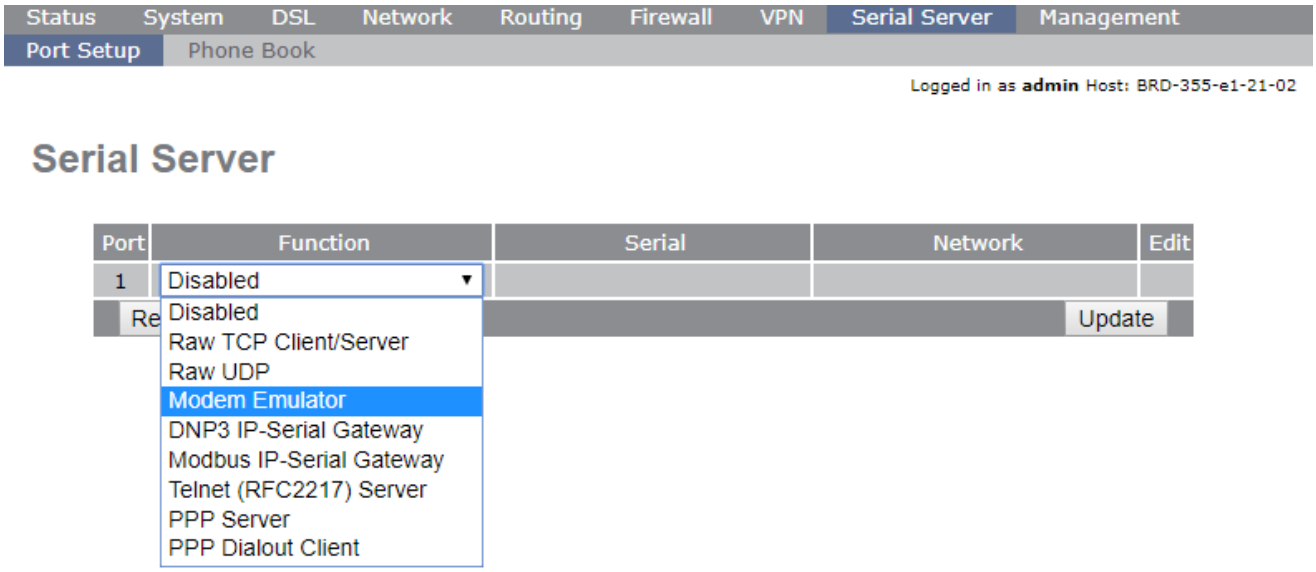
Port Configuration	
Baudrate	19200 ▾
Data bits	8 ▾
Stop bits	1 ▾
Parity	None ▾
Flow control	None ▾
Line state when disconnected	☐ RTS ☐ DTR
Network congestion backoff signal	☐ RTS ☐ DTR

FIXED DESTINATION: ANSWERING A CALL

This method is used when the legacy serial device is expecting to answer a modem call with the ATA string.

Browse to Serial **Server > Port Setup**.

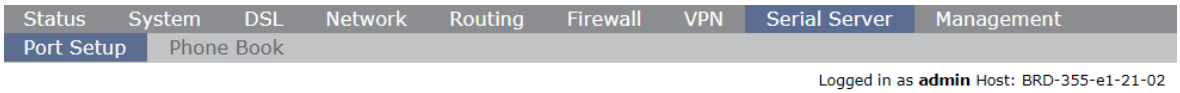
Select **Modem Emulator** from the Function dropdown list.

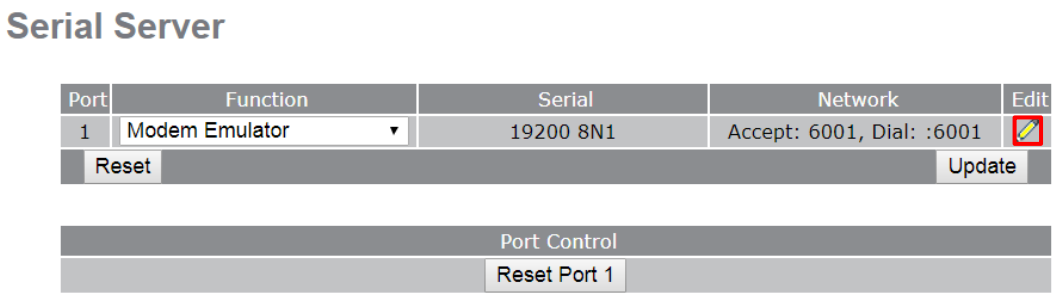


ATD DIAL STRING TO FIXED DESTINATION

BRD-355 Modem Emulation Configuration

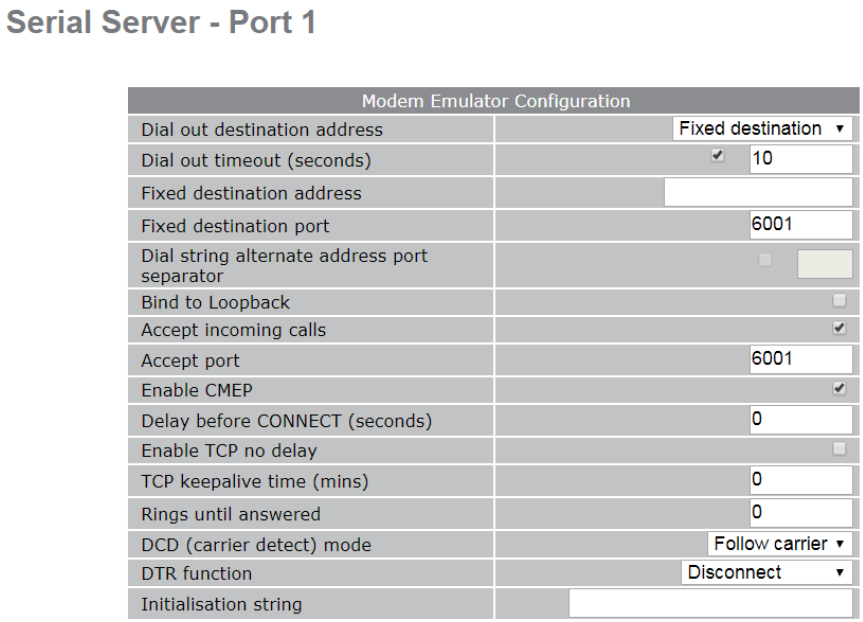
Click the Edit icon to configure the Modem Emulation settings.





Accept Incoming calls: ✓
Accept port: 6001*
Enable CMEP: ✓
NB: If you want the BRD-355 to answer the call automatically, set a value of 1 or above in the **Rings until answered** field.

* Choose an appropriate **Accept port**. This should be the same as the **fixed destination port** on the calling **MRD-455** DSL Router. If in doubt use the default Destination / Accept ports shown below.



ATD DIAL STRING TO FIXED DESTINATION

BRD-355 Port Configuration (RS232)

These settings should correspond to the RS232 port settings of your local serial equipment/PLC etc.

