Emu Router

User Manual

Rev: V0.7

30th June 2016

Revision History:

Date	Rev No.	Description	By
8-2-2016	V0.1	Initial draft	ConnectedIO
9-4-2016	V0.2	Change GUI to Luci2 and add Modem page	ConnectedIO
19-4-2016	V0.3	Modify Language Setting	ConnectedIO
07-06-2016	V0.4	Change Company Logo	ConnectedIO
30-06-2016	V0.5	Change IP address to default 192.168.45.1	ConnectedIO
16-07-2016	V0.6	Add Approvals and Certifications	ConnectedIO
10-08-2016	V0.7	Add Antenna Section	ConnectedIO

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1. Introduction

ConnectedIO Emu Router is a 4G router with full band offering LTE connectivity for M2M applications. The Emu router includes a 4G modem and an embedded host processor based on Mediatek MT7620A SoC. The 4G connectivity is made by an operator certified LTE module. The host platform provides Linux based embedded operating system and openwrt code base. This document provides instructions and basic operation guidelines for a Systems Administrator.

2. Hardware Model

Emu router provides the following hardware configurations:

Model Name	LTE Band (MHz)	UMTS/HSPA+ (MH)	Wi-Fi	Ethernet
ER1000-VZ	• B4: 1700 (UL)/2100 (DL) • B13: 700	• B4: 1700 (UL)/2100 (DL) • B13: 700	No	2 x 10/100/1000 Mbps
ER1000T-NA	• B2: 1900 • B4: 1700 (UL)/2100 (DL) • B5: 850 • B17: 700	• B2: 1900 • B5: 850	No	2 x 10/100/1000 Mbps
ER1000T-EU	• B3: 1800 • B7: 2600 • B20:800	• B1: 2100 • B8: 900	No	2 x 10/100/1000 Mbps

3. System Configuration

3.1. Initial IP Setup

The Emu Router Management GUI can be accessed through the Ethernet ports with the default IP address of 192.168.45.1.

To configure the Emu Router follow the following sequence:

- Connect the Ethernet cable between the computer and the Emu Router LAN port
- Setup the desktop as a static IP in 192.168.45.x domain or DHCP client to get IP from EMU Router
- Open a browser and type http://192.168.45.1 to start the settings

On login page, you can just click the Login icon to enter the GUI as shown in Figure 1. Default password is “password”, it is recommended that a new password be created under Web GUI System->Administration page.

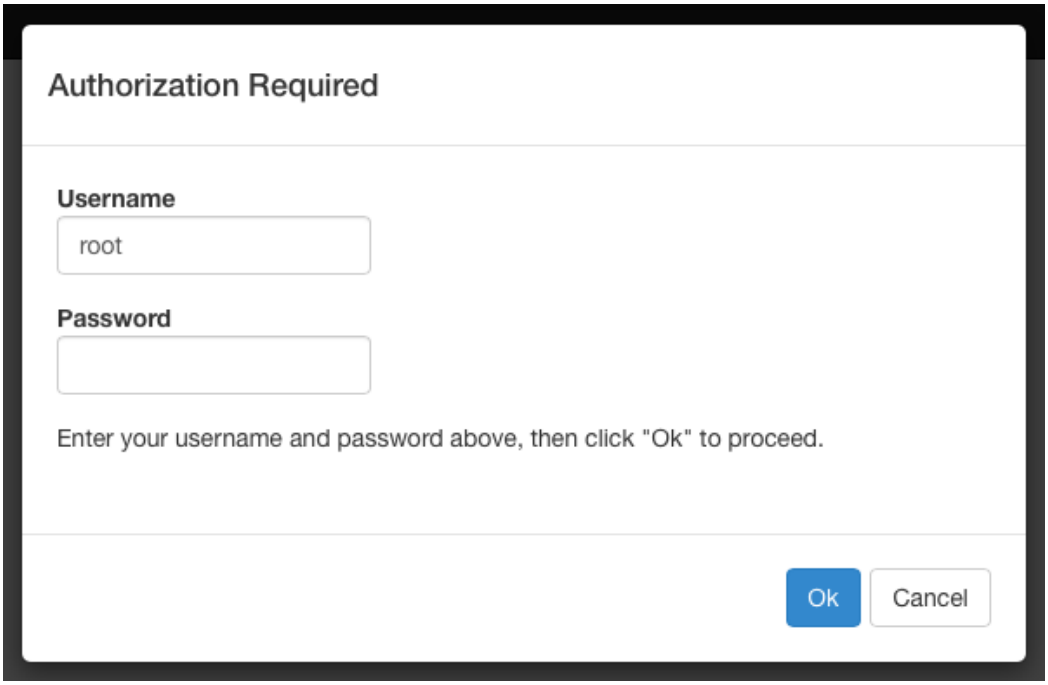

Figure 1: Login Page

You can see the EMU Router overview after login into GUI, the overview page includes important messages such as system status, and memory information as shown in Figure 2.

