



CELLULAR INTEGRATION FOR FRONIUS INVERTER APPLICATION GUIDE

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Solar Energy / System & components

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1 INTRODUCTION

This document contains an overview of the application options for a cellular gateway in combination with Fronius inverters as well as a summary of the hardware requirements and details of the expected data volume. Fronius accepts no liability for the actual data volume.

In the following, Fronius describes the options for connecting to a cellular gateway. Fronius is not liable for costs which may arise from data transmission by the user via the mobile networks. Furthermore, Fronius is not responsible for the security of the data transmission via the mobile networks and is not liable for any damages which may occur therefrom.

1.1 Validity

This white paper covers the following inverter generations:

- / GEN24 inverter
- / Tauro inverter
- / SnapINverter generation (web server)
- / Symo Hybrid
- / Datamanager Box

2 HARDWARE

The gateway can be powered by the inverter (Primo GEN24, Symo GEN24 and Tauro) if it meets the following criteria:

- / Supply voltage: 12 V
- / Power consumption ≤ 6 W

An external power supply (Fronius power supply unit for Datcom and Datamanager Box) is recommended for devices with a Datamanager Card. If additional loads are connected (signal lamps, relays, etc.), their consumption must be taken into account in the performance measurement.

The communication between the gateway and inverter takes place via the LAN interface (Ethernet).

Attention: no communication via USB!

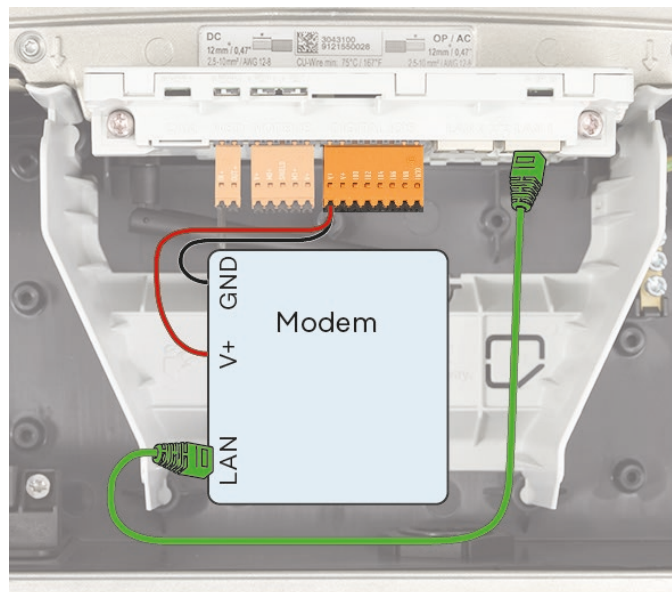
To guarantee reception, the antenna needs to be positioned outside the inverter. Depending on the gateway, a corresponding antenna cable extension may be necessary. It is important that there is a distance of at least 30 cm between the antenna and the metal housings.

Fronius has tested a range of gateways (the Teltonika TRB 140 gateway is used in the following as an example of a gateway that has passed all tests and is recommended by Fronius):

- / Ethernet interface
- / LTE Cat 4 with speeds of up to 150 Mbps
- / 9-30 VDC voltage input
- / Open VPN and IPsec
- / Embedded firewall
- / Mini SIM (2FF)
- / Management: RMS, FORA, SSH, CLI, SMS (status/configuration)
- / Operating temperature of -40 °C to 75 °C
- / Size (L x W x H): 70 x 60 x 18 mm
- / Weight: approx. 134 grams

The gateway is powered via the IO connector on the inverter at terminals "V+" and "GND". Communication is established via a CAT5 cable between the "Ethernet port" gateway and "Ethernet port" inverter ("LAN 1").