Baudrate: Choose the same baudrate as the local serial device.
Data bits: Enter the same data bits as the local serial device.
Stop Bits: Enter the same number of stop bits as the local serial device.
Parity: Enter the same parity setting as the local serial device.

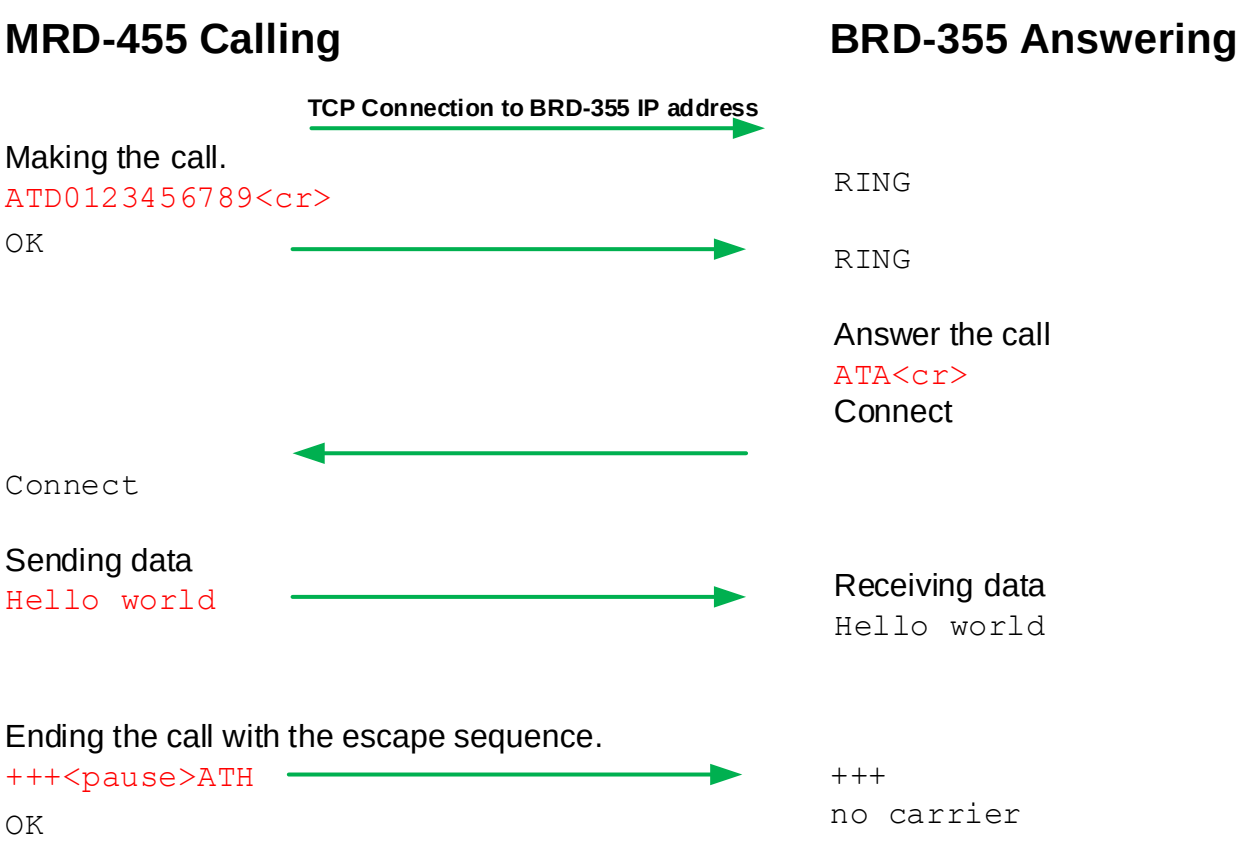
Port Configuration	
Baudrate	19200 ▾
Data bits	8 ▾
Stop bits	1 ▾
Parity	None ▾
Flow control	None ▾
Line state when disconnected	☐ RTS ☐ DTR
Network congestion backoff signal	☐ RTS ☐ DTR

ATD DIAL STRING TO FIXED DESTINATION

Using the Fixed Destination Modem Emulator

Because the MRD-455 is configured to 'call' a fixed destination, any number can be used with the dial string as long as it starts with ATD.

NB: Entered commands are in red text. Reponses are in black text.



PHONE BOOK METHOD

This method is used when the legacy serial devices are expecting to be making calls to various locations.

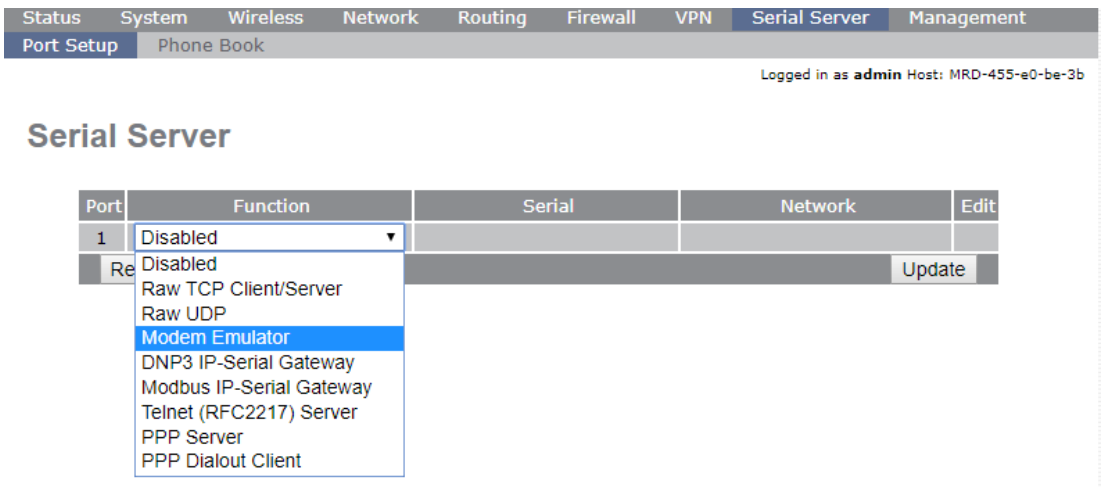
An AT command interface will be generated at the serial port. The legacy serial equipment making the call will send an ATD dial string to an associated destination as if it was connected to a modem. But instead of making a dial up connection over a PSTN line, the MRD-455 will create a transparent TCP data pipe to a fixed destination IP address to a BRD-355 DSL router.

When the TCP connection has been established, the BRD-355 will send a series of 'RING' alerts out of it's serial port until the legacy equipment sends an ATA command to pick up the 'call'. Once the 'call' has been answered, serial data can be sent transparently between the two legacy devices over an TCP/IP connection as if it was over a PSTN line.

This MRD-455 Modem Emulation Configuration

Browse to Serial **Server > Port Setup**.