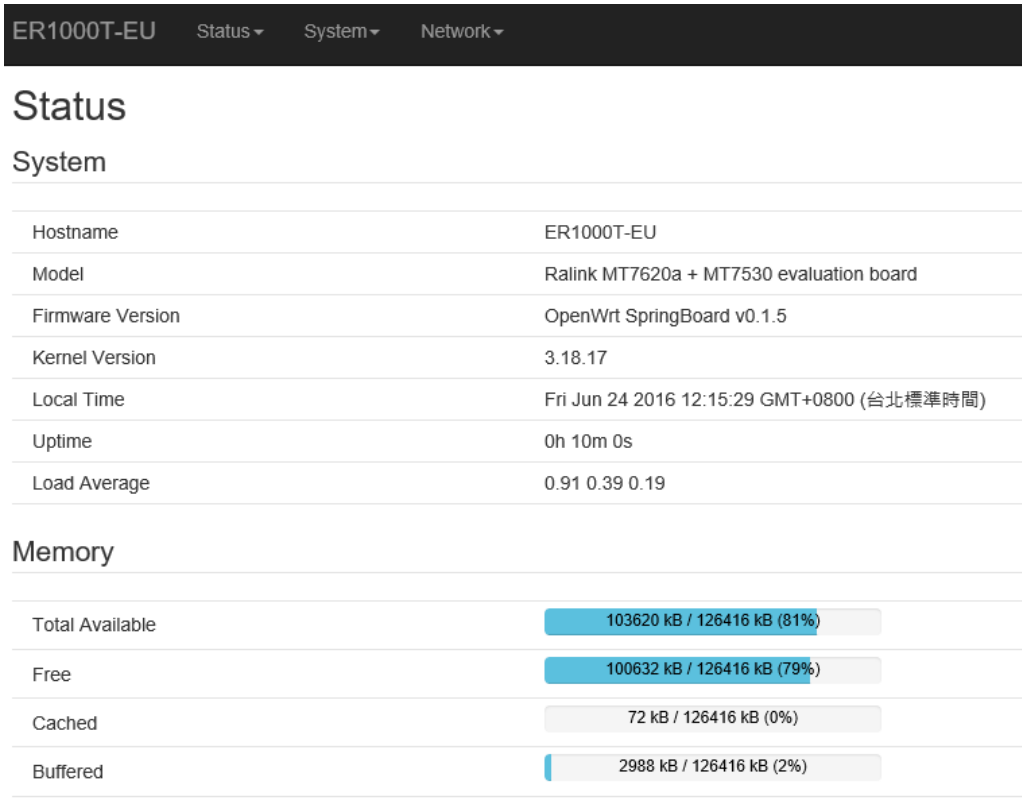

Figure 2: Overview Page

3.2. Setup New IP

Select Network->Interfaces as shown in Figure 3.

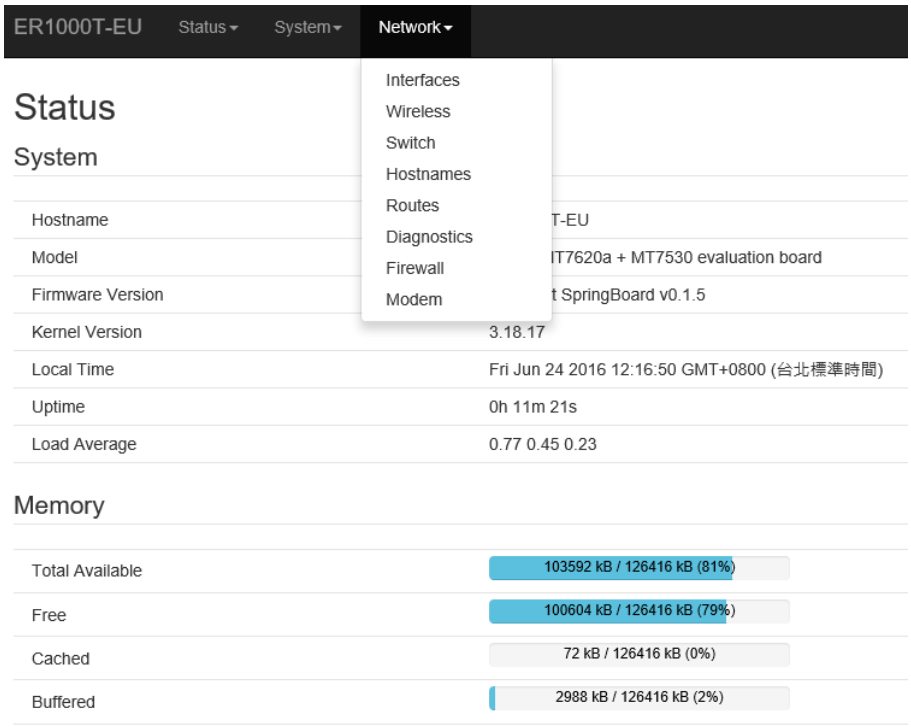

Figure 3: Network List

Select LAN and click “Edit” from Figure 4.

Figure 4: Interface Overview

Enter the new IP address in the “IPv4 address” filed, and then click the “Change” icon in the bottom-right corner in Figure 5.

