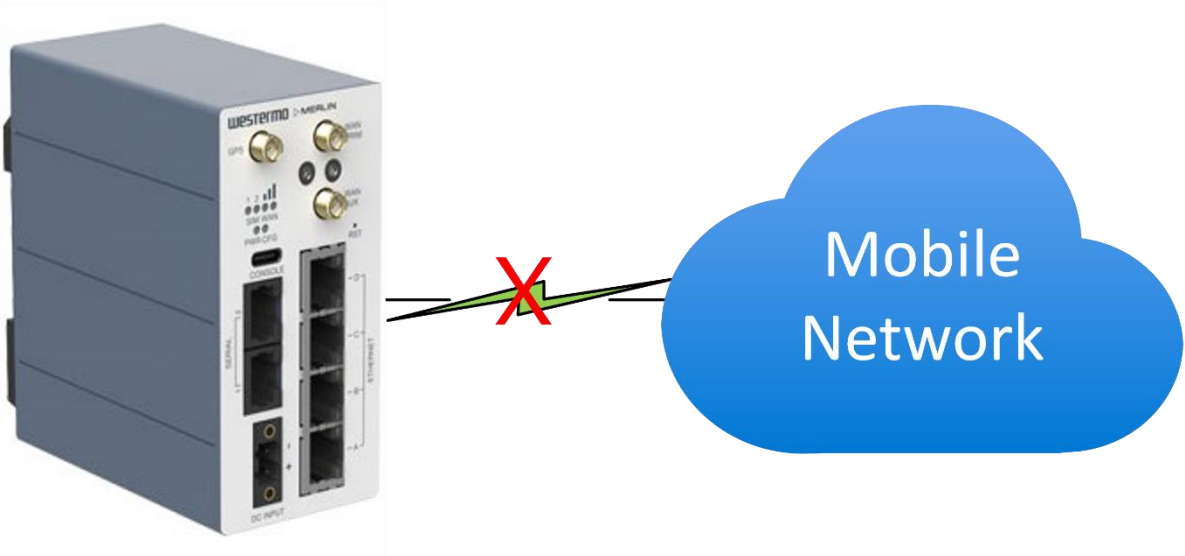


# MERLIN CONNECTION WATCH: MOBILE LINK ERROR DETECTION & RECOVERY

How to configure Mobile error detection and recovery on a Westermo Merlin Mobile router using the Connection Watch function.



Contents

- Introduction:**..... 3
- What is the Merlin Connection Watch Feature?**..... 3
- Overview**..... 4
- Assumptions**..... 4
- Merlin 4407 Mobile Router Configuration**..... 5
  - LAN IP Address.** ..... 5
  - Mobile Settings**..... 6
  - Connection Watch Settings**..... 7
  - Connection Watch Settings (Continued)** ..... 8
  - Browse to System > System Log** ..... 10
- Parameter Definitions**..... 11
- Revision History**..... 12

## Introduction:

### What is the Merlin Connection Watch Feature?

Mobile networks such as 4G has proven to be extremely reliable as a means of communication for the industrial sector. Along with VPN technologies such as Westermo's [WeConnect](#), Mobile technology has enabled Westermo customers to connect remote sites and gain remote access to their networks in difficult to reach places, often without the availability of wired connectivity to the internet.

For this reason, it has become crucial to maintain reliable connections to the Mobile network. Therefore Westermo has built into their Mobile routers additional functionality that allows Westermo customers to implement extra contingencies in order to make our Mobile routers as self sufficient as possible. Especially when the consequences of losing contact with a remote network can be severe in terms of recovery costs (site visits and downtime 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 Mobile link to appear up and healthy but no longer able to route data over the Mobile network. Westermo has added a feature called **Connection Watch** that will detect these types of problems and automatically recover the link (except where a total failure of the mobile network has occurred).

The following method works by generating ICMP pings from the Mobile 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: This method will generate additional traffic over the Mobile link and therefore may incur extra data charges depending on the tariff. However in most cases the data costs will be negligible.

## Overview

This application note shows how to configure the Connection Watch function within a Westermo Merlin 4407 Mobile router. However it is applicable to all Mobile routers in the Merlin range.

Firmware version used: SXL-25.04.16.000

## Assumptions

This application note shows the Merlin-4407 Mobile router and assumes the router has a factory default configuration. This application note can be applied to the other Mobile routers in the Merlin range.