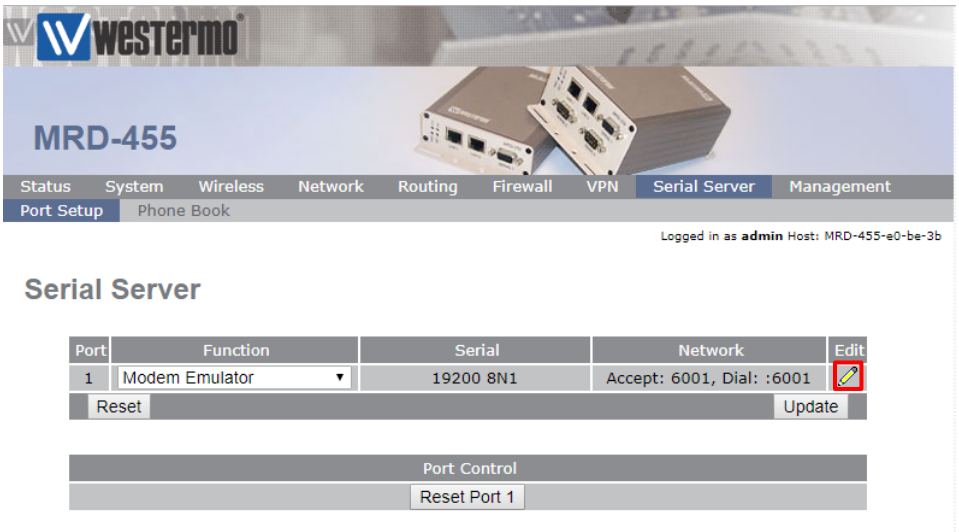
Select **Modem Emulator** from the Function dropdown list.



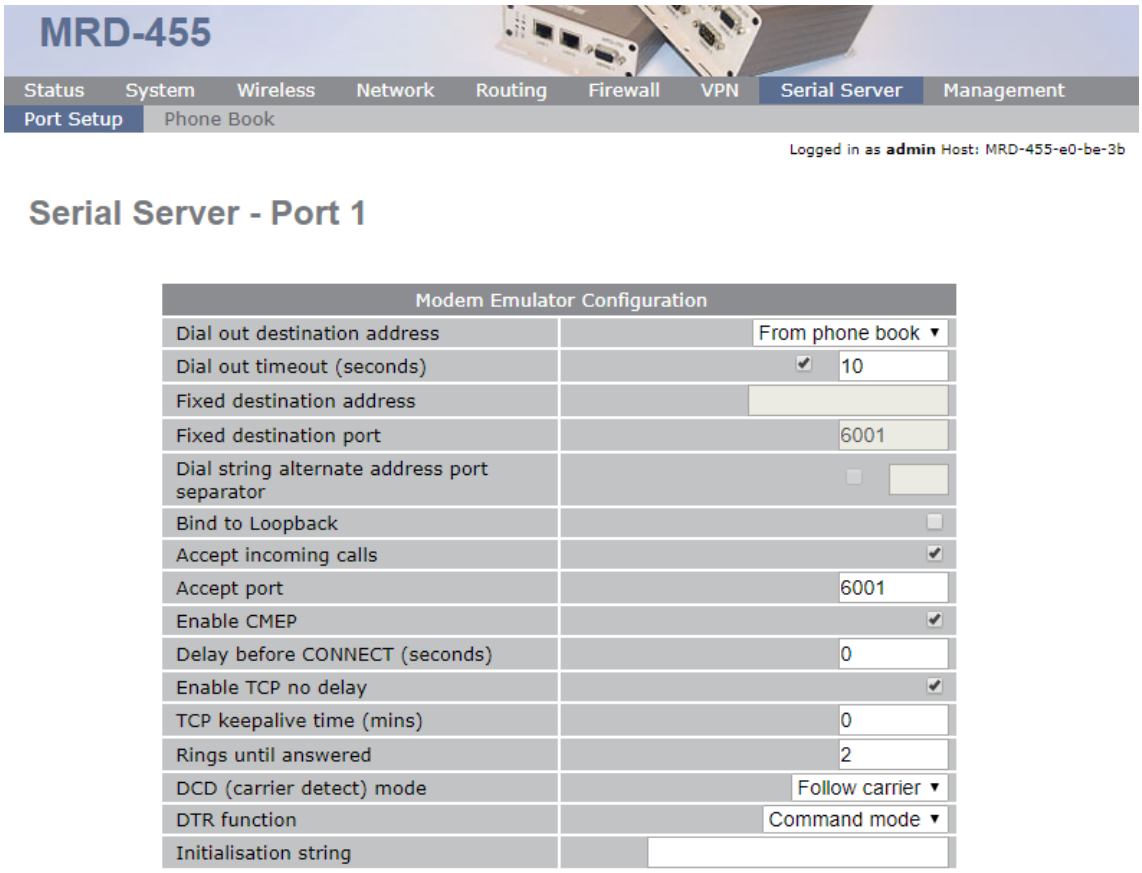
PHONE BOOK METHOD

MRD-455 Modem Emulation Configuration

Click the Edit icon to configure the Modem Emulation settings.



Dial out destination address: From phone book
Enable CMEP: ✓



PHONE BOOK METHOD

MRD-455 Port Configuration (RS232)

These settings should correspond to the RS232 port settings of your local serial equipment/PLC etc.

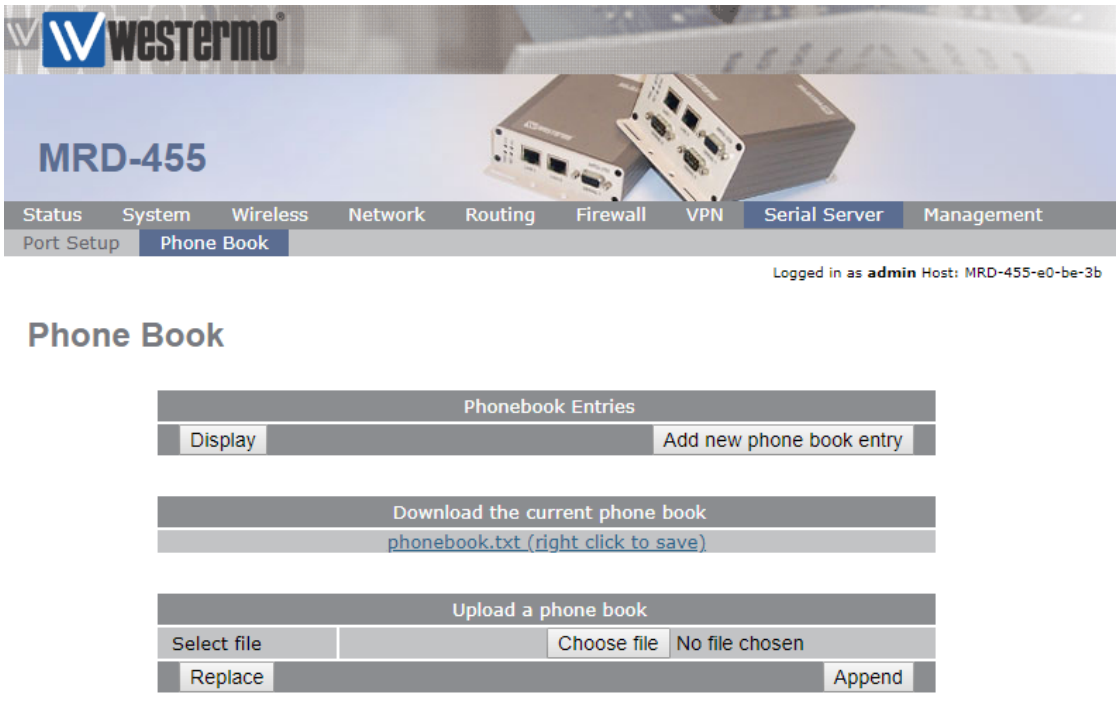
Baudrate: Choose the same baudrate as the local serial device.
Data bits: Enter the same data bits as the local serial device.
Stop Bits: Enter the same number of stop bits as the local serial device.
Parity: Enter the same parity setting as the local serial device.

