

APPLICATION NOTE AN-0197-ENG Rev. 2.0

4G/3G Connection Management

4G/3G Link Error Detection and Recovery



Introduction

Overview

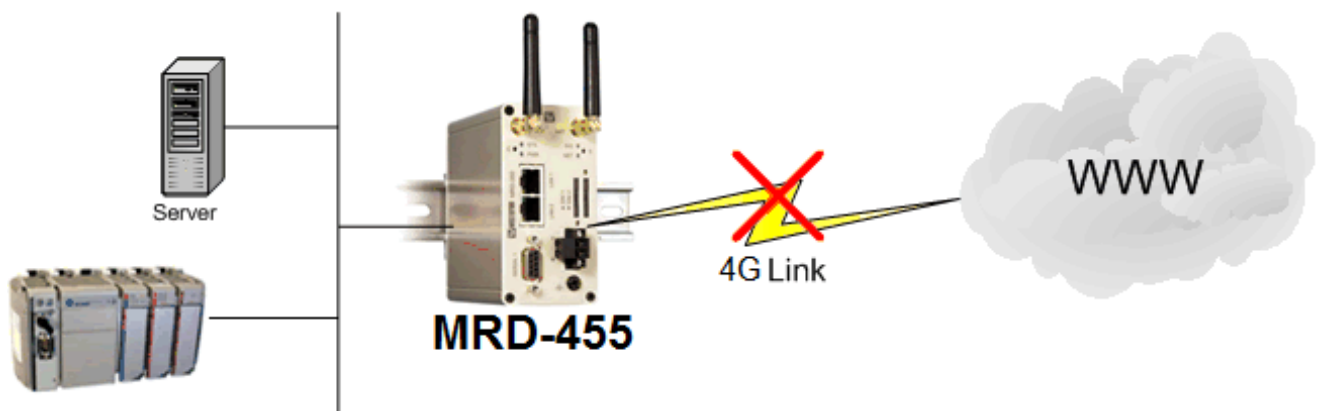
Wireless WAN technologies such as 4G and 3G have proven to be extremely reliable. But because 4G routers tend to be placed in remote and difficult to reach places, it warrants extra precautions. Especially when the consequences of losing contact with a remote network can be severe in terms of recovery costs (site visits etc.).

Problems are rare, but on such occasions due to power spikes, interference, or the network blocking the connection due to some failure, it's possible for a link to appear up and healthy but no longer able to route data. Therefore Westermo have added features that will make a 3G router self sufficient in terms of detecting these problems and automatically recovering the link (except where a total failure of the mobile network has occurred).

The following method works by generating ICMP pings from the 4G link over the mobile network to a reliable, always on, fixed public IP address. This has the advantage of working in the background 24/7 and 365 days a year and is transparent to your everyday M2M connectivity.

NB: Additional data charges from your network provider may result from transmitting the link monitoring pings. The amount of traffic generated by the monitoring pings can however be adjusted, therefore making additional costs, if any, negligible. E.g. By decreasing the frequency of the pings if a quick recovery is not required. Any additional data charges will almost certainly be less expensive than sending an Engineer to site.

4G Network Failure



Introduction

Assumptions

This application note applies to;
MRD-455 4G router and MRD-355, MRD-305, MRD-350, MRD-330 and MRD-310 3G routers with
firmware version 1.55 or later.

This application note also assumes you are starting from a factory default configuration.

Corrections

Requests for corrections or amendments to this application note are welcome and should be
addressed technical@westermo.co.uk

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

MRD-455 4G Router Configuration

4G Link

Browse to WIRELESS → PACKET MODE



The screenshot shows the Westermo MRD-455 configuration interface. The 'Wireless' menu is selected, and 'Packet Mode' is active. The 'Connection Configuration' section shows 'Connection Mode' set to 'Disabled', 'SIM 1 profile (active)' and 'SIM 2 profile' both set to '----'. There are 'Reset' and 'Update' buttons. Below is a table for profiles:

Index	APN	Auth	User	Password	Edit	Delete
No profiles configured.						
Add new profile						

Click **Add new profile**.



