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Teltonika RUTX device: Modem Firmware Recovery

THE MSDLL'S NOTEBOOKS

Teltonika RUTX device: Modem Firmware Recovery

Unreachable Modem Issue

Draft v 0.1

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Procedure to recover a Quectel modem in a Teltonika RUTX router by forcing the firmware flash

Waiver of Liability

By following the instructions provided in this guide for recovering a Quectel modem in a Teltonika RUTX router by forcing a firmware flash, you acknowledge and agree to the following terms:

1. **No Responsibility**: The author and any associated parties are not responsible for any damage, loss of data, or any other issues that may arise from following these instructions. This includes, but is not limited to, hardware damage, software corruption, or loss of functionality.
2. **Assumption of Risk**: You understand that flashing firmware carries inherent risks. You assume full responsibility for any consequences that may result from performing the steps outlined in this guide.
3. **No Warranty**: The instructions are provided "as is" without any warranties, express or implied. There is no guarantee that the procedure will successfully recover the modem or that it will not cause further issues.
4. **Expertise Required**: This procedure is intended for advanced users with experience in networking and firmware updates. If you are not confident in your ability to perform these steps, it is recommended that you seek assistance from a qualified professional.
5. **Scope:** This procedure is intended for use only on devices that are non-functional and not covered by any warranty. It should be attempted only after professional repairs have been tried and proven unsuccessful.
6. **Indemnification**: You agree to indemnify and hold harmless the author and any associated parties from any claims, damages, or expenses arising from your use of the instructions provided.

By proceeding with the firmware update, you acknowledge that you have read, understood, and agreed to this waiver of liability.

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Preface

Quectel modems, are known for their reliability and robustness. However, there are instances where something goes wrong during the upgrade procedure of the modem firmware, leading to a not working modem. This guide aims to provide a comprehensive, step-by-step procedure to try to recover your Quectel modem by forcing a firmware flash.

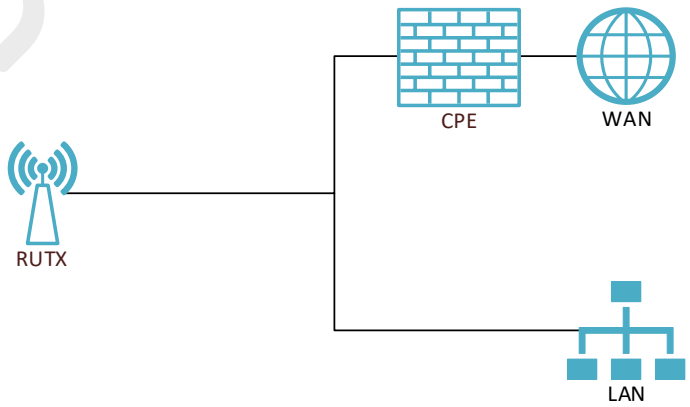
This process is designed for advanced users who are familiar with IT networking concepts and have experience in handling firmware updates. It involves accessing the router's command line interface (CLI) and executing specific commands to ensure the modem firmware is correctly forcibly flashed. Please note that this procedure carries inherent risks, including the potential for irreversible damage to the modem if not executed correctly. Therefore, it is imperative to follow each step meticulously and ensure that your device remains powered and connected throughout the process.

By following this guide, you will be able to restore your Quectel modem to its optimal state, ensuring reliable and efficient network performance. Let's embark on this technical journey to bring your Teltonika RUTX router back to its peak functionality.

Note: This procedure is intended for use only on devices that are non-functional and not covered by any warranty. It should be attempted only after professional repairs have been tried and proven unsuccessful.

Topology reference

Forced flashing should be performed within a network topology similar to the one shown below. Ensure that the RUTX device has an active wired connection to the WAN through another CPE (Customer Premises Equipment).



Network Topology Reference

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Essentials

Before starting, we need to contact Teltonika support to inquire about the latest recommended modem firmware release for the selected RUTX model. If you cannot access the VIP Helpdesk, you may use one of the following methods:

Teltonika Support	
Teltonika Networks (Contact Us Form)	https://teltonika-networks.com/about-us/contacts
Teltonika Community (Sign Up Required)	https://community.teltonika.lt/

As of August 16, 2024, the following modem firmware releases are available via FOTA from Teltonika:

- EG06ELAR04A**20**M4G
- EG06ELAR04A07M4G
- EG06ELAR04A04M4G

As of August 16, 2024, Quectel has released several new modem firmware updates. The most recent firmware update was made available on July 16, 2023.

- EG06ELAR04A**23**M4G
- EG06ELAR04A22M4G
- EG06ELAR04A21M4G

It is advisable to use the firmware release recommended by Teltonika or one available via FOTA, as these versions are expected to have undergone some degree of testing before being rolled out on RUTX devices.