Port Configuration	
Baudrate	19200
Data bits	8
Stop bits	1
Parity	None
Flow control	None
Line state when disconnected	RTS DTR
Network congestion backoff signal	RTS DTR

MRD-455 Phone Book Configuration

In this example there are 2 phone book entries to 2 destinations.

Browse to Serial Server > Phone Book.
Click the **Add new phone book entry** button.



PHONE BOOK METHOD (Site A)

Add new phone book entry

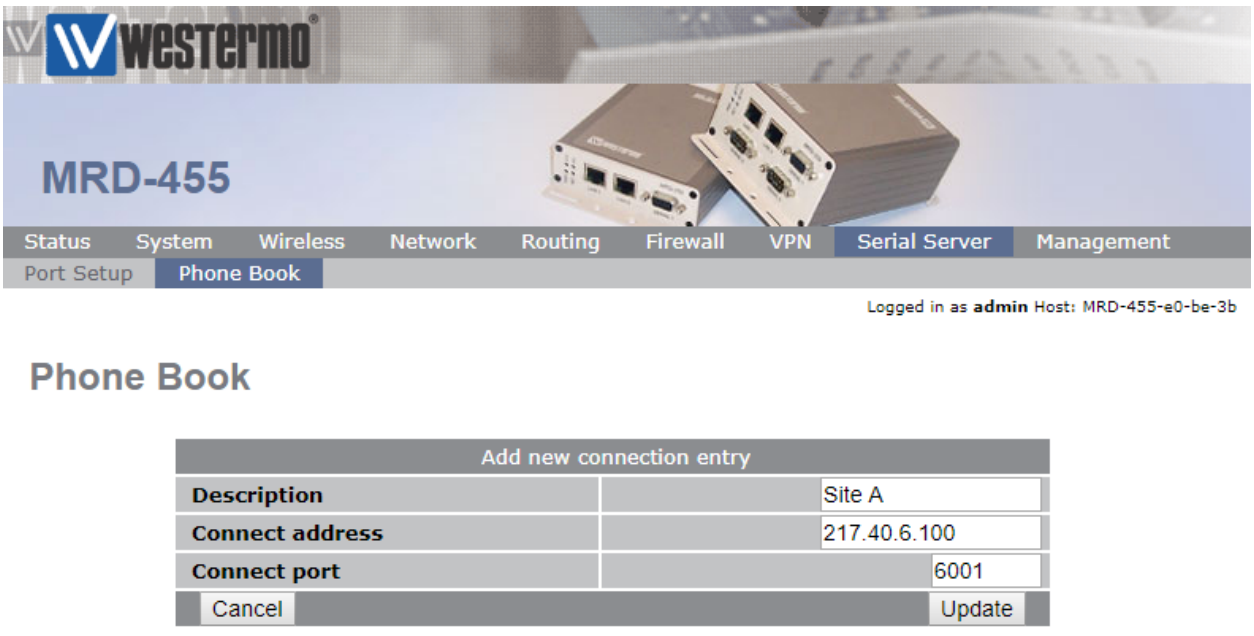
Enter the details for the first destination.

Description: Enter a description for the first destination. E.g. a site name.
Dial string: Enter a dial string associated with the first destination.
(The phone number does not need to exist.)
NB: Do not include the ATD in the Dial string field, this is assumed.

Add new connection entry

Enter the destination IP address and port to be associated with the above dial string.

Description: Enter a description for the first destination. E.g. a site name.
Connect address: Enter the broadband IP address of the BRD-355 associated with the first destination.
Connect Port: Enter the destination port (same as the Accept Port on the destination BRD-355).

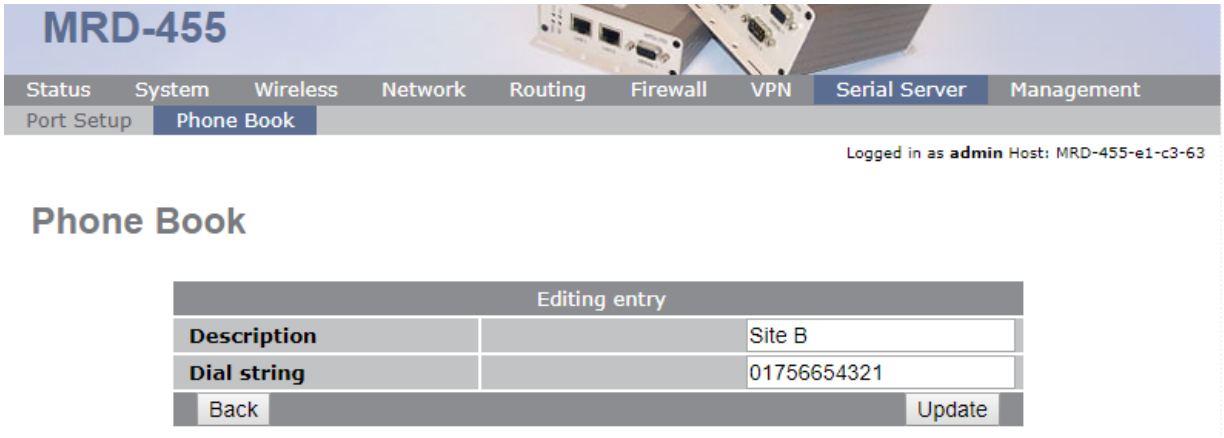


PHONE BOOK METHOD (Site B)

Add new phone book entry

Enter the details for the second destination.