The screenshot shows the 'Editing profile 1' form in the Packet Mode configuration. The 'Wireless' menu is selected, and 'Packet Mode' is active. The form fields are:

- APN:** YOUR_APN_GOES_HERE
- Authentication:** None
- Username:** (empty)
- Password:** Not set (New checkbox is unchecked)

Buttons for 'Cancel' and 'Update' are visible at the bottom.

Packet Mode

Editing profile 1	
APN	YOUR_APN_GOES_HERE
Authentication	None
Username	
Password	Not set New: <input type="checkbox"/>
<input type="button" value="Cancel"/>	<input type="button" value="Update"/>

Enter the **APN** (Access Point Name) provided by your network SIM provider.

NB: Standard 4G/3G tariffs do not often require authentication

MRD-455 4G Router Configuration

Browse to WIRELESS → PACKET MODE continued.



The screenshot shows the configuration page for the MRD-455 4G Router. The breadcrumb path is WIRELESS → PACKET MODE. The page title is "MRD-455" and the sub-section is "Packet Mode". The navigation menu includes Status, System, Wireless, Network, Routing, Firewall, VPN, Serial Server, and Management. The "Packet Mode" sub-menu includes Connection Management, Circuit Switched Mode, and SMS. The user is logged in as "admin" on host "MRD-455-e0-be-3b".

Packet Mode

Connection Configuration

Connection Mode	Always connect ▼				
SIM 1 profile (active)	1 ▼				
SIM 2 profile	1 ▼				
Reset	Update				

Index	APN	Auth	User	Password	Edit	Delete
1	internet	None		Not set		

[Add new profile](#)

Connection Mode: Always connect

SIM 1 profile: 1

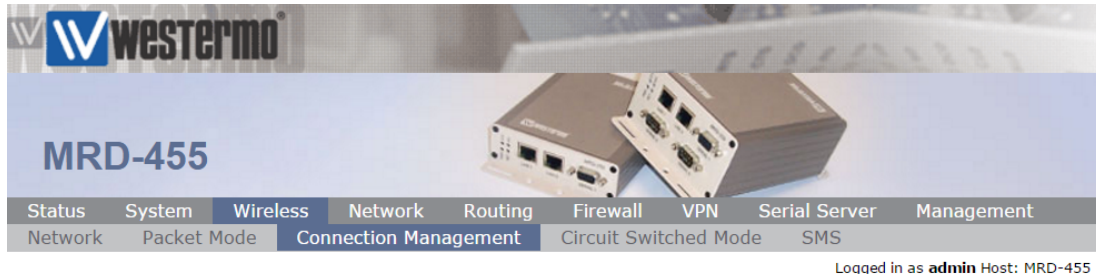
NB: In this example the SIM card in slot 1 will use profile 1. You can set up multiple profiles and assign them to either SIM slot 1 or 2 depending on the provider of the SIM card.

E.g. In this example the SIM card in slot 1 will use profile 1. You can set up multiple profiles and assign them to either SIM slot 1 or 2 depending on the provider of the SIM card.

Configuration

Connection Establishment

Browse to **Wireless** → **Connection Management**



Connection Management

Connection Establishment	
Rotate SIM	<input type="checkbox"/>
Secondary SIM hold period (mins)	<input type="checkbox"/> 0
Timeout for network initialisation (secs, min 60)	120
Timeout for connection establishment (secs, min 30)	45
Poll on connection establishment, period (secs, min 15)	<input type="checkbox"/> 15
Failed polls before restarting the connection	0
Failed establishment attempts before interface restart	3
Failed establishment attempts before modem reboot	12
Failed establishment attempts before dropping to CSD	0
Time to spend in CSD (mins)	15

Failed establishment attempts before interface restart: 3

Failed establishment attempts before modem reboot: 12

The above parameters are set by default but are an important part of the link recovery function.