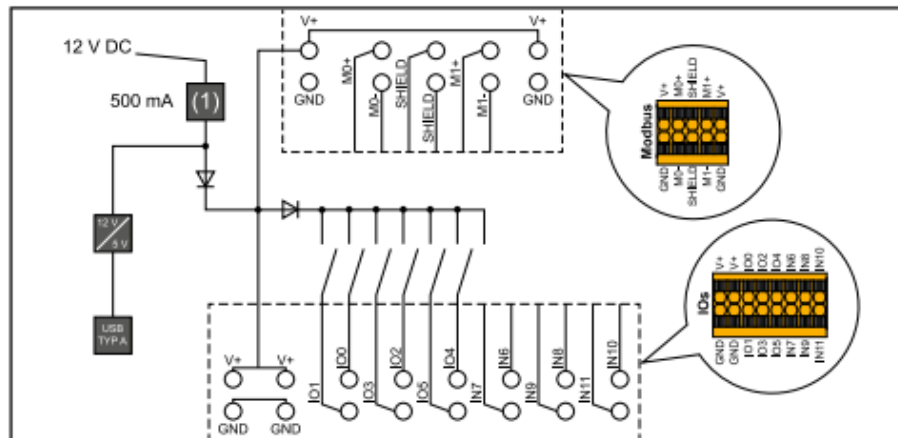
The figure below depicts the cabling of a gateway with a GEN24 inverter.



Connection diagram on the data communication interface of the inverter:

IMPORTANT!

If the total output (6 W) is exceeded, the inverter switches off the entire external power supply.



(1) Power limitation

The gateway can be installed both within the inverter's connection area and outside of it (**the specification of the gateway manufacturer's must be taken into account!**)

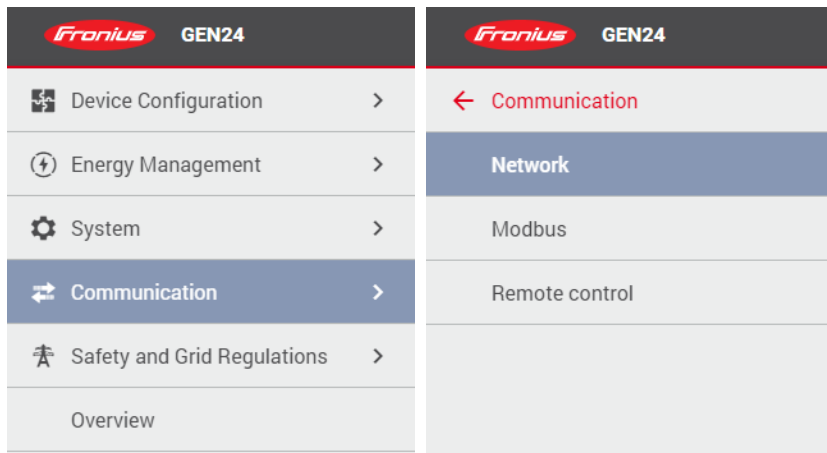
The installation process is similar when a gateway is being used with a SnapINverter – the LAN port of the inverter/Datamanager (LAN) is connected to the Ethernet port of the gateway. The power supply is provided via the terminals (+ / -). Further details can be found in the Fronius Datamanager 2.0 operating manuals.

3 SOFTWARE / CONFIGURATION

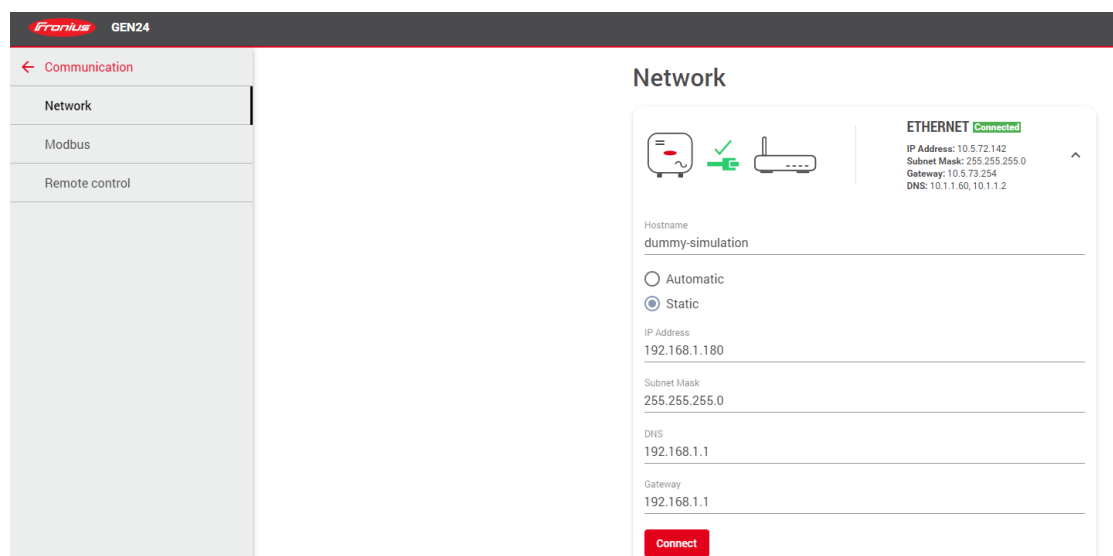
The configuration of the gateway at the inverter is identical to the network set-up of a "conventional" LAN connection::