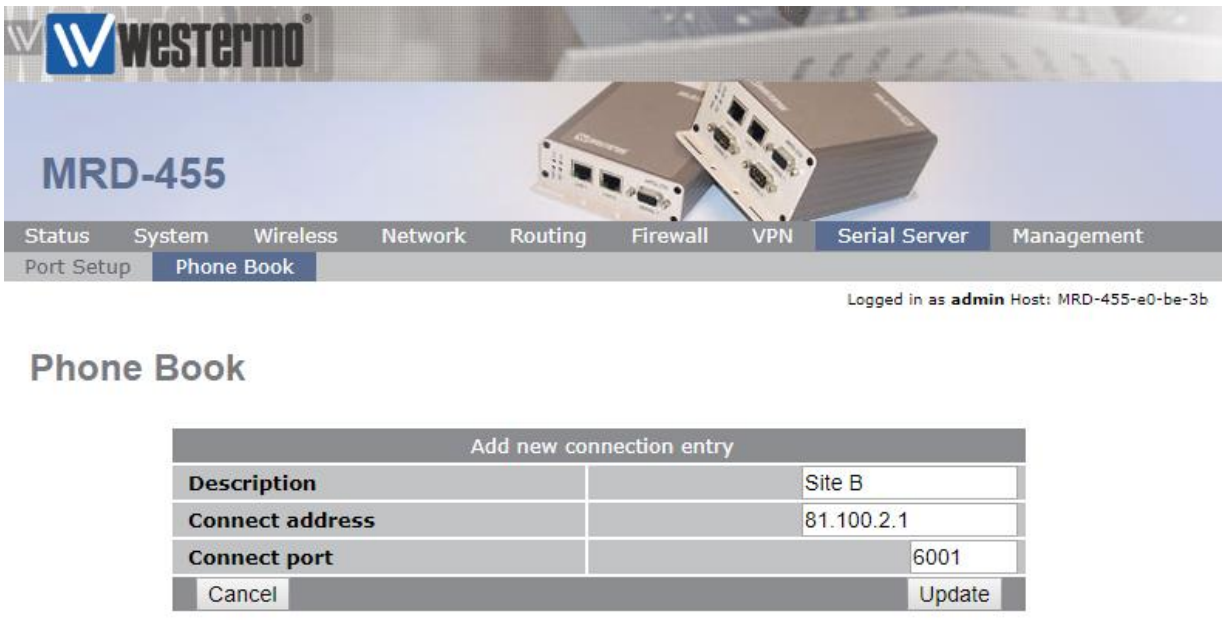
Description: Enter a description for the second destination. E.g. a site name.
Dial string: Enter a dial string associated with the second destination.
(The phone number does not need to exist)
NB: Do not include the ATD in the Dial string field, this is assumed.



Add new connection entry

Enter the destination IP address and port to be associated with the above dial string.

Description: Enter a description for the second destination. E.g. a site name.
Connect address: Enter the broadband IP address of the BRD-355 associated with the second destination.
Connect Port: Enter the destination port (same as the Accept Port on the destination BRD-355).

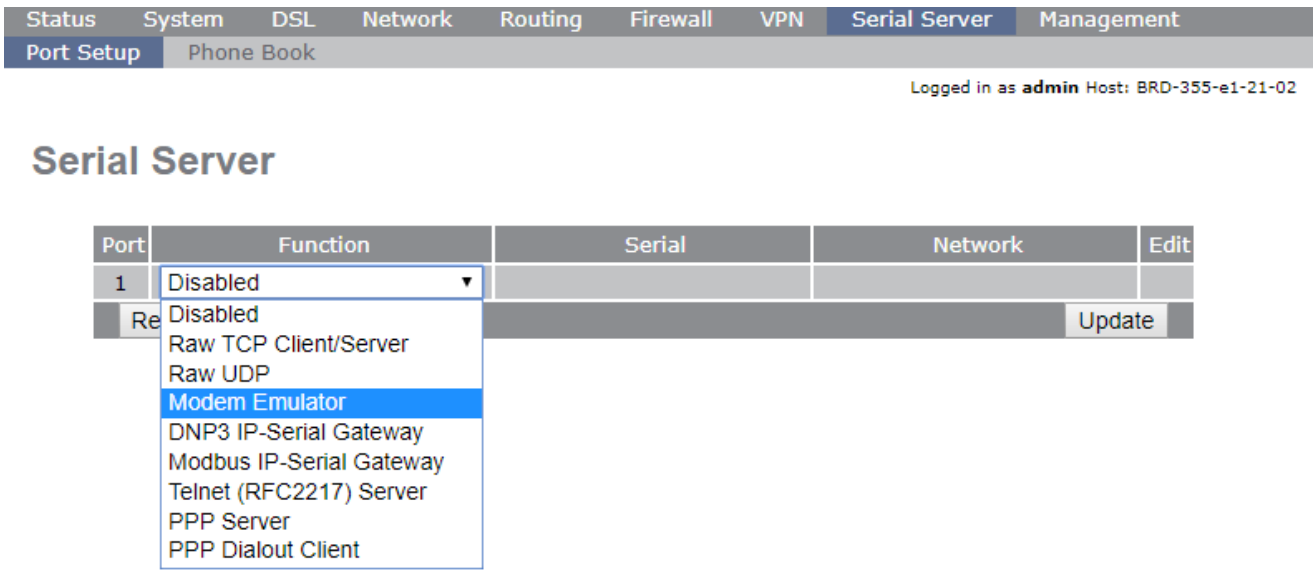


PHONE BOOK DESTINATION: ANSWERING A CALL

This method is used when the legacy serial device is expecting to answer a modem call with the ATA string.

Browse to Serial **Server > Port Setup**.

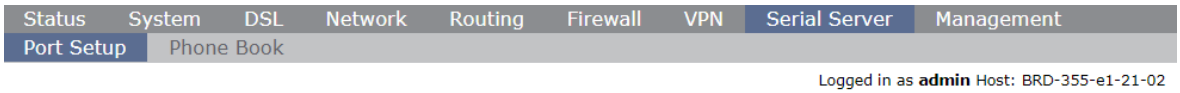
Select **Modem Emulator** from the Function dropdown list.