You can request the selected firmware release from Quectel through their official forum:

Quectel Support	
Quectel Forum (Sign Up Required)	https://forums.quectel.com/

Verify modem unreachability

To check if the modem is unreachable, you can use both Linux commands and *gsmctl* commands by following the steps shown below.

1. **Access the Command Line Interface**
   - From the Web console of your RUTX device, or
   - Through SSH.

2. **Execute the following command**

Linux command
*root@rutx:~# **opkg list | grep -e modem_updater***

This command will display and filter the list by searching for the pattern *modem_updater* in the package name or its description.

3. **Check the output**

- If the package is available, an output similar to the one shown below will be displayed:

Example output
root@rutx:~# opkg list | grep -e modem_updater *modem_updater - 7.1.1 - Modem firmware update tool by Teltonika* *root@rutx:~#*

- If the package is available, execute the following command to retrieve any available updates:

Linux command
*root@rutx:~# **opkg update modem_updater***

4. **Handle missing package**

- If the package is not installed and you execute the command *modem_updater,* the following error message will be returned: *Unknown package 'modem_updater'*.
- To install the package *modem_updater*, execute the following command:

Linux command
*root@rutx:~# **opkg install modem_updater***

⚠ If the error *'Unknown package: modem_updater'* is returned, it can be fixed by running the command *opkg update* before executing *opkg install modem_updater*. The command *opkg update* ensures that you have the latest information about what packages can be installed or updated.

5. **Enumerate detectable modem(s)**

- Once installed, you can execute the following command:

Linux command
*root@rutx:~# **modem_updater -g***

The command *modem_updater -g* will list all detectable modems installed in the RUTX device. If a modem is not detected on a RUTX device with a single modem, or one or both modems are not detected on a RUTX device with dual modems, it indicates that the modem is not correctly recognized. In such cases, it may be necessary to forcibly flash the firmware.

6. Findings validation

To validate the findings of the *modem_updater*, use the following command:

Linux command
root@rutx:~# ***ll /dev/ttyUSB****

- For a RUTX device with a single modem, if fewer than four USB-serial ports exist, or
- For a RUTX device with a dual modem, if fewer than eight USB-serial ports exist,

it indicates that the modem is not correctly recognized. In such cases, it may be necessary to forcibly flash the firmware.

The command *ll /dev/ttyUSB** lists all active USB-serial ports. Below is the output of this command executed on a RUTX device with fully functional modem(s):

Single modem's example output (4-port)	Dual modems' example output (8-port)
crw-rw---- 1 root dialout 188, 0 Aug 16 22:01 /dev/**ttyUSB0** crw-rw---- 1 root dialout 188, 1 Aug 16 22:01 /dev/**ttyUSB1** crw-rw---- 1 root dialout 188, 2 Aug 17 16:16 /dev/**ttyUSB2** crw-rw---- 1 root dialout 188, 3 Aug 16 22:01 /dev/**ttyUSB3**	crw-rw---- 1 root dialout 188, 0 Aug 16 22:01 /dev/**ttyUSB0** crw-rw---- 1 root dialout 188, 1 Aug 16 22:01 /dev/**ttyUSB1** crw-rw---- 1 root dialout 188, 2 Aug 17 16:16 /dev/**ttyUSB2** crw-rw---- 1 root dialout 188, 3 Aug 16 22:01 /dev/**ttyUSB3** crw-rw---- 1 root dialout 188, 4 Aug 16 22:01 /dev/**ttyUSB4** crw-rw---- 1 root dialout 188, 5 Aug 16 22:01 /dev/**ttyUSB5** crw-rw---- 1 root dialout 188, 6 Aug 17 16:16 /dev/**ttyUSB6** crw-rw---- 1 root dialout 188, 7 Aug 16 22:01 /dev/**ttyUSB7**

7. Further validation

Further validation can be performed using the *gsmctl* command with the *-m* option to identify the modem's device model. Additionally, the auxiliary *-N* option allows selection of the modem(s). The auxiliary *-N* option can select modems within the range of 0-12

As of August 16, 2024, for Teltonika RUTX devices, the only necessary options are *0* for a single modem device and *0* and *1* for a dual modem device.

gsmctl command	
root@rutx:~# ***gsmctl -m -N 0***	Internal/Primary modem
root@rutx:~# ***gsmctl -m -N 1***	Secondary modem

In the example output below from a dual modem RUTX device, the Secondary Modem is not correctly recognized. In such cases, it may be necessary to forcibly flash the firmware.