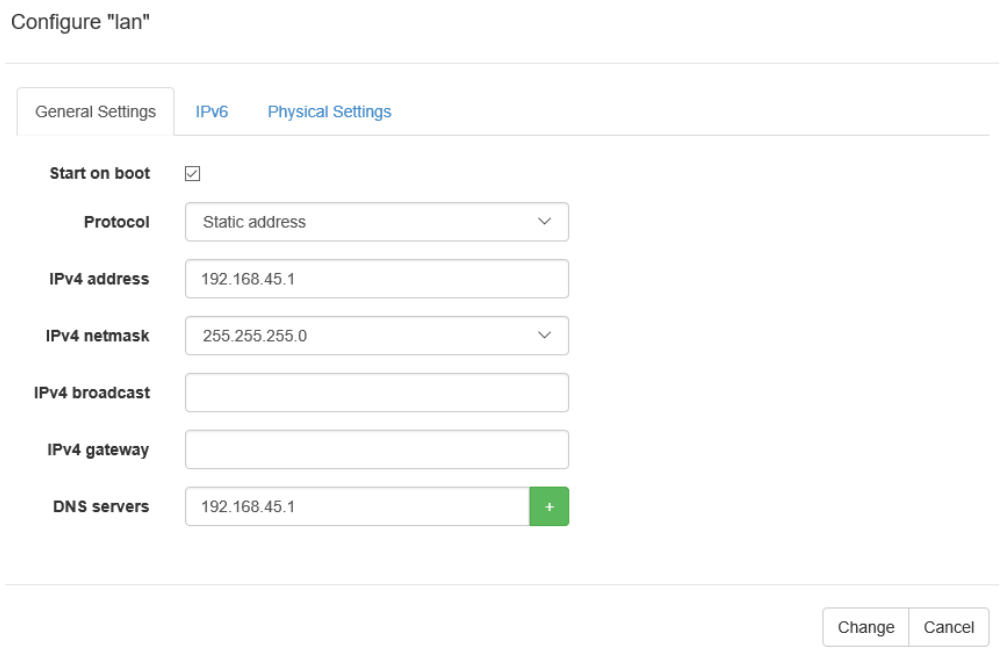

Figure 5: New IP Address for LAN

After setup new IP, the GUI will return to “Interface Overview”, you have to press “Apply” in the upper right corner as shown in Figure 6.

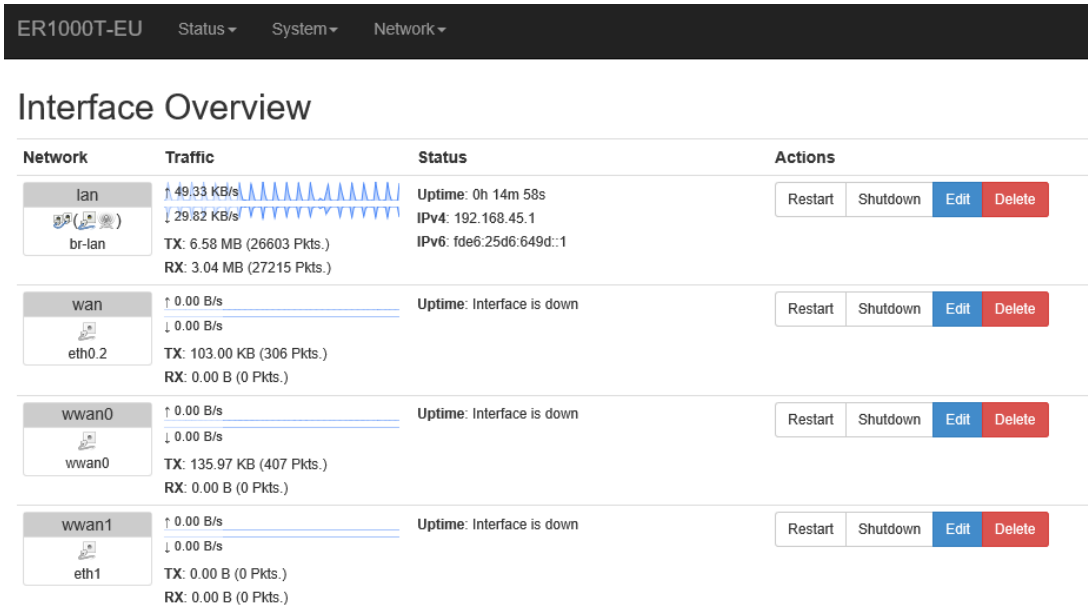

Figure 6: Save the New Setting

After pressing “Apply”, the system will show a confirmation window. Please see Figure 7.

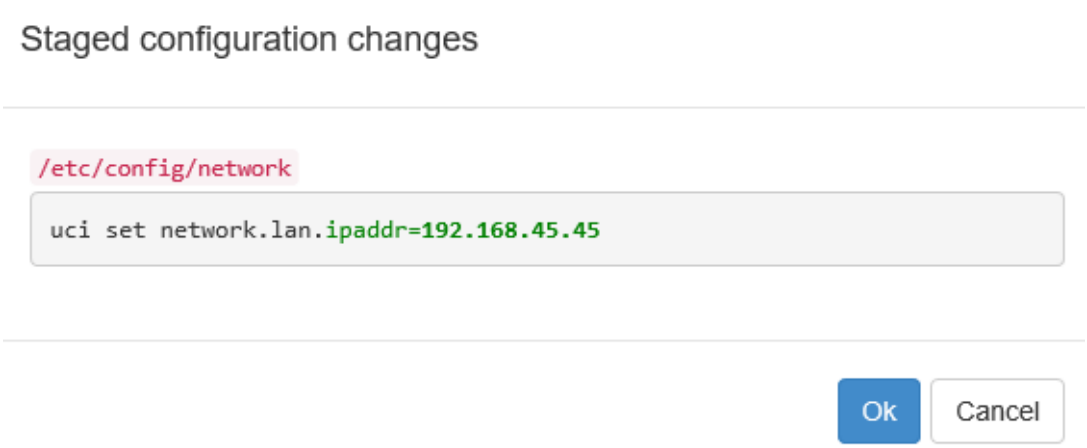

Figure 7: Configuration Change

3.3. Enable/Disable the DHCP Server on LAN Interface

[N.A]