3.1 For the GEN24/Tauro inverter

1. Open the access point of the inverter by actuating the sensor → right LED flashes blue
2. Connect to the access point
3. Open the browser and call up the user interface of the inverter by entering the IP 192.168.250.181
4. In the Communication tab of the user interface of the inverter → go to the tab network

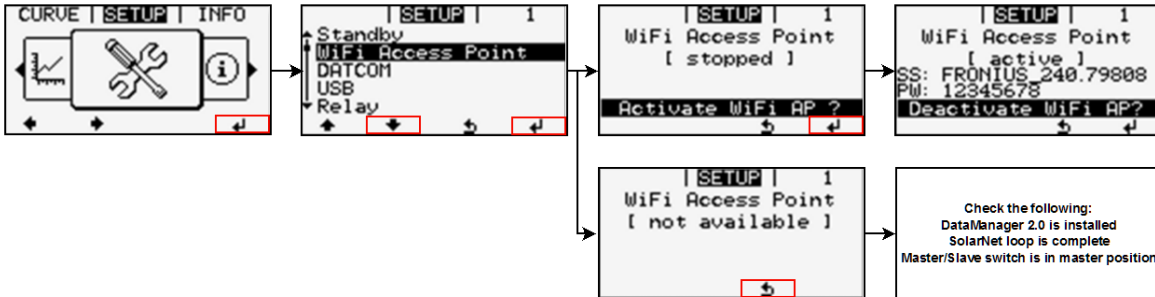


5. Click on LAN and apply the settings
6. Complete the configuration by clicking "Connect"

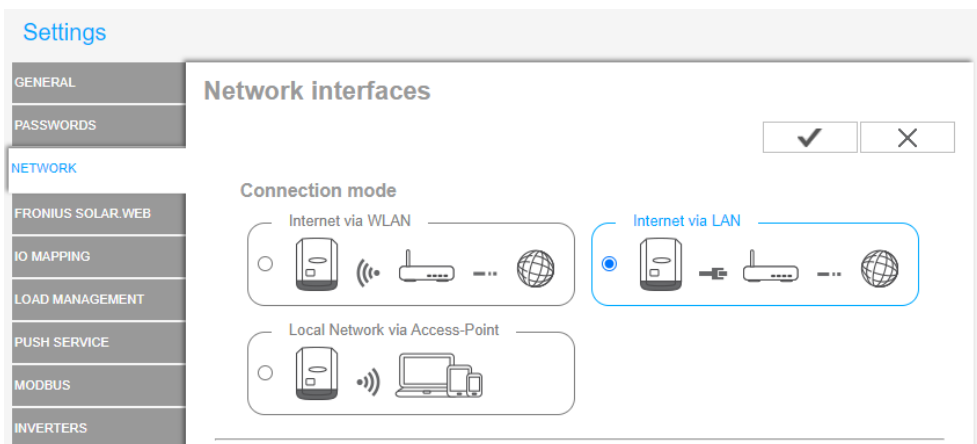


3.2 For the SnapInverter (web server), Symo Hybrid and Datamanager Box

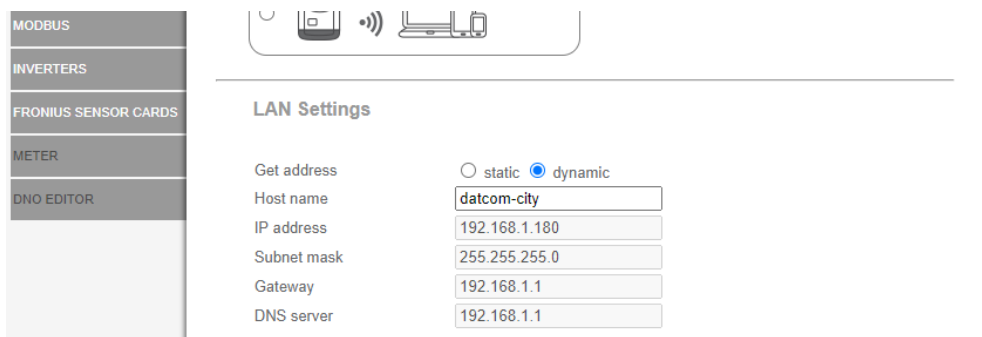
1. Activate access points



2. Connect to the access point
3. Open the browser and call up the Datamanager user interface of the inverter by entering the IP 192.168.250.181 in the address line.
4. Go to the Settings section of the user interface of the inverter → Click on Network