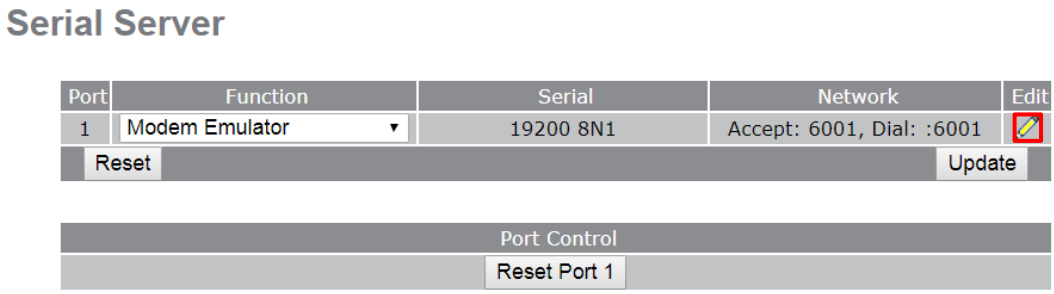


PHONE BOOK DESTINATION: ANSWERING A CALL

BRD-355 Modem Emulation Configuration

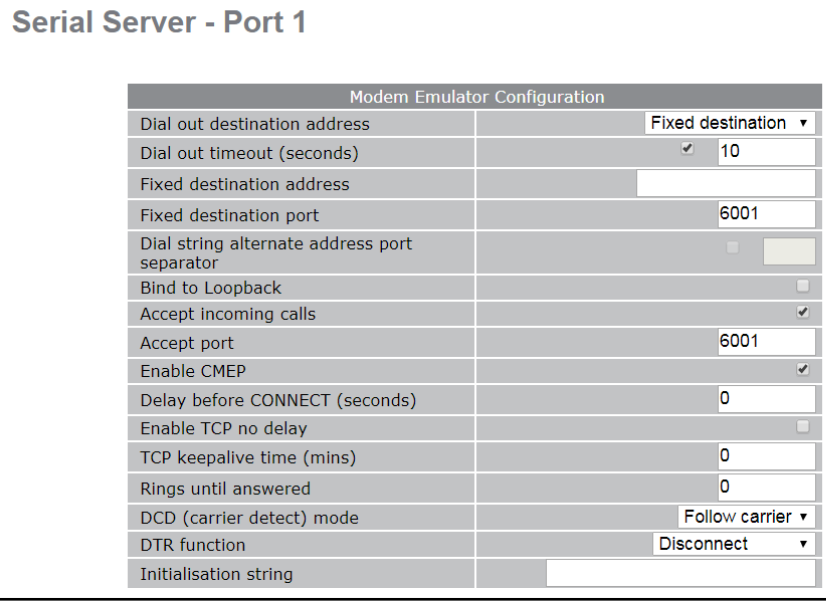
Click the Edit icon to configure the Modem Emulation settings.





Accept Incoming calls: ✓
Accept port: 6001*
Enable CMEP: ✓
NB: If you want the BRD-355 to answer the call automatically, set a value of 1 or above in the **Rings until answered** field.

* Choose an appropriate **Accept port**. This should be the same as the **fixed destination port** on the calling **MRD-455** DSL Router. If in doubt use the default Destination / Accept ports shown below.



PHONE BOOK DESTINATION: ANSWERING A CALL

BRD-355 Port Configuration (RS232)

These settings should correspond to the RS232 port settings of your local serial equipment/PLC etc.

Baudrate: Choose the same baudrate as the local serial device.
Data bits: Enter the same data bits as the local serial device.
Stop Bits: Enter the same number of stop bits as the local serial device.
Parity: Enter the same parity setting as the local serial device.

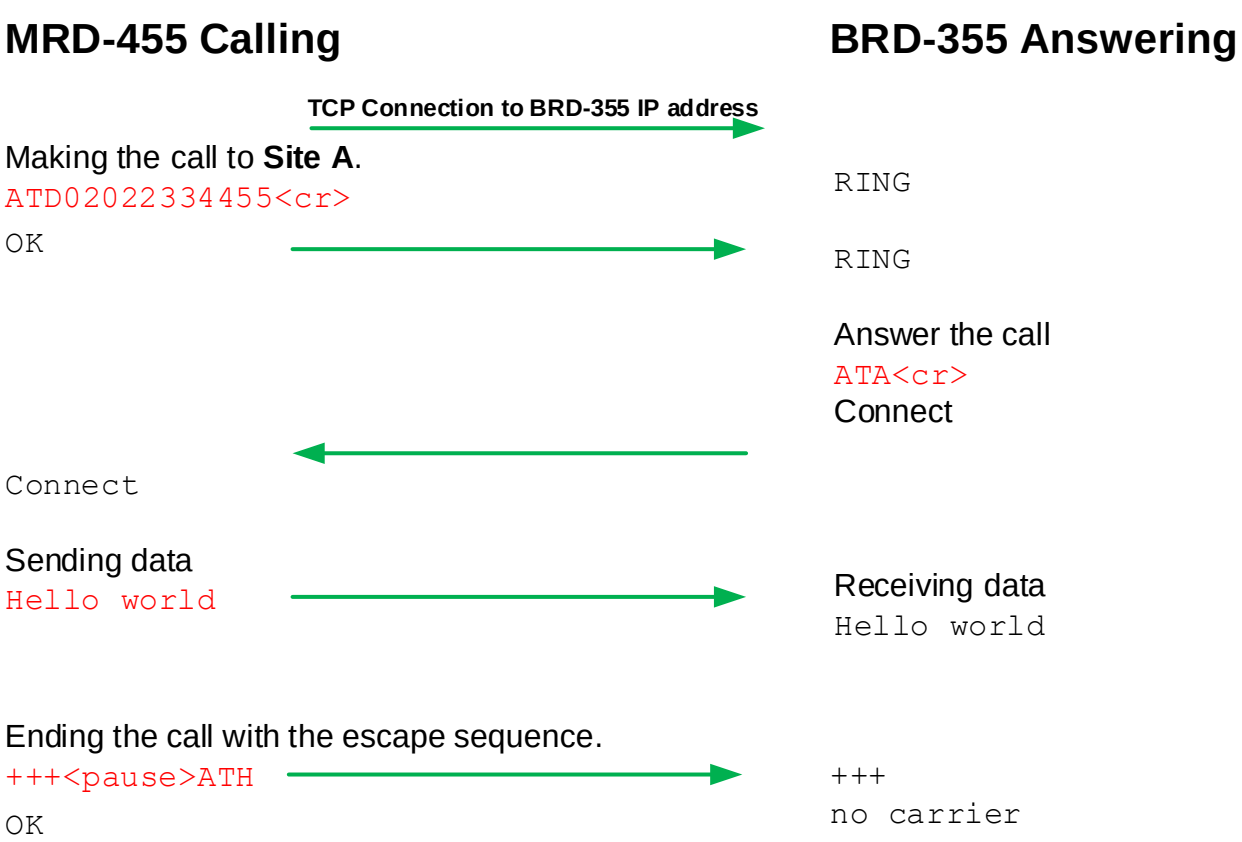
Port Configuration	
Baudrate	19200 ▾
Data bits	8 ▾
Stop bits	1 ▾
Parity	None ▾
Flow control	None ▾
Line state when disconnected	☐ RTS ☐ DTR
Network congestion backoff signal	☐ RTS ☐ DTR

ATD DIAL STRING TO FIRST PHONE BOOK ENTRY

Using the Fixed Destination Modem Emulator

Because the MRD-455 is configured to 'call' a fixed destination, any number can be used with the dial string as long as it starts with ATD.

NB: Entered commands are in red text. Reponses are in black text.



Raw TCP Client / Server Mode

This method is used when the serial device is expecting the dial strings to be handled by the modem.