## Corrections

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

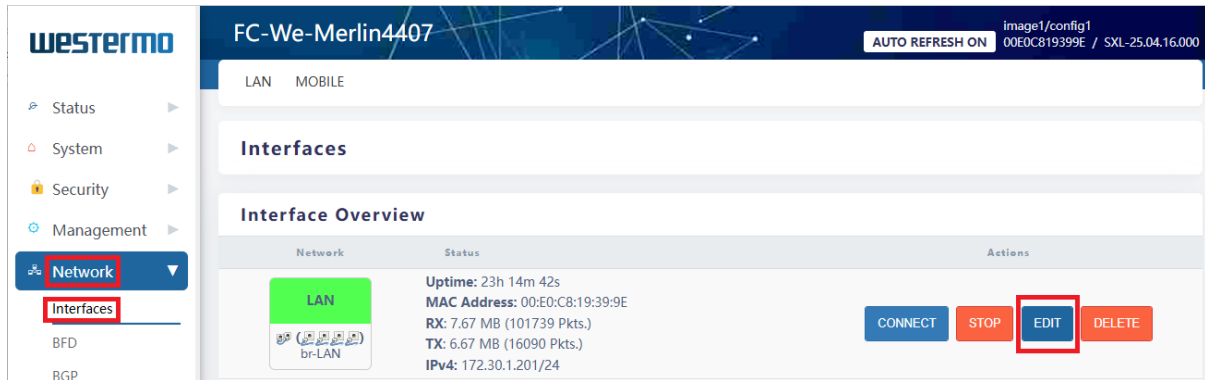
Requests for new Application Notes and Quick Notes can be sent to the same address.

## Merlin 4407 Mobile Router Configuration

### LAN IP Address.

Log in to the Merlin web configuration UI and browse to **Network > Interfaces**.

In the LAN section, click the **EDIT** button.

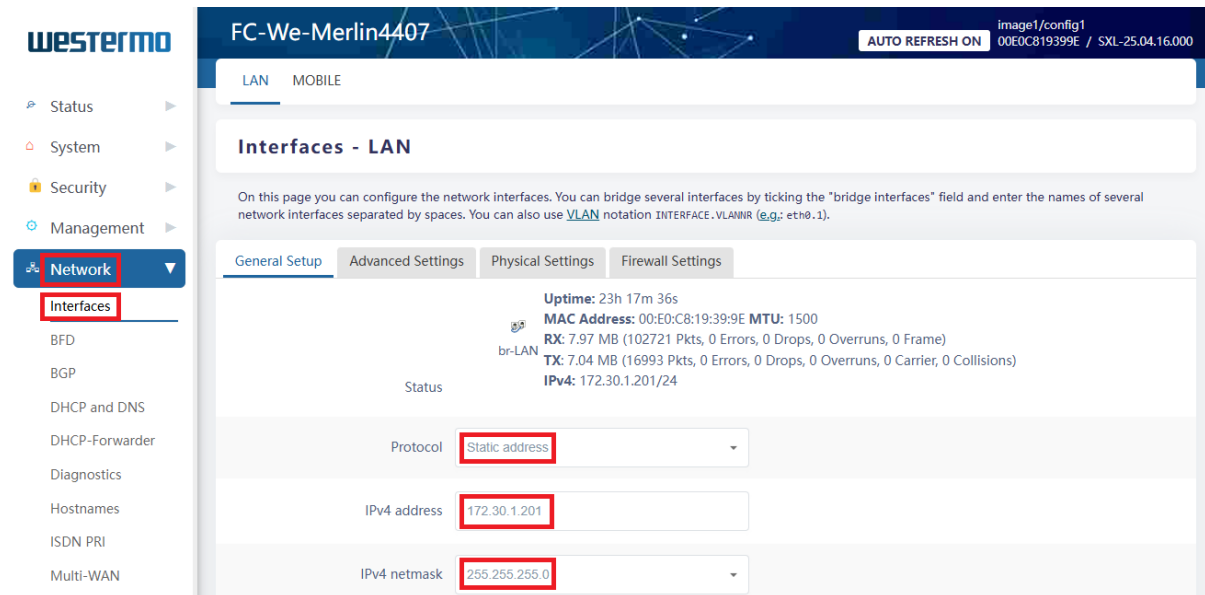


Next enter the new LAN IP address and subnet mask:

**Protocol:** Static address

**IPv4 address:** 172.30.1.201

**IPv4 netmask:** 255.255.255.0



Scroll to the bottom of the page and click **Save & Apply**.