5. Click on Internet via LAN
6. Complete configuration under LAN settings.



7. Click on to save the applied settings.

3.3 Configuration TRB140

3.3.1 Login/password

Before the gateway is connected to the inverter, the configuration of the inverter has to be finalised in order to have internet connection during the setup process.

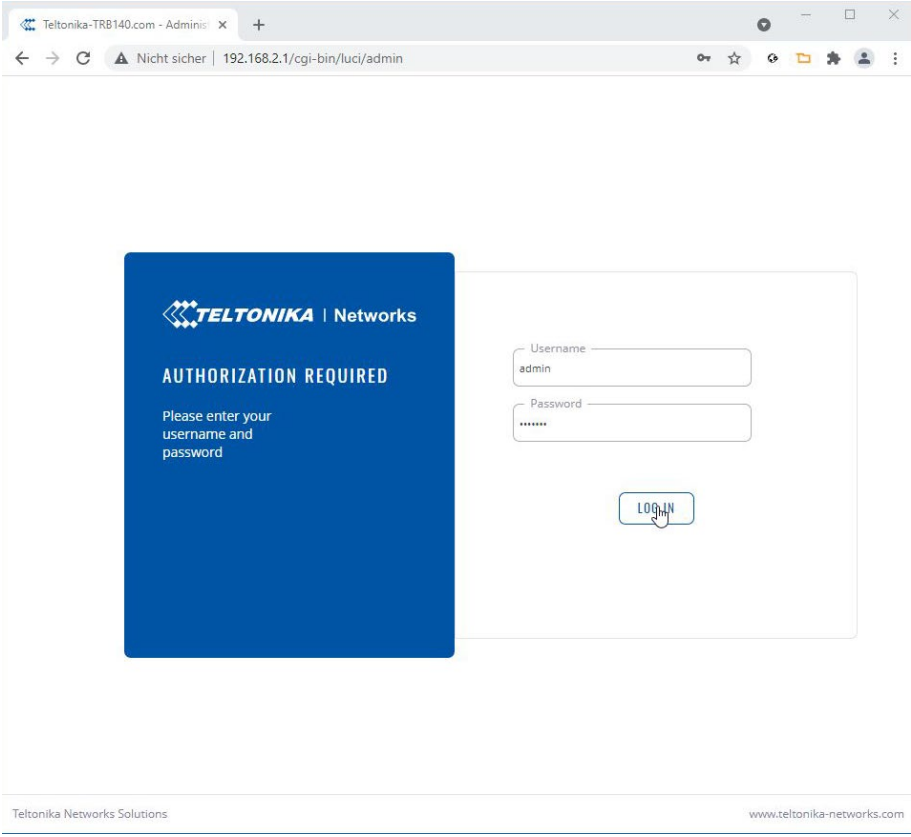
To configure the gateway, connect it to the network port of a computer. Then insert following data:

Gateway website: <http://192.168.2.1>

Standard login user: admin

Password: admin01

Info: A new password must then be created:



Teltonika-TRB140.com - Adminis: x

Nicht sicher | 192.168.2.1/cgi-bin/luci/admin

TELTONIKA | Networks

AUTHORIZATION REQUIRED

Please enter your username and password

Username
admin

Password

LOGIN

Teltonika Networks Solutions www.teltonika-networks.com

Teltonika-TRB140.com - Overview x +

Nicht sicher | 192.168.2.1/cgi-bin/luci/admin

TELTONIKA | Networks

32.75% CPU load

SYSTEM

ROUTER UPTIME
0h 1m 34s

LOCAL DEVICE TIME
2020-02-27, 21:27:25

MEMORY USAGE
RAM: 75.51% FLASH: 0.24%

FIRMWARE VERSION
TRB1_R_00.02.05.2

MODEM

DATA CONNECTION
Disconnected

STATE
Searching, N/A 3G (WCDMA)

SIM CARD INFO
PIN required, 3 attempts left.