Connection Maintenance

Connection Maintenance	
Remote polling mode	Poll at fixed interval ▼
Poll period (secs, min 15)	1800
Retry period (secs, min 15)	<input checked="" type="checkbox"/> 30
Failed polls before restarting the connection	4
Network registration timeout (mins)	5
Traffic generator enabled, interval (secs) & address	<input type="checkbox"/> 10

Remote polling mode: Poll at fixed interval

Poll period (secs, min 15): 1800 – Send a ping every 1800 seconds (30 minutes)

Retry period(secs, min 15): 30 – increase ping frequency to 30 seconds after no reply.

Failed polls before restarting the connection: 4 – Restart the wireless link and instigate link restart and recovery after 4 consecutive ping failures.

Configuration

Remote Poll Setup

Here you set the poll type and the IP addresses to poll.

Important: It is crucial to poll IP addresses that are fixed, reliable and always on. If the addresses go offline then the router will assume there has been a link failure, disconnect the 4G link and enter recovery mode.

Remote Poll Setup	
Primary poll type	Ping (ICMP) ▾
Primary poll address	8.8.8.8
Primary test	Test
Backup poll type	Disabled ▾
Backup poll address	
Secondary test	Test

NB: Set up the **backup poll type** and **address** if you want to send test pings to a second IP address should pings to the primary IP address fail.

Send debug to the system log

Miscellaneous Options	
Automatically obtain DNS	<input checked="" type="checkbox"/>
Verbose output to system log	<input checked="" type="checkbox"/>
Reset	Update

Verbose output to system log: ✓

Testing

Browse to **Wireless** → **Connection Management**

Temporarily point the monitoring pings to an IP address which you can control and block the pings or does not exist. This will simulate a faulty link and will force it into recovery mode.



Browse to **Status** → **System Log**



This event appears when the test pings have failed.

```
Nov 11 13:51:13 mrx[2075]: ConnectionTester: ICMP resetting
Nov 11 13:53:13 mrx[2075]: ConnectionTester WLS: polling has timed out
```

NB: If the 4G link fails to re-establish on either SIM, the router will eventually reboot the router as specified in the **Failed establishment attempts before modem reboot** setting detailed in page 5.

Connection Maintenance and Remote Poll Status

Connection Maintenance	
Outstanding Request	No
Interface Restarts	3
Active Poll	ICMP to 1.2.3.4
Remote poll: ICMP to 1.2.3.4	
Data Sent	12
Data Received	69

The **Interface Restarts** shows how often the interface has been restarted due to failed responses to the monitoring pings. This page also shows how many pings have been transmitted (Data sent) and how many replies have been received (Data Received).