4. System Maintenance

This chapter describes how to back-up the current EMU Router configuration to your computer, and how to restore that same configuration at a later date if needed. This can be done by selecting System > Backup/Upgrade:

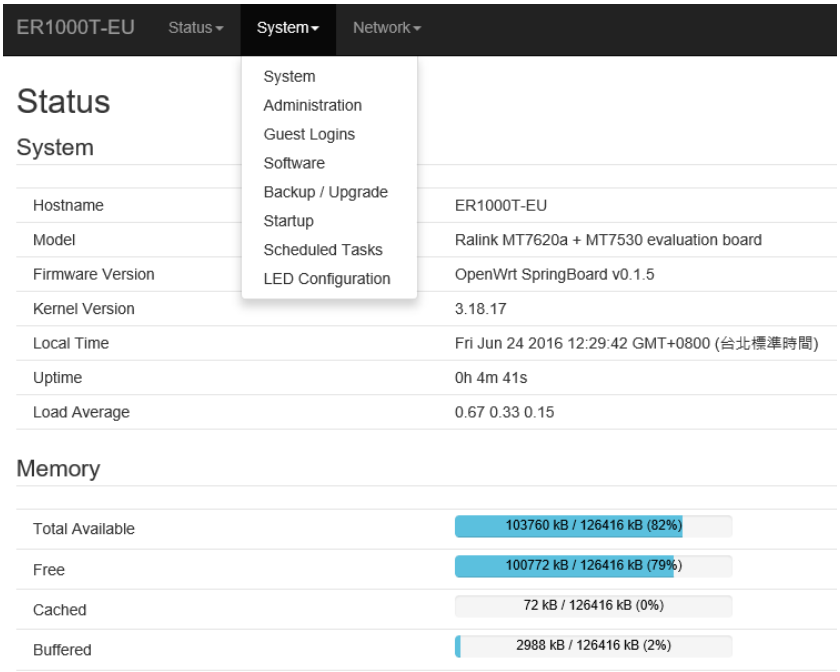

Figure 8: System List

4.1. Backup the Configuration

Select Firmware in the GUI page then click the icon “Generate archive” to save this configuration file in the folder you specified.

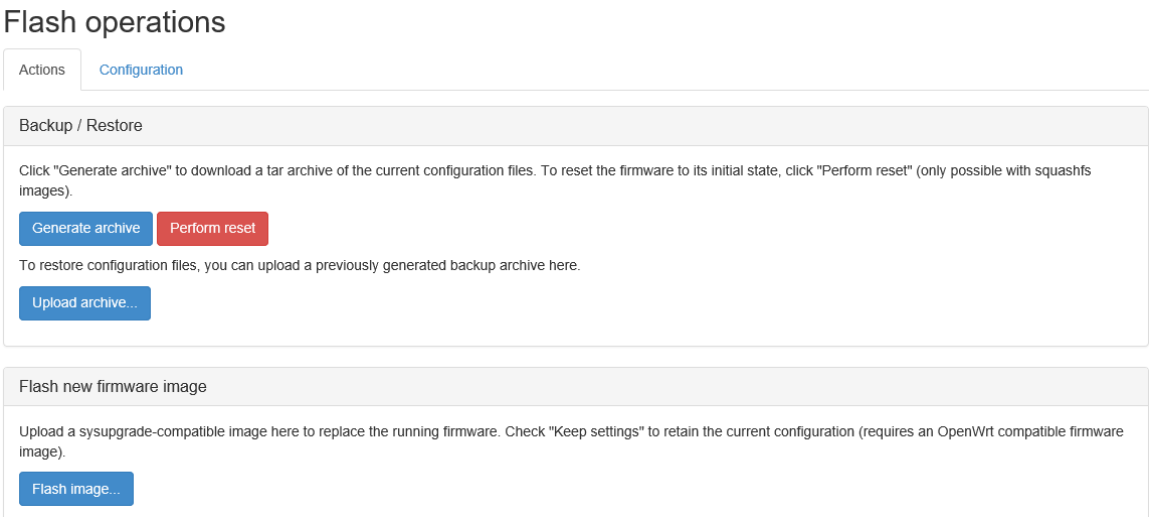

Figure 9: Backup the Configuration

The file is in tar.gz format, we suggest that you can rename it to a meaningful file name.

4.2. Restore the Configuration

Click the icon “Update archive” in flash operations page as shown Figure 10. Device will write the stored configuration back to flash then reboot the system.

