APPLICATION NOTE AN-002-WUK

3G/4G Connection Management

3G/4G Link Error Detection and Recovery

Introduction

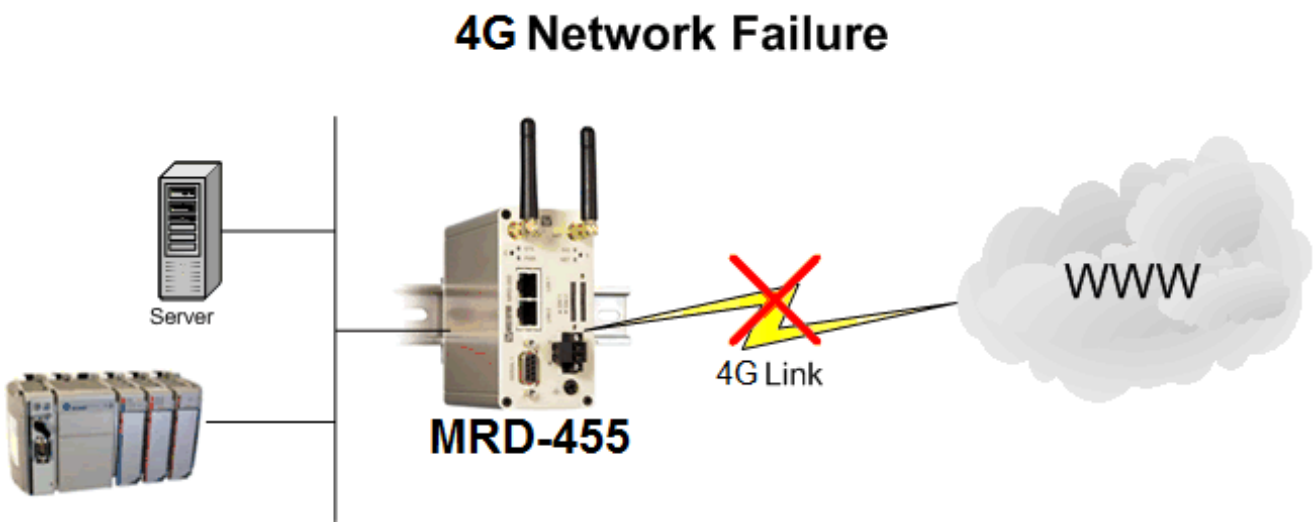
Overview

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.



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

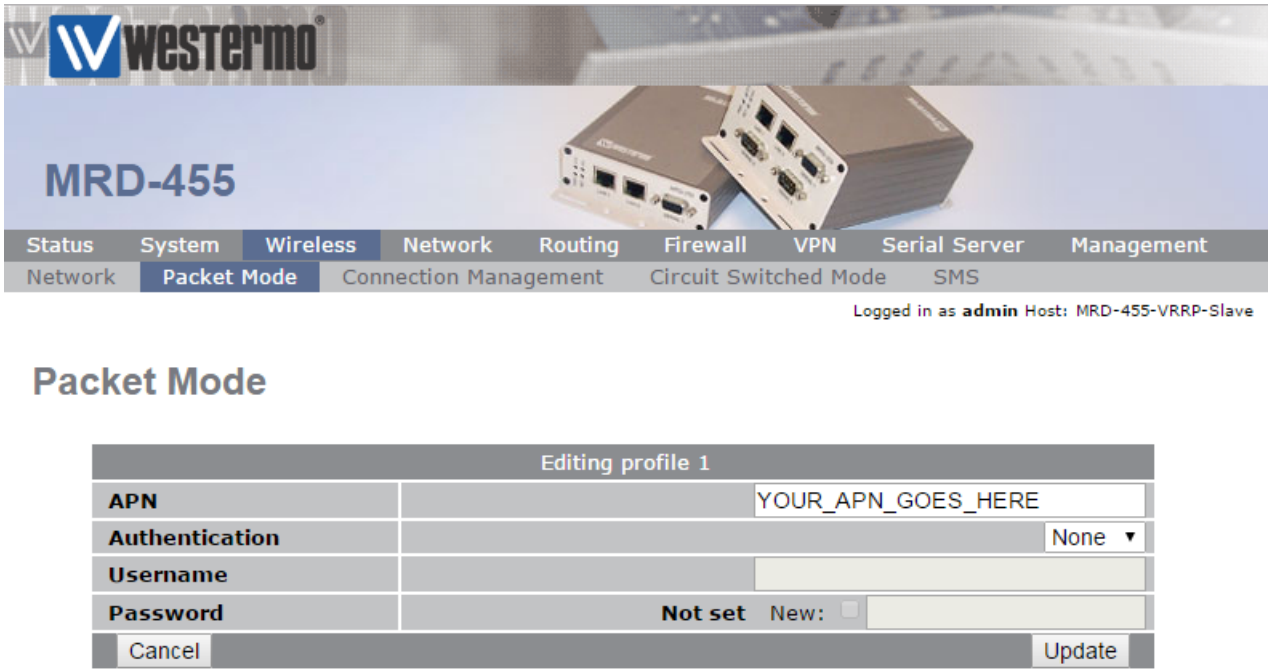
Requests for new application notes can be sent to the same address.