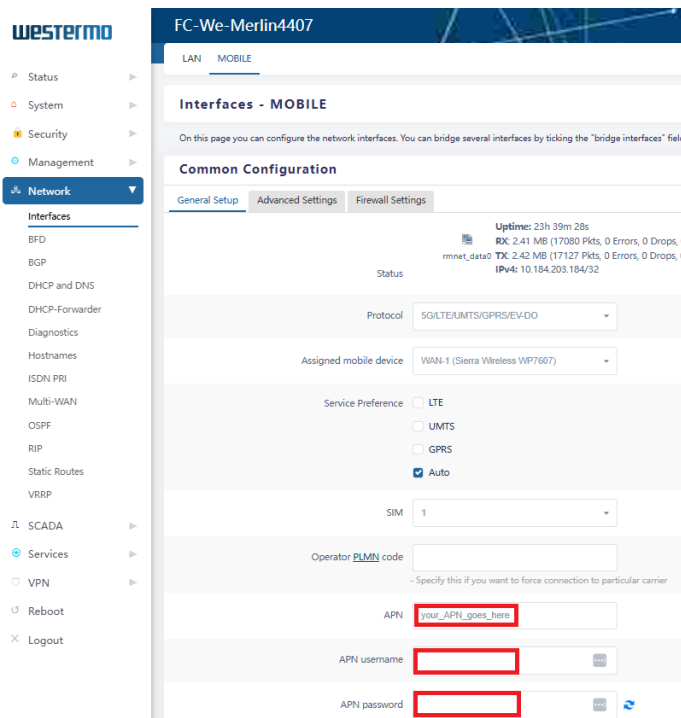
## Mobile Settings

Browse to **Network > Interfaces**.

In the MOBILE section, click the **EDIT** button.



Enter the appropriate APN (Access Point Name) provided by your mobile network provider.



**APN:** Enter your APN here

**APN Username:** Only if applicable

**APN Password:** Only if applicable

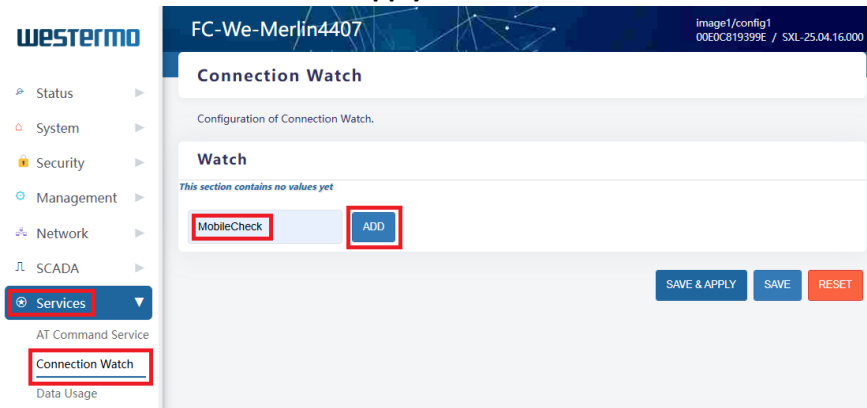


Scroll to the bottom of the page and click **Save and Apply**.