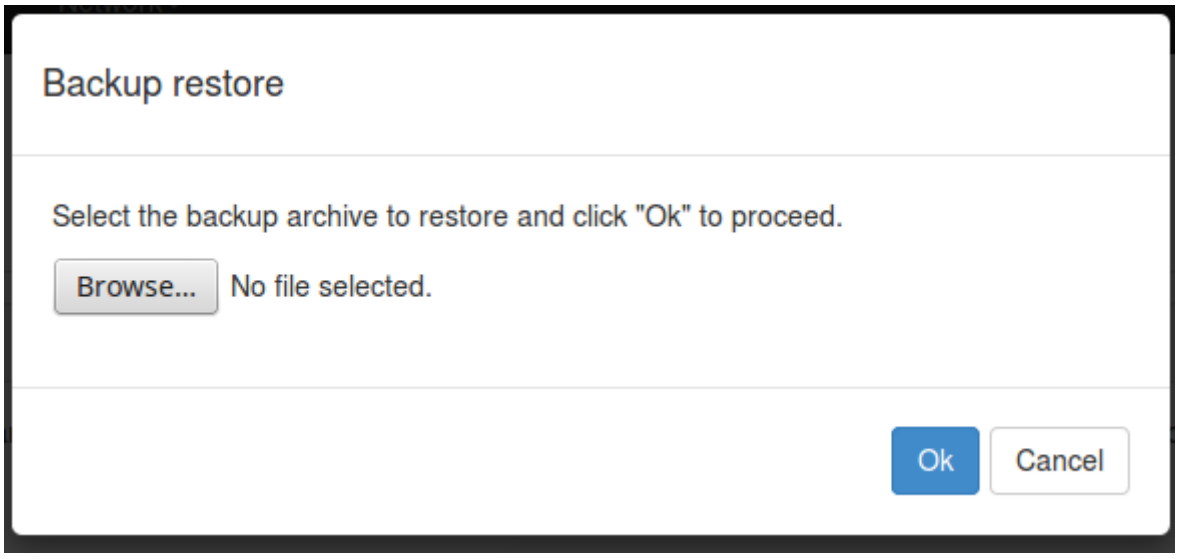

Figure 10: Restore the Configuration

4.3. Reset to Factory Default under Web GUI

Click the icon “Perform reset”, a warning window will pop-up saying “Really reset all changes?” The device will reset to factory default and reboot if “Yes” is chosen.

NOTE: It is important NOT to power off the device before the entire process is completed.

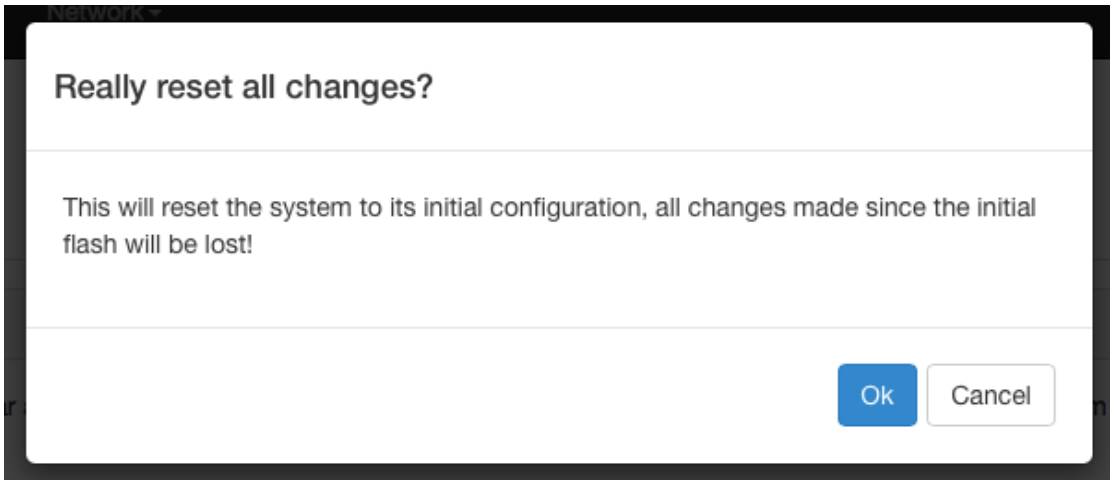

Figure 11: Reset to Default

4.4. Firmware Upgrade

Select System from web GUI, and find “Flash image” section. Click the icon

“browse” and select the new image that you want upgraded to the device.

The upgrade process may take longer than 10 minutes for flashing and rebooting. It is important NOT to power off the device during the process. Administrators can PING the device after the upgrade process is completed to ensure that the device is programmed and rebooted successfully.

Figure 12: Firmware Upgrade

After upgrading the new FW, check if the FW version is correct. This can be done by selecting Status-> Overview, and find the “Firmware Version” field.

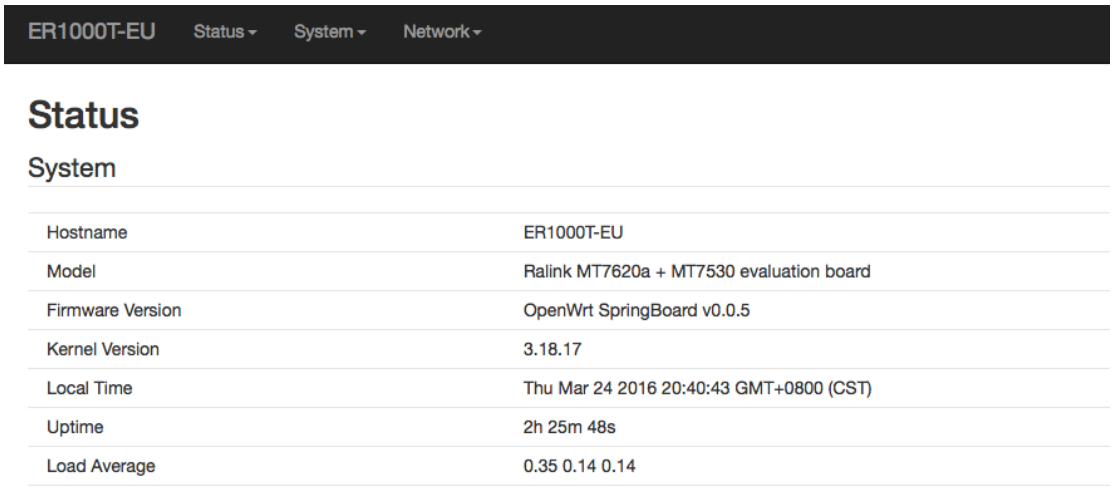

Figure 13: New Firmware Version

5. Modem

Select Network -> Modem as shown Figure 14.