BYTES RECEIVED / SENT
0 B / 0 B

LAN

TYPE
Wired (eth-usb)

SET NEW PASSWORD

You haven't changed the default password for this router.

Password requirements: 8-32 characters, at least one uppercase letter, one lowercase letter and one number.

SUBMIT

3.3.2 Gateway configuration

Set time zone and confirm LAN settings.

The screenshot shows the 'GENERAL SETTINGS' section of the configuration wizard. The current system time is 'Thu Feb 27 21:30:56 2020' with a 'SYNC WITH BROWSER' button. The time zone is set to 'Europe/Vienna'. The 'WEBUI MODE SETTINGS' section shows the mode set to 'Basic'. There are 'SKIP WIZARD' and 'NEXT' buttons at the bottom.

The screenshot shows the 'LAN CONFIGURATION' section of the configuration wizard. The IP address is '192.168.2.1' and the netmask is '255.255.255.0'. The 'DHCP CONFIGURATION' section has 'Enable DHCP' checked, with a start of '100', limit of '150', lease time of '12' hours, and units set to 'Hours'. There are '< BACK', 'SKIP WIZARD', and 'NEXT' buttons at the bottom.

The next step involves setting the right APN for the grid operator. SIM card PIN protection should also be activated. This prevents the SIM card from being used elsewhere.

The screenshot shows a web browser window with the URL `192.168.2.1/cgi-bin/luci/admin/system/wizard/step-wan`. The page title is "MOBILE CONFIGURATION | MOB1S1A1". The form contains the following fields:

- Auto APN: off
- APN:
- Custom APN:
- Authentication Type:
- Username:
- Password:
- PIN:

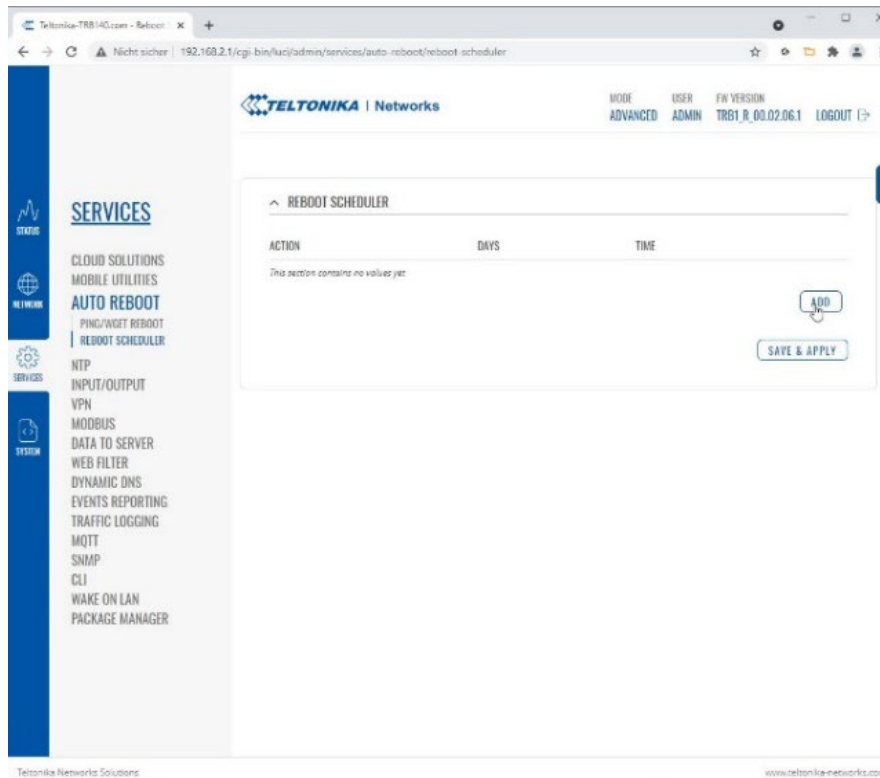
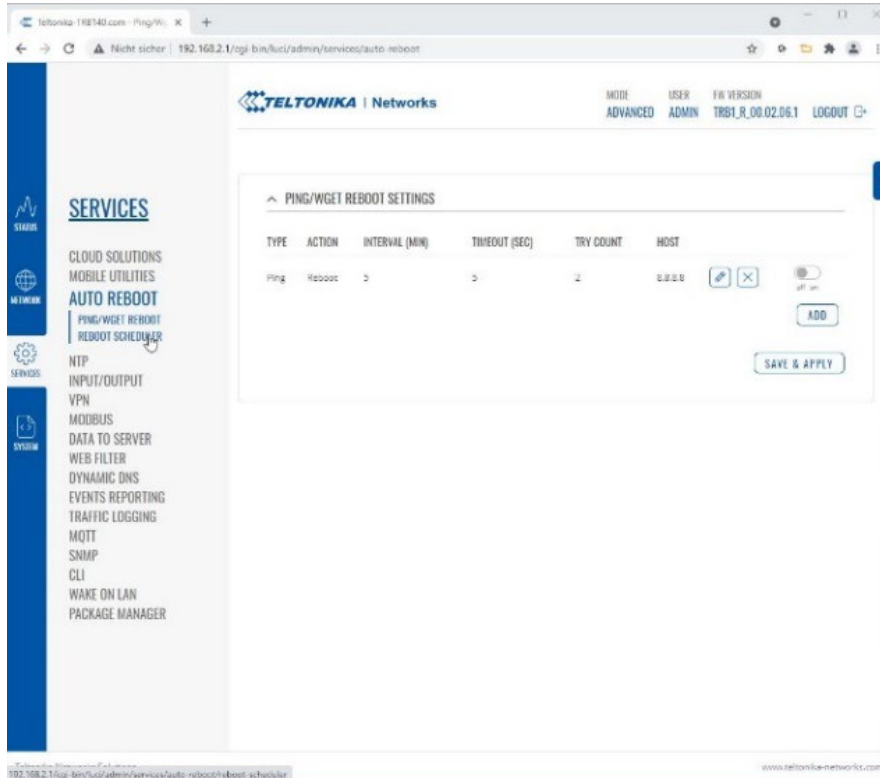
At the bottom of the form, there are three buttons: "< BACK", "SKIP WIZARD", and "NEXT". A mouse cursor is hovering over the "NEXT" button.