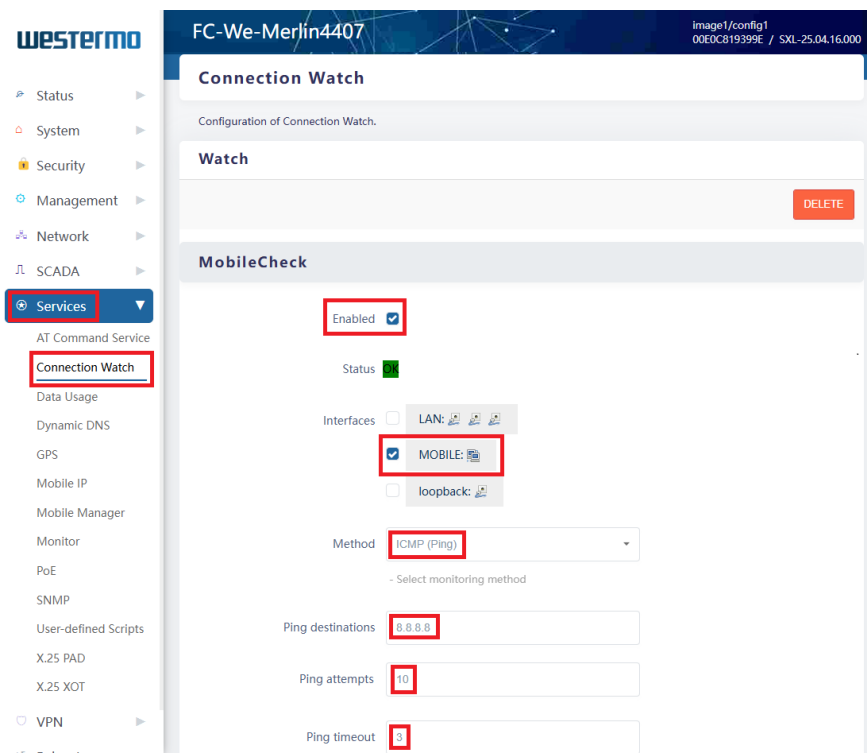
## Connection Watch Settings

Browse to **Services > Connection Watch**.

If this section is blank, enter a label for your Connection Watch settings (e.g. **MobileCheck**). Then Click **ADD**. Then **Save & Apply**.



A list of settings will appear.



**Enabled:** Tick to enable.

**Interfaces:** Tick the **MOBILE** interface.

**Method:** ICMP

**Ping destinations:** 8.8.8.8 – This will accept a space separated list of target IP addresses.

**(Important:** This is an example IP address only. Choose a reliable, always on IP address that responds to pings on **your Mobile interface**. The condition of the Mobile link is assessed by whether or not the router is receiving ping replies from this address).

**Ping attempts:** 10

(It is recommended to set this value to at least 4 as it's not unusual to drop the occasional ping).

**Ping timeout: 3**

## Connection Watch Settings (Continued)

Browse to **Services > Connection Watch** (continued on the same web configuration page).

The screenshot shows the WesterMO web configuration interface. On the left, a sidebar menu has 'Services' and 'Connection Watch' highlighted. The main configuration area is titled 'Connection Watch' and contains the following settings:

- Ping payload size: 56
- Ping TTL value: 128
- Required reliability: 50 (Percentage of pings required to succeed)
- Failure Time for Action 1: 30
- Failure Action 1: Interface restart
- Failure Grace Time 1: 0s (Interface activity will be ignored during the grace time)
- Failure Time for Action 2: 61
- Failure Action 2: Radio module restart
- Failure Grace Time 2: 0s (Interface activity will be ignored during the grace time)
- Failure Time for Action 3: 182
- Failure Action 3: Reboot
- Failure Grace Time 3: 0s (Interface activity will be ignored during the grace time)

**Ping payload size: 56**

**Ping TTL value: 128**

**Required reliability: 50**

**Failure Time for Action 1: 30**

**Failure Action 1: Interface restart**

**Failure Grace Time 1: 0s**

**Failure Time for Action 2: 61**

**Failure Action 2: Radio module restart**

**Failure Grace Time 2: 0s**

**Failure Time for Action 3: 182**

**Failure Action 3: Reboot**

**Failure Grace Time 3: 0s**

With the above configuration, the Merlin router will monitor the pings sent to 8.8.8.8. If ping responses drop below 50% in 30 secs, action 1 (Mobile interface restart) will be triggered. If the



problem persists for 61 seconds, action 2 (Radio module restart ) will be triggered. If the ping response failure rate persists for 182 seconds, action 3 (Reboot) will be triggered.