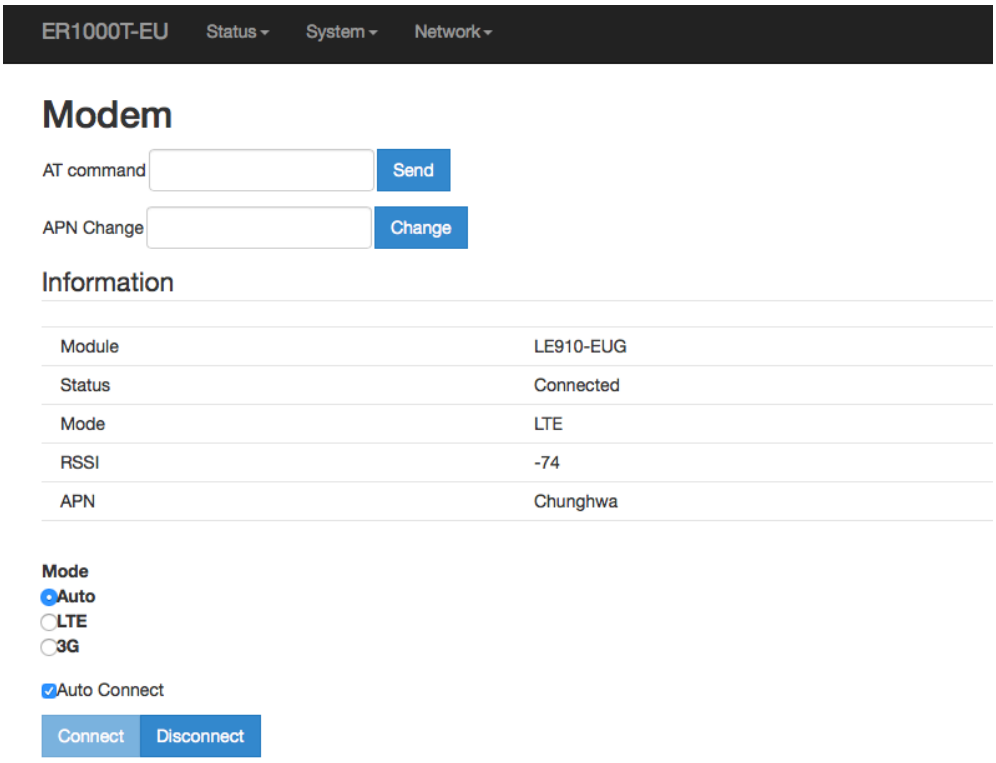

Figure 14: Modem Page

5.1. AT Command

You can use the AT command to check the LTE status. The AT command format is “AT+ Command” for example: AT+CSQ. Enter the AT command and click “Send”.

AT command responses will be displayed in the message bar right below the command as shown in Figure 15.

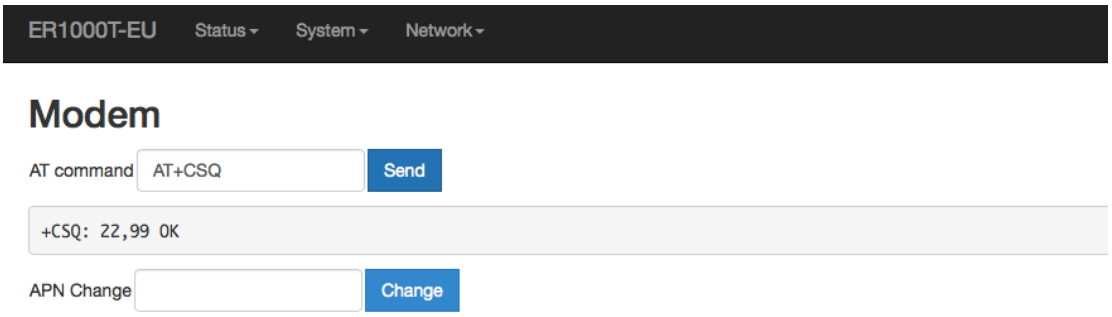

Figure 15: AT Command Example

5.2. APN Change

Typically, your APN is auto-configured or auto-detected. The APN Change command allows you to change the local telecommunication company. Enter the APN name and click “Change” button as shown in Figure 16.

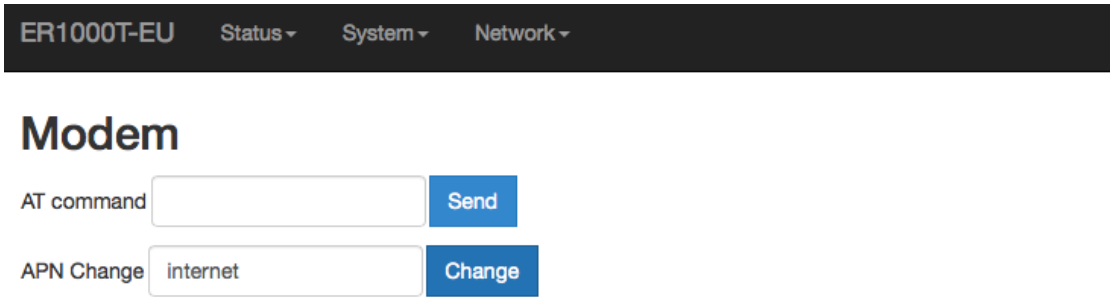

Figure 16: APN Change

If you would like to check whether the APN setting is successful, pleases enter AT command “AT+CGDCONT?” See Figure 17.