MRD-455 4G Router Configuration

4G Link

Browse to WIRELESS → PACKET MODE

Click **Add new profile**.

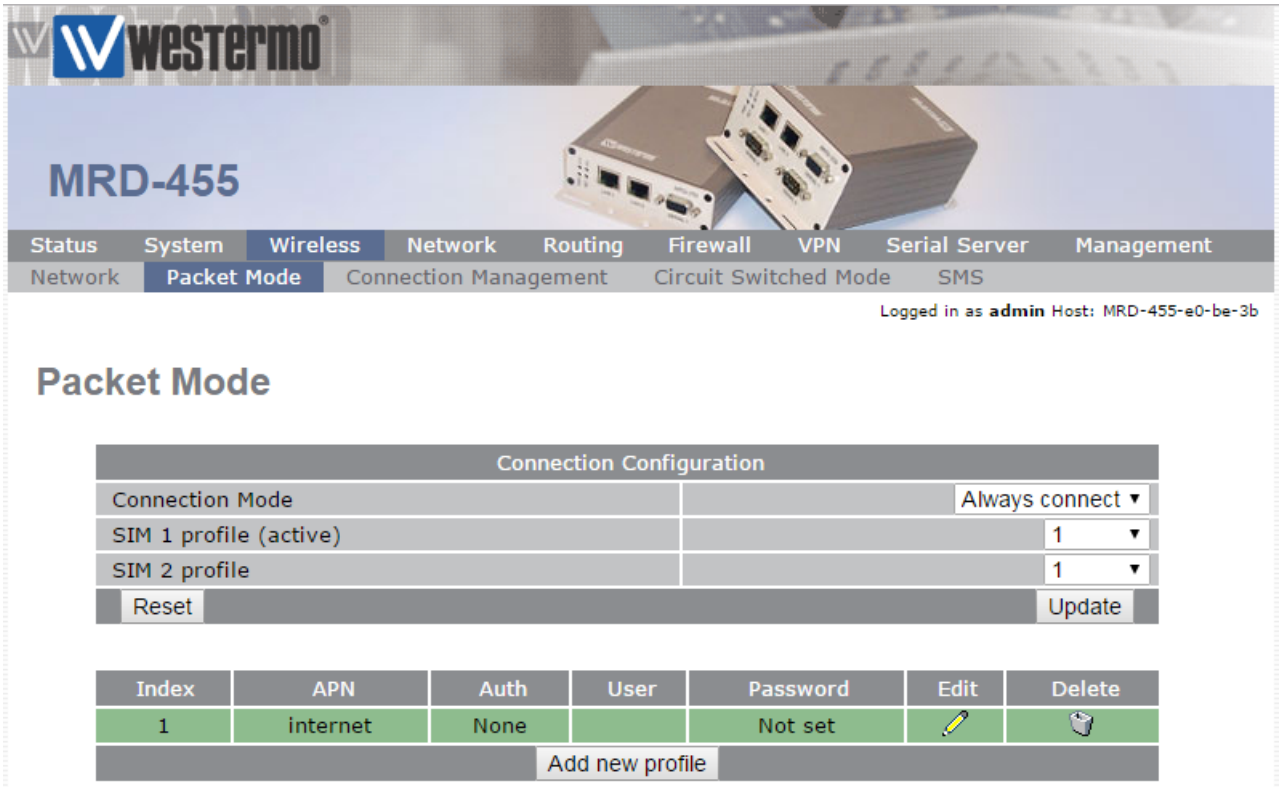


Enter the **APN** (Access Point Name) provided by your network SIM provider.

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

MRD-455 4G Router Configuration

Browse to WIRELESS → PACKET MODE continued.



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.

If you are using 2 SIM cards, please refer to application note **AN-003-WUK Dual SIM Failover**.

Configuration

Connection Establishment

Browse to **Wireless → Connection Management**

Connection Management

Connection Establishment	
Rotate SIM	☐
Secondary SIM hold period (mins)	☐ 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)	☐ 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)	☑ 30
Failed polls before restarting the connection	4
Network registration timeout (mins)	5
Traffic generator enabled, interval (secs) & address	☐ 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.