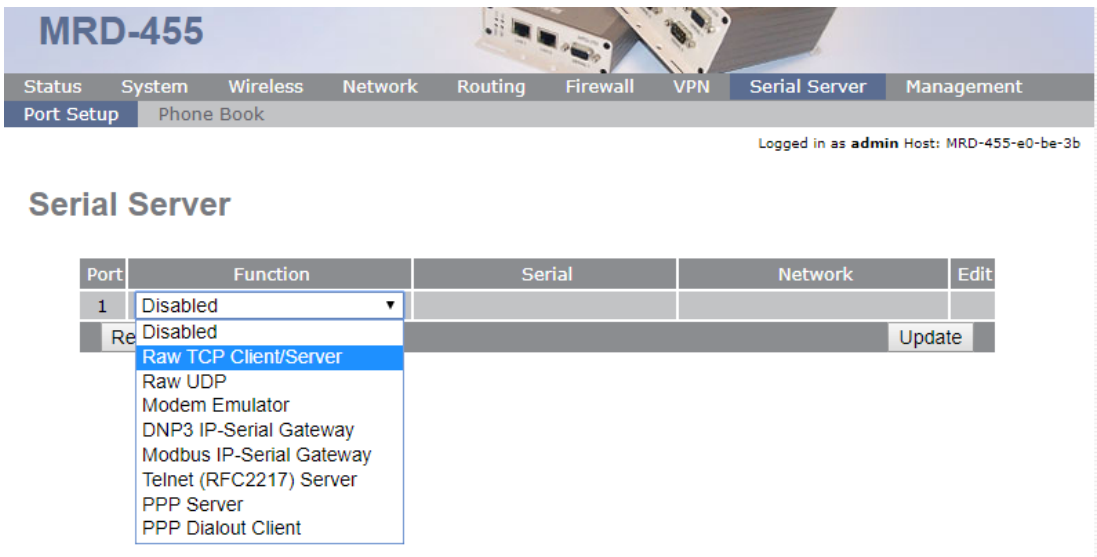
No AT command interface will be generated at the serial port. When the port is selected from the virtual console, a transparent data pipe is created between the serial port and the wireless port. But instead of making a call over a PSTN or Leased line, the router will create a TCP connection over the xDSL/4G network to a remote IP address and port.

In this example, when an MRD-455 4G router receives data to send on it's RS23 serial port, it will make a TCP client connection to a BRD-355 broadband router TCP server. The received data will be sent out of the serial ports to legacy serial equipment.

MRD-455 TCP Client Configuration

Browse to Serial **Server > Port Setup**.

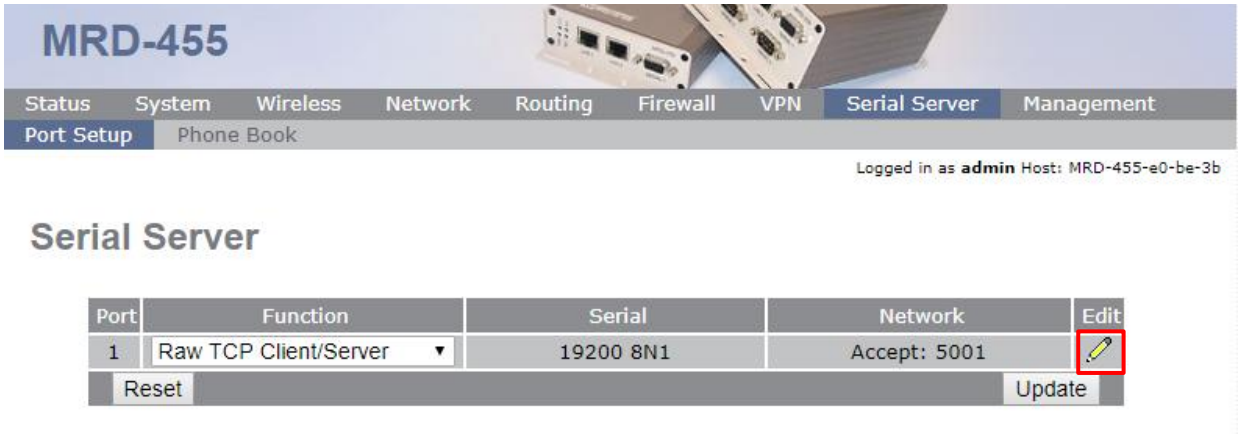
Select **Raw TCP Client/Server** from the dropdown list.



Raw TCP Client / Server Mode

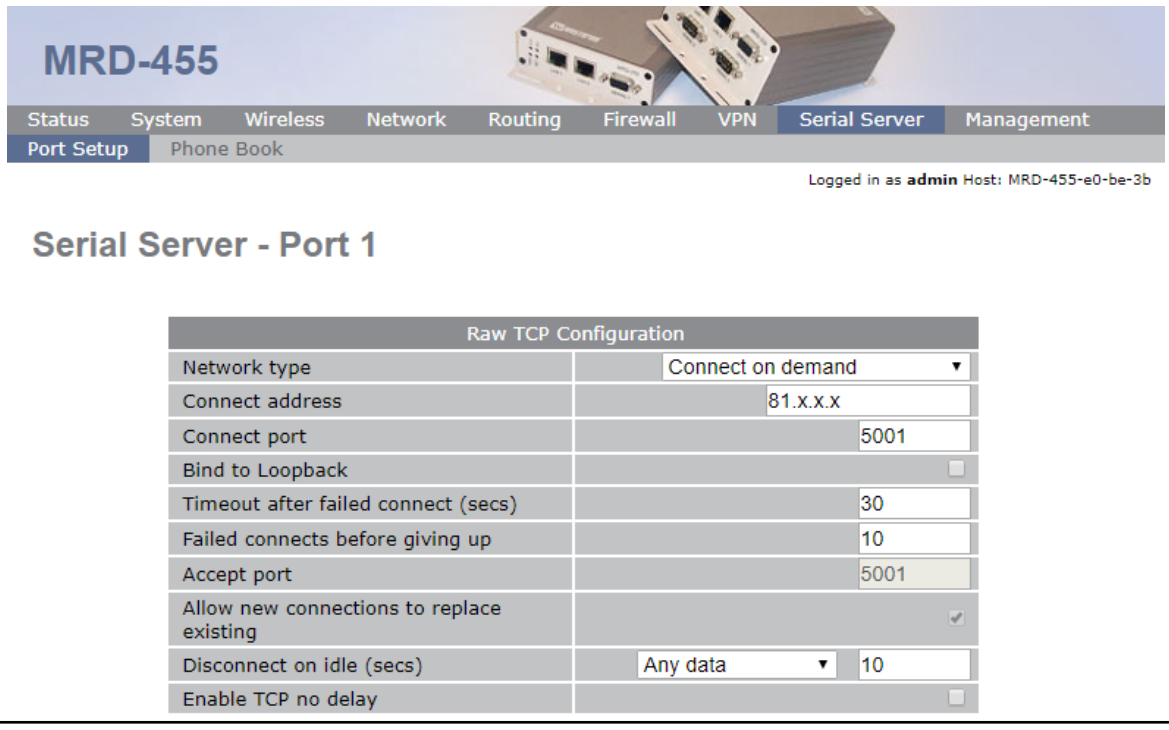
MRD-455 TCP Client Configuration

Click the Edit icon to configure the TCP Client settings.



In this example the settings have been configured for an on demand connection. However if you want the TCP socket to the server to be always on, use the default **Connect** setting, instead of the on demand option and Disable the **Disconnect on idle (secs)** option.