Example output
root@rutx:~# gsmctl -m -N 0 *EG06-E* *root@rutx:~# gsmctl -m -N 1* ***ERROR: Couldn't retrieve data*** *root@rutx:~#*

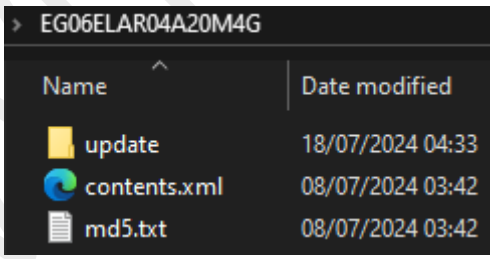
Media preparation

Once you have identified and obtained the recommended firmware release, the USB flash drive can be prepared as follows:

1. **Format the USB Flash Drive**
    - The RutOS running on Teltonika RUTX devices supports various file systems, including FAT, FAT32, exFAT, NTFS (read-only), ext2, ext3, and ext4.
    - **exFAT** is the recommended file system due to its high compatibility. It is supported by a wide range of operating systems, including Microsoft Windows, Apple macOS, and Linux, making it a versatile choice for devices that may need to be used across different platforms.

2. **Prepare the USB with Firmware**
    - Decompress the zip archive containing the firmware.
    - Remove any PDF files included in the unzipped folder.
    - Plug the USB flash drive into the USB port at the back of the RUTX device.

The directory structure of the USB flash drive containing the modem firmware EG06ELAR04A20M4G is shown below:



Directory Structure

Flashing modem firmware

To flash the modem firmware, follow the steps shown below.

1. **Access the Command Line Interface**
    - From the Web console of your RUTX device, or
    - Through SSH.

2. **Execute the following command**

Linux command
root@rutx:~# ***modem_updater -i <MODEM_N> -p /mnt/sda1/<FIRMWARE_VERSION> -f***

The *modem_updater* command is designed to check for and apply firmware updates to modem(s) connected to the RUTX device. This is crucial for ensuring that the modem operates with the latest features, security patches, and performance improvements.

The auxiliary option *-i* specifies the modem USB ID (eg.: 1-1, 3-1 etc.). The reference table below shows the possible USB IDs for the Internal, Primary and Secondary Modems installed on the RUTX series. It is recommended to validate the relevant USB ID(s) with Teltonika support before proceeding.

Model	Primary Modem USB ID	Secondary Modem USB ID	Internal Modem USB ID
RUTX50	-	-	2-1
RUTX14	-	-	1-1
RUTX12	3-1	1-1.2	-
RUTX11	-	-	3-1
RUTX10	-	-	?
RUTX9	-	-	3-1

The option -p specifies a custom firmware path. The USB connected to the Teltonika device would be mounted with the path */mnt/sda1/*, which refers to the first partition of the first flash drive.

The auxiliary option *-f* forces the upgrade without extra validation (USE AT YOUR OWN RISK).

Below is an example command to forcibly flash the modem firmware *EG06ELAR04A20M4G* to the Secondary Modem of a RUTX12 device.

Linux command example
root@rutx:~# ***modem_updater -i 1-1.2 -p /mnt/sda1/EG06ELAR04A20M4G -f***

Flashing modem firmware verification

To check if the modem is now reachable with installed the proper firmware, you can use both Linux commands and *gsmctl* commands by following the steps shown below.

1. **Access the Command Line Interface**

   - From the Web console of your RUTX device, or
   - Through SSH.

2. **Enumerate detectable modem(s)**

- Execute the following command:

Linux command
*root@rutx:~# **modem_updater -g***

In the example output below from a single modem RUTX device, the Internal Modem is correctly recognized.

Example output
root@rutx:~# modem_updater -g *Modem List:* *[0] Quectel EG06-E | USB_ID: 3-1 | Firmware: EG06ELAR04A20M4G | builtin:true* *Available versions (highest version number first):* *EG06ELAR04A20M4G* *EG06ELAR04A07M4G* *EG06ELAR04A04M4G*

3. **Verify the current modem firmware**

- Execute the following command:

Linux command
*root@rutx:~# **gmsctl -y***

The command gsmctl -y is valid for a single modem RUTX device. In case of a dual modem RUTX device such as the RUTX12 you must use the auxiliary option *-O* or *-N* to specify the selected modem: *gsmctl -y -O 1-1.2* or *gsmctl -y -N 1*.

In the example output below from RUTX12 device, the current firmware for the Secondary Modem is *EG06ELAR04A20M4G*.

Example output
root@rutx:~# gsmctl -y -O 1-1.2 *EG06ELAR04A20M4G*

Conclusion

The modem firmware should now be successfully recovered, ensuring optimal performance and stability. If the forced update procedure did not succeed, please attempt the process again.

It is crucial to follow each step carefully to ensure the firmware is correctly installed. Should you encounter any further issues, reaching out to either Teltonika or Quectel technical support may provide additional guidance.