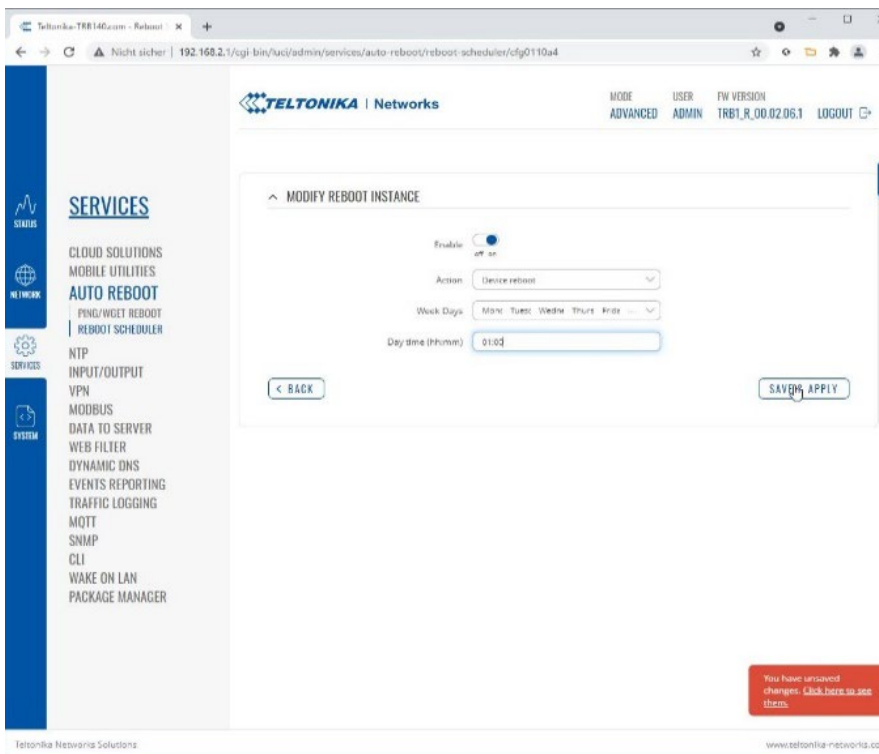
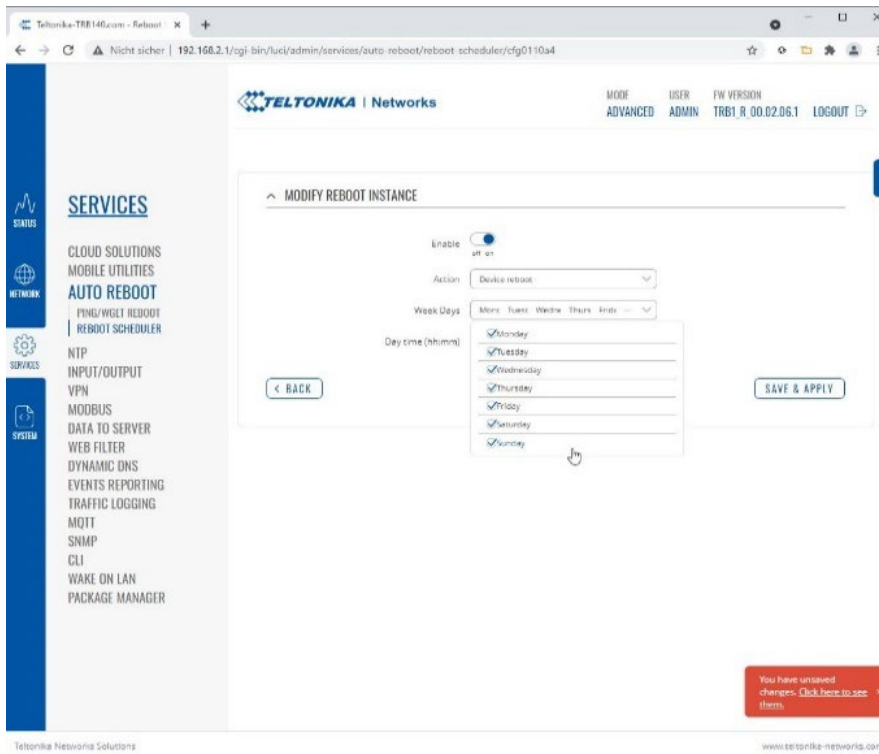
The setup wizard can now be closed.