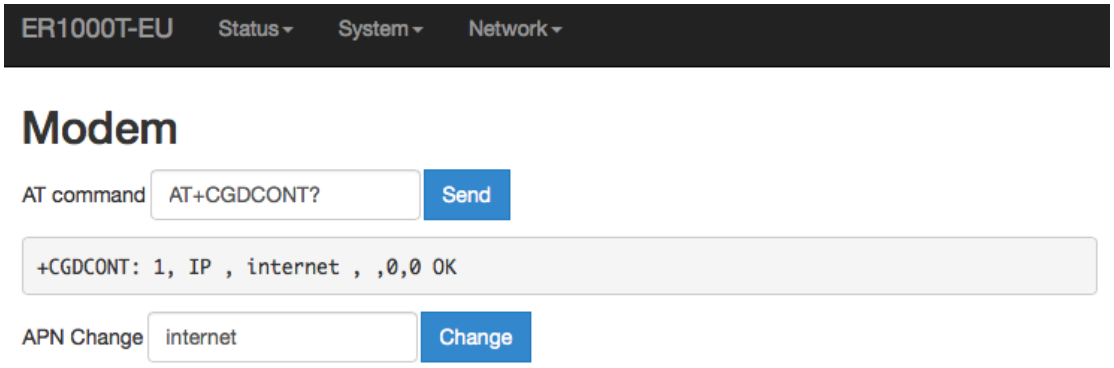

Figure 17: Check APN Function

5.3. Mode Setting

EMU Router supports the switching between 3G and LTE modes. We suggest that you should choose Auto mode for most of the applications. In Auto mode the system will automatically coordinate between different modes.