## Browse to System > System Log

On ping failure within the criteria of the Connection Watch settings, the system log will indicate the various actions to recover the Mobile link.

```
Nov 25 14:05:14 user.info 00E0C819399E cwatch[6472]: watch MobileCheck executed action 1 grace_time 0
Nov 25 14:05:15 user.info 00E0C819399E mobile[5011]: WAN-1 - Interface MOBILE up on SIM 1 in "vodafone UK"
LTE network, signal quality -69 dBm
et_data0)
Nov 25 14:05:15 user.info 00E0C819399E firewall: removing MOBILE (rmnet_data0) from zone wan
Nov 25 14:05:15 user.info 00E0C819399E firewall: adding MOBILE (rmnet_data0) to zone wan
Nov 25 14:05:16 local0.warn 00E0C819399E iface.20-firewall: conntrack v1.4.6 (conntrack-tools): connection
tracking table has been emptied.
Nov 25 14:05:16 daemon.info 00E0C819399E ipsec: 04[KNL] fe80::a3d:ec58:8b12:7f7e appeared on rmnet_data0
Nov 25 14:05:16 daemon.info 00E0C819399E ifplugd(rmnet_data0): started: BusyBox v1.23.2 (long time ago)
Nov 25 14:05:16 daemon.info 00E0C819399E ifplugd(rmnet_data0): using IFF_RUNNING detection mode
Nov 25 14:05:16 daemon.info 00E0C819399E ifplugd(rmnet_data0): link is up

Nov 25 14:05:33 user.warn 00E0C819399E cwatch[6472]: Restarting all radio modules
Nov 25 14:05:33 user.info 00E0C819399E cwatch[6472]: watch MobileCheck executed action 2 grace_time 0
Nov 25 14:06:50 user.warn 00E0C819399E cwatch[6472]: Restarting all radio modules
Nov 25 14:06:50 user.info 00E0C819399E cwatch[6472]: watch MobileCheck executed action 2 grace_time 0

Nov 25 14:07:28 user.warn 00E0C819399E cwatch[6472]: Rebooting router
Nov 25 14:07:28 user.info 00E0C819399E cwatch[6472]: watch MobileCheck executed action 3 grace_time 0
```

On the **Connection Watch Settings** page you will also see an error message similar to this when the failure thresholds are being reached.

Status **FAULT (excessive packet loss on interface MOBILE) action #1 is DONE; action #2 in 50 seconds; action #3 in 101 seconds**

## Parameter Definitions

Connection Watch parameter definitions.

**Interfaces:** The name(s) of the interface(s) to be monitored. If no rx data is observed over the time periods defined then the defined actions are taken.

**Method:** Specifies the test method to be used for determining the connectivity status: 'statistics' - monitors Rx counters, 'icmp' in this case sends ICMP packets to (a) destination(s). This will accept a space separated list of target IP addresses for monitoring traffic to more than one remote IP address.

**Ping attempts:** Number of ICMP packets to be sent per connectivity test.

**Ping timeout:** Timeout in seconds for ICMP replies to arrive to be considered a success.

**Required reliability:** Percentage of successful ICMP ping replies required for the Mobile connection to be considered up and working. In this example, for every 10 pings sent, 50% of those pings (5) must be successful for the Mobile link to be considered operational.

**Failure time for action 1:** If no ping replies are received within the above scope and in the time period defined here, then the 'Failure action 1' is triggered ('Mobile Interface restart' in this example).

**Failure action 1:** If the 'Failure time for action 1' is exceeded then 'failure action 1' is triggered ('Mobile Interface restart' in this example)

**Failure grace time 1:** Interface activity will be ignored during the grace time after 'failure action 1' is executed.

**Failure time for action 2:** If no ping replies are received within the above scope and in the time period defined here, then the 'Failure action 2' is triggered ('Radio module restart' in this example).

**Failure action 2:** If the 'Failure time for action 2' is exceeded then 'failure action 2' is triggered ('Radio module restart' in this example)

**Failure grace time 2:** Interface activity will be ignored during the grace time after 'failure action 2' is executed.

**Failure time for action 3:** If no ping replies are received within the above scope and in the time period defined here, then the 'Failure action 3' is triggered (router 'Reboot' in this example).

**Failure action 3:** If the 'Failure time for action 3' is exceeded then 'failure action 3' is triggered (router 'Reboot' in this example in this example)

**Failure grace time 3:** Interface activity will be ignored during the grace time after 'failure action 3' is executed.

**NB:** Whenever two actions might trigger at the same time, the action with the longer period takes precedence. For example, if **failure time 1** is 30 seconds and **failure time 2** is 61 seconds, then **failure action 1** will trigger at 30 seconds after the interface failure and again at 60 seconds, but at 61 only **failure action 2** will trigger and so on. Which is why in this example failure timings are multiples of each other plus 1 second for each.

**Revision History**

Revision	Rev by	Revision Notes	Date
00	GJM		06/01/2025
01			
02			
03			
04			
05			
06			
07			