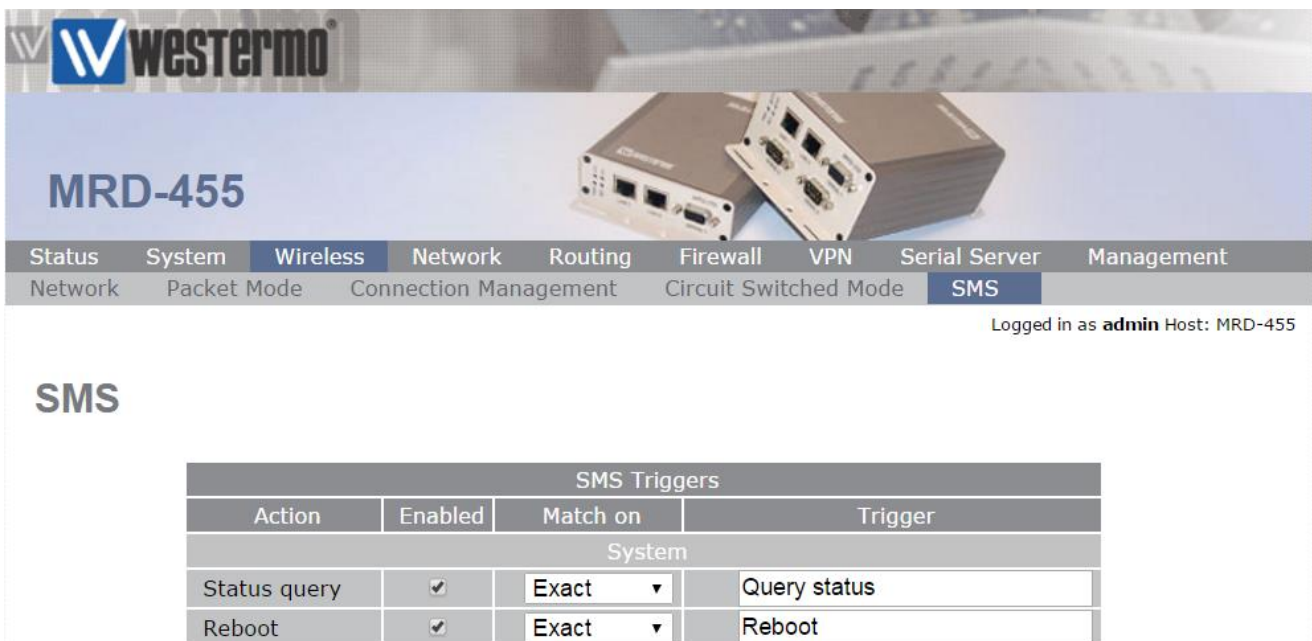
NB: For testing purposes we sent pings to IP address 1.2.3.4 which was unreachable.

SMS Triggers

As an additional failsafe, the SMS Triggers option, are a very useful feature to have if you think the remote router has lost its connection and doesn't seem to be recovering.

The following settings are disabled by default. The router needs only to GSM registration only to receive and send SMS messages and does not need to be connected to the 4G network for the SMS function to work.

Browse to **Wireless** → **SMS**



The screenshot shows the Westermo MRD-455 web interface. The navigation menu includes: Status, System, **Wireless**, Network, Routing, Firewall, VPN, Serial Server, and Management. Under the **Wireless** menu, the sub-menu includes: Network, Packet Mode, Connection Management, Circuit Switched Mode, and **SMS**. The page title is "SMS" and it shows the "SMS Triggers" configuration table.

SMS Triggers			
Action	Enabled	Match on	Trigger
System			
Status query	<input checked="" type="checkbox"/>	Exact ▼	Query status
Reboot	<input checked="" type="checkbox"/>	Exact ▼	Reboot

Status query: ✓

reboot: ✓

This allows you to send an SMS text to the router with the trigger phrases **Status query** and **Reboot**. The **Status query** SMS will return the link status including the signal strength. The **Reboot** SMS will initiate a full reboot - Although there shouldn't be a need to manually **Reboot** if the instructions in this application note have been followed correctly.

Revision history for version2.0

Revision	Rev by	Revision note	Date
00		Re-do v1 application note for the new MRD-455, MRD-355 products	
01			
02			
03			
04			
05			
06			
07			



H E A D O F F I C E

Sweden

Westermo
SE-640 40 Stora Sundby
Tel: +46 (0)16 42 80 00
Fax: +46 (0)16 42 80 01
info@westermo.se
www.westermo.com

Sales Units

Westermo Data Communications

China

sales.cn@westermo.com
www.cn.westermo.com

France

infos@westermo.fr
www.westermo.fr

Germany

info@westermo.de
www.westermo.de

North America

info@westermo.com
www.westermo.com

Singapore

sales@westermo.com.sg
www.westermo.com

Sweden

info.sverige@westermo.se
www.westermo.se

United Kingdom

sales@westermo.co.uk
www.westermo.co.uk

Other Offices



For complete contact information, please visit our website at www.westermo.com/contact or scan the QR code with your mobile phone.