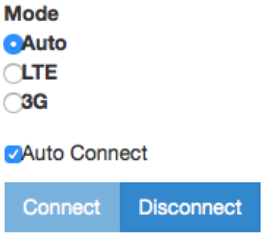

Figure 18: Mode Change

6. LOG

6.1. System LOG

Select Status -> System Log

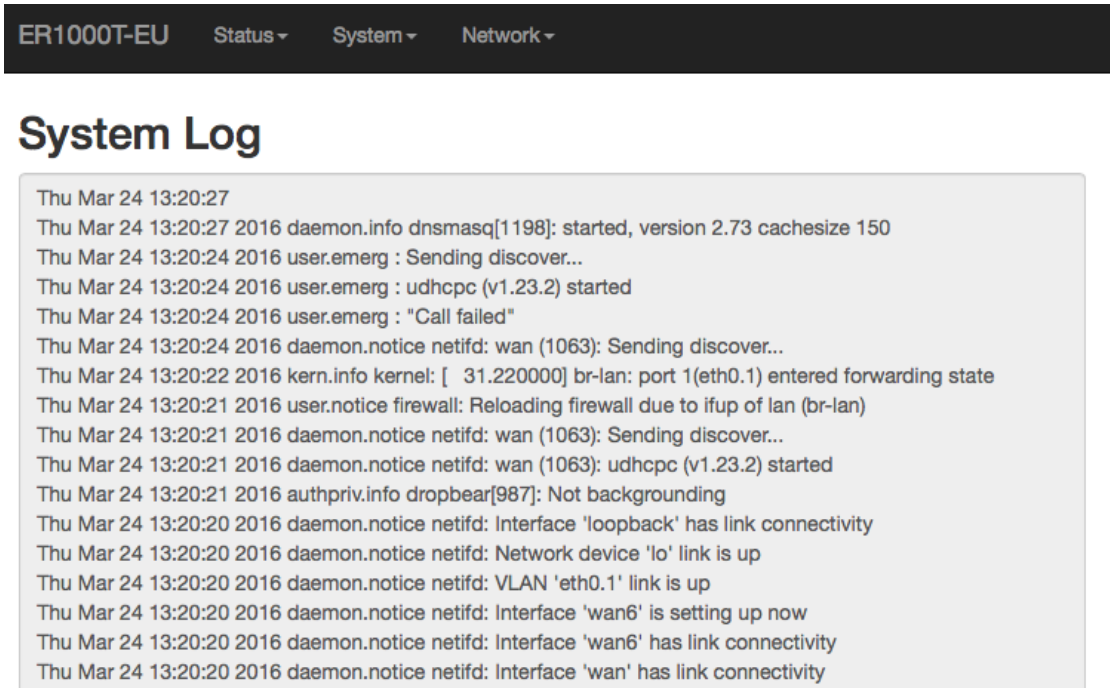

Figure 19: System Log

6.2. Kernel LOG

Select Status -> Kernel Log

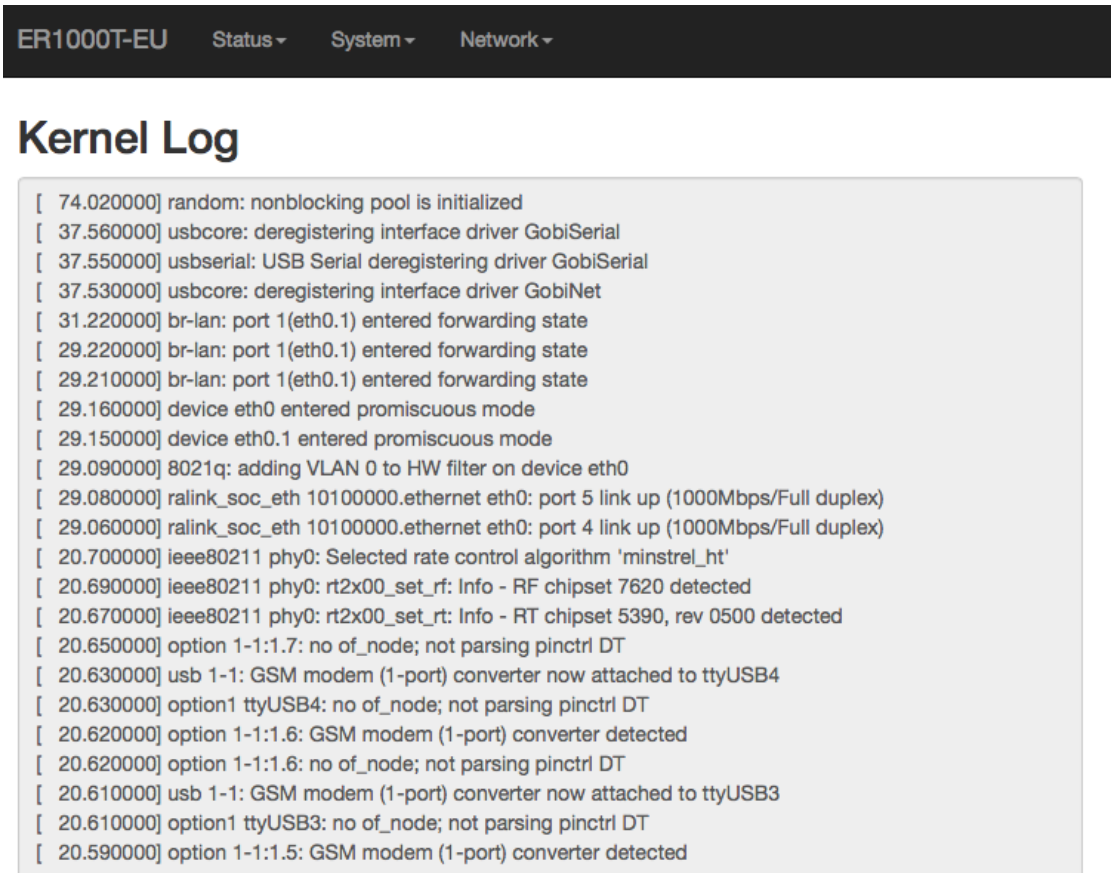

Figure 20: Kernel Log

7. Antenna

7.1. Antenna – Installation Guidelines

When installing the antenna to the ER1000 product line there are a number of items to consider so good antenna performance can be maintained.

- Install the antenna in a place covered by the LTE signal.
- Antenna must not be installed inside a metal case.
- Antenna shall also be installed according to the Antenna manufacturer instructions.
- Antenna integration should optimize the Radiation Efficiency. Efficiency values >50% are recommended on all frequency bands for any antennas selected.
- Antenna integration should not dramatically perturb the radiation pattern. It is preferable to get, after antenna installation, an omnidirectional radiation pattern for the best overall coverage.
- Antenna Gain must not exceed values indicated in the regulatory

requirements in order to meet related EIRP limitations.
    - Typical antenna Gain in most M2M applications should not exceed 2dBi.
- At least 20cm of separation distance between the antennas, the collocated router transmitters, and the human body must be maintained at all times.

7.2. Maximum Antenna Gain

This equipment complies with the FCC and IC radiation exposure limits set forth for an uncontrolled environment. The antenna should be install and operated with a minimum distance of 20cm between the radiator and the human body.

Antenna gain must not exceed the limits in the following table:

Frequency Band	ER1000-VZ	ER1000T-NA
700 MHz	6.0 dBi	8.0 dBi
850 MHz	N/A	6.0 dBi
1700 MHz	6.0 dBi	5.0 dBi
1900 MHz	3.0 dBi	2.5 dBi

7.3. Recommended Antennas

To aid in selecting an antenna for this router device the following antennas are recommended as functional and meeting the requirements for most M2M applications.

- PCTel Inc., Portable Omnidirectional Antenna, P/N: MHWS6982700SMA
    - 700-960/1575-2700MHz Dipole, 1-4dBi Gain with SMA Articulating Plug
- Cortec Technology Inc., Omnidirectional Antenna, P/N: AN0727-90E01BSM
    - 704-960/1710-2700MHz Dipole, 1-2.5dBi Gain with SMA Articulating Plug
- Pulse Electronics Corp., PulseLarson Antennas, Omnidirectional Antenna, P/N: SPDA24700/2700
    - 698-960/1710-2170/2500-2700MHz Dipole, 2dBi Gain with SMA Articulating Plug

8. Environmental

8.1. Operating Environment

- Operating Temperature: -20°C to +55°C
- Storage Temperature: -20°C to +125°C

8.2. Physical Parameters

- Size: 84mm x 77mm x 17.8
- Weight: 60gr.

9. Approvals and Certifications

9.1. Manufacturing

- RoHS Compliant

9.2. North American Certifications

9.2.1. ER1000-VZ & ER1000T-NA

- FCC Compliance
  - This device Complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions. (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- Canada
  - Complies with ICES-003:2016 Issue 6, Class A
  - **CAN ICES-3 (A) / NMB-3 (A)**

9.2.2. ER1000T-NA

- PTCRB

9.3. European Certifications

9.3.1. ER1000T-EU

- TBD

========== End of Document ==========

11.