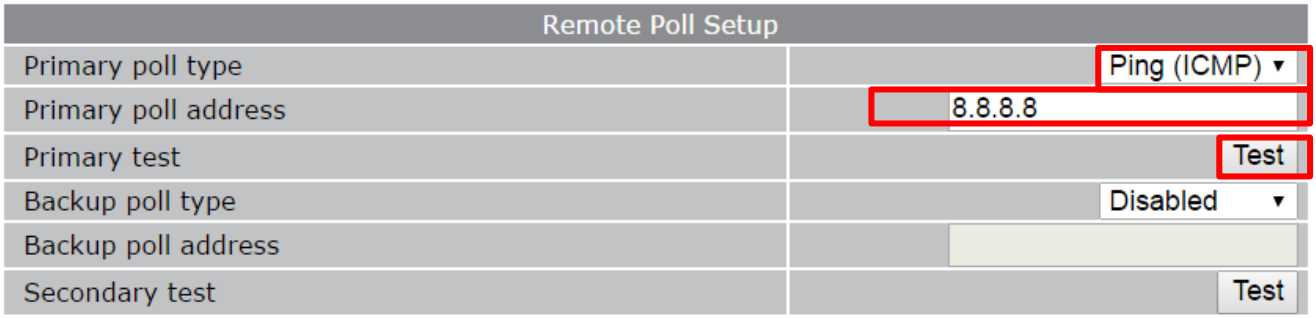
Configuration

Remote Poll Setup

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

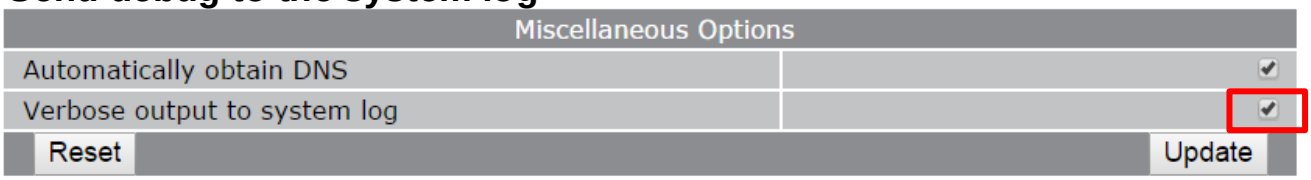
Important: It is crucial to poll IP addresses that are fixed, reliable and always on. If the addresses go offline then the router will assume there has been a link failure, disconnect the 4G link and enter recovery mode.

Best practice is to poll IP addresses that can be controlled by your organisation, rather than depend on the availability of public IP addresses that can change without notice.



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



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 Maintenenance 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).

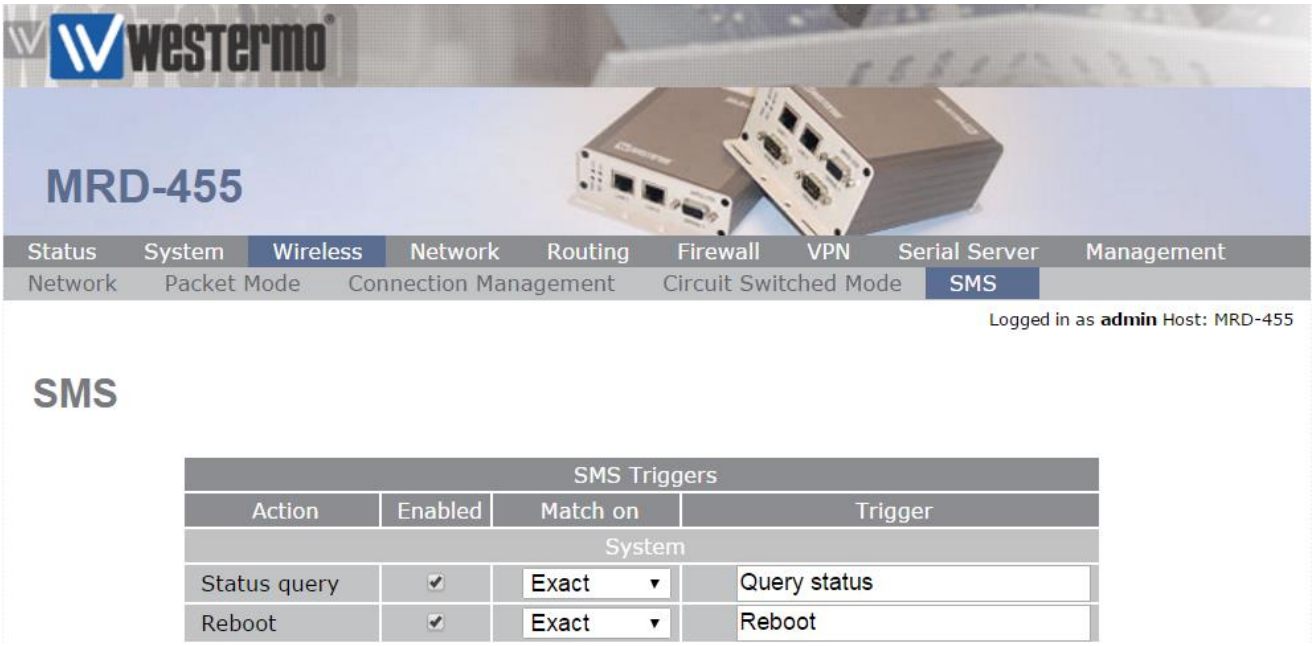
NB: For testing purposes we sent pings to IP address 1.2.3.4 which was unreachable.

SMS Triggers

As an additional failsafe, the SMS Triggers 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 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**



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 version2.01

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

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