Network type: Connect on demand
Connect ddress: Enter the IP address of the destination BRD-355
Connect Port: enter the destination port for the TCP connetion.
NB: The connect port should be the same as the Accept Port on the destination BRD-355.
Disconnect on idle (secs): Any data
Then set a time in seconds after the which period of no date, the connection is allowed to disconnect.



Raw TCP Client / Server Mode

MRD-455 TCP Client Configuration

These settings should correspond to the RS232 port settings of your local serial equipment/PLC etc.

Baudrate: Choose the same baudrate as the local serial device.
Data bits: Enter the same data bits as the local serial device.
Stop Bits: Enter the same number of stop bits as the local serial device.
Parity: Enter the same parity setting as the local serial device.

Port Configuration	
Baudrate	19200
Data bits	8
Stop bits	1
Parity	None
Flow control	None
Line state when disconnected	RTS DTR
Network congestion backoff signal	RTS DTR

The MRD-455 is now ready to send serial client data.

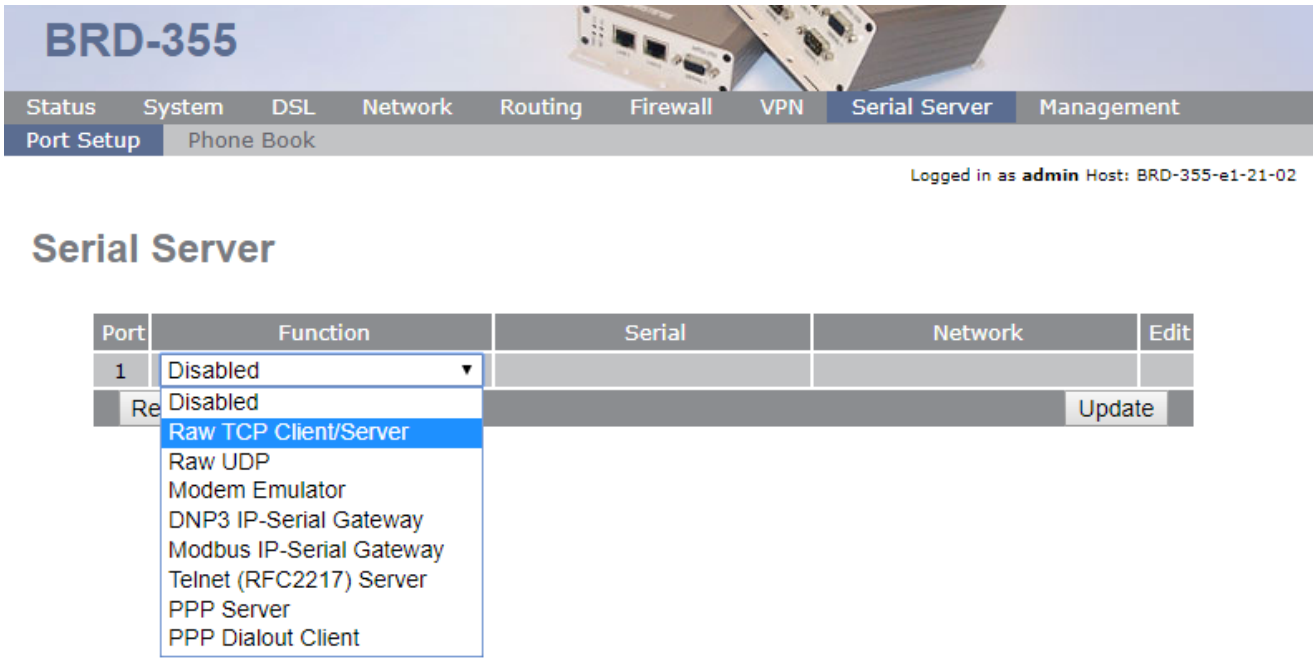
Raw TCP Client / Server Mode

BRD-355 TCP Server Configuration

When the BRD-355 receives data to port 5001 (the Accept Port), ot will forward this data out of the serial port to the waiting legacy serial device/PLC etc.

Browse to Serial **Server > Port Setup**.

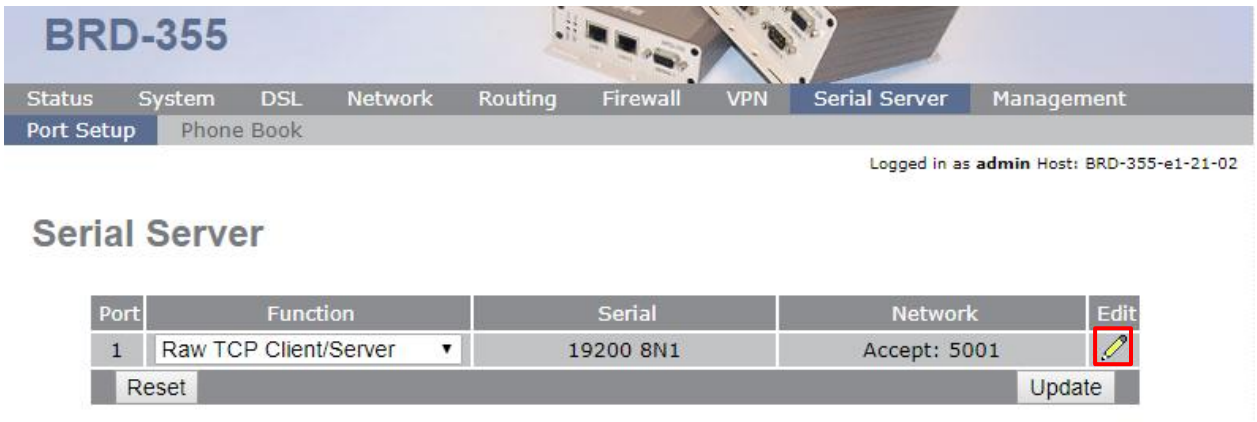
Select **Raw TCP Client/Server** from the Function dropdown list.



Raw TCP Client / Server Mode

BRD-355 TCP Server Configuration

Click the Edit icon to configure the TCP Server settings.



By default the BRD-355 is configured to accept TCP serial server connections to port 5001. Therefore in this example no changes have been made.

Network Type: Accept
Accept port: 5001

Raw TCP Client / Server Mode

BRD-355 Port Configuration (RS232)

These settings should correspond to the RS232 port settings of your local serial equipment/PLC etc.

Baudrate: Choose the same baudrate as the local serial device.
Data bits: Enter the same data bits as the local serial device.
Stop Bits: Enter the same number of stop bits as the local serial device.
Parity: Enter the same parity setting as the local serial device.

Port Configuration	
Baudrate	19200 ▾
Data bits	8 ▾
Stop bits	1 ▾
Parity	None ▾
Flow control	None ▾
Line state when disconnected	☐ RTS ☐ DTR
Network congestion backoff signal	☐ RTS ☐ DTR

The BRD-355 is now ready to receive serial server data.

Revision history for version 1.0

Revision	Rev by	Revision note	Date
1.0	JM	Initial Release	
1.1	JM	Phonebook method. Pg 15 & 16. Remove ATD from Dial string field. The ATD is assumed.	01.07.2019

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