3.3.3 Auto reboot (optional but recommended)

Since there are always malfunctions in the cellular network, it is recommended that the gateway should be set to reboot every day. In the example here, the daily reboot is set for 01:00 in the morning.

This can be found in the user interface of the inverter under "SERVICES" → "AUTO REBOOT" → "REBOOT SCHEDULER"





Teltonika TRB140.com - Reboot

192.168.2.1/cgi-bin/lucy/admin/services/auto-reboot/reboot-scheduler

TELTONIKA | Networks

MODE: **ADVANCED** USER: **ADMIN** FW VERSION: **TRB1_R_00.02.06.1** LOGOUT

SERVICES

- CLOUD SOLUTIONS
- MOBILE UTILITIES
- AUTO REBOOT**
 - PING/WGET REBOOT
 - REBOOT SCHEDULER
- NTF
- INPUT/OUTPUT
- VPN
- MODBUS
- DATA TO SERVER
- WEB FILTER
- DYNAMIC DNS
- EVENTS REPORTING
- TRAFFIC LOGGING
- MQTT
- SNMP
- CLI
- WAKE ON LAN
- PACKAGE MANAGER

REBOOT SCHEDULER

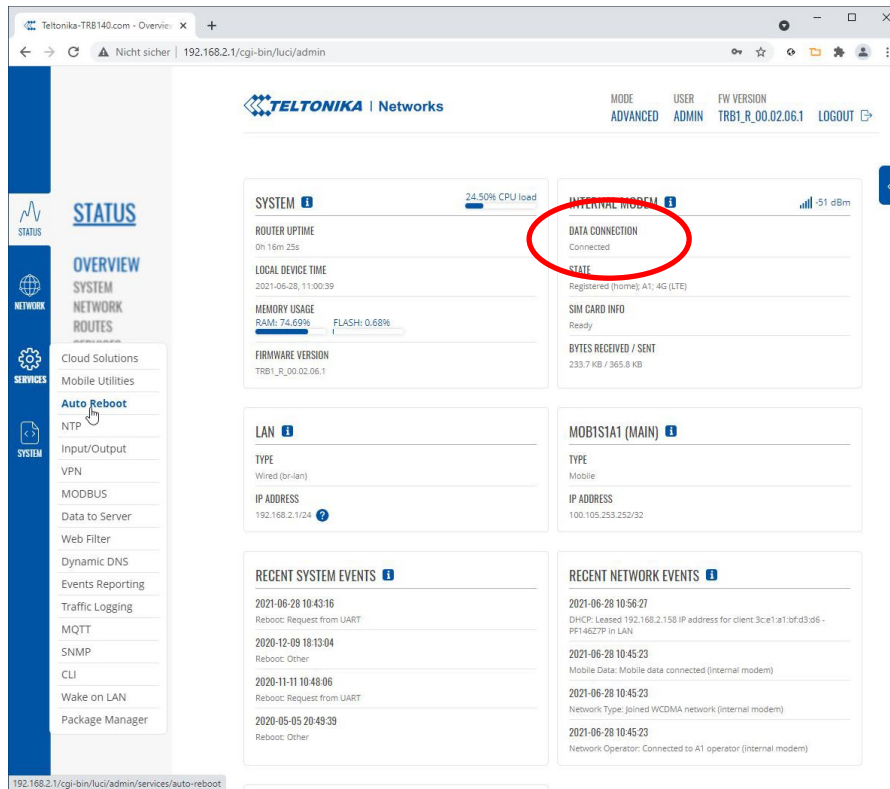
ACTION	DAYS	TIME			
Reboot	Mon, Tue, Wed, Thu, Fri, Sat, Sun	01:00			<input checked="" type="checkbox"/> ON <small>OFF</small>

ADD **SAVE & APPLY**

Teltonika Networks Solutions www.teltonika-networks.com

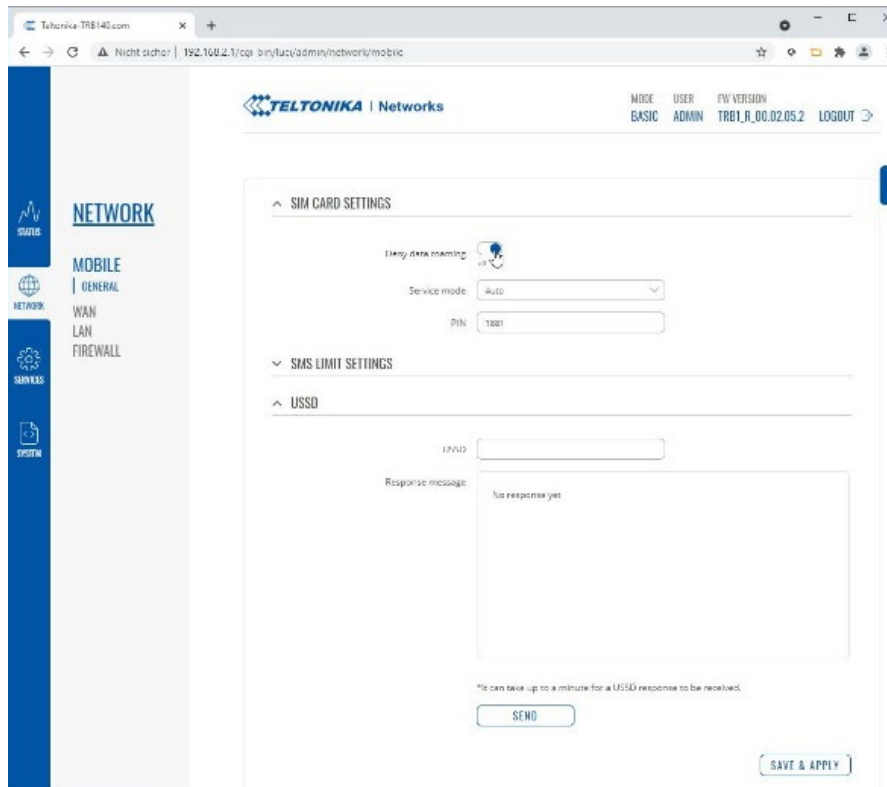
3.3.4 Testing the data connection

If the previous steps have been carried out correctly, there should now be a data connection. This can be checked by visiting a website. If it is not possible to connect, additional steps may be necessary; see Point (3.3.5). If there is a data connection, the gateway can be disconnected from the computer and connected to the "LAN1" port of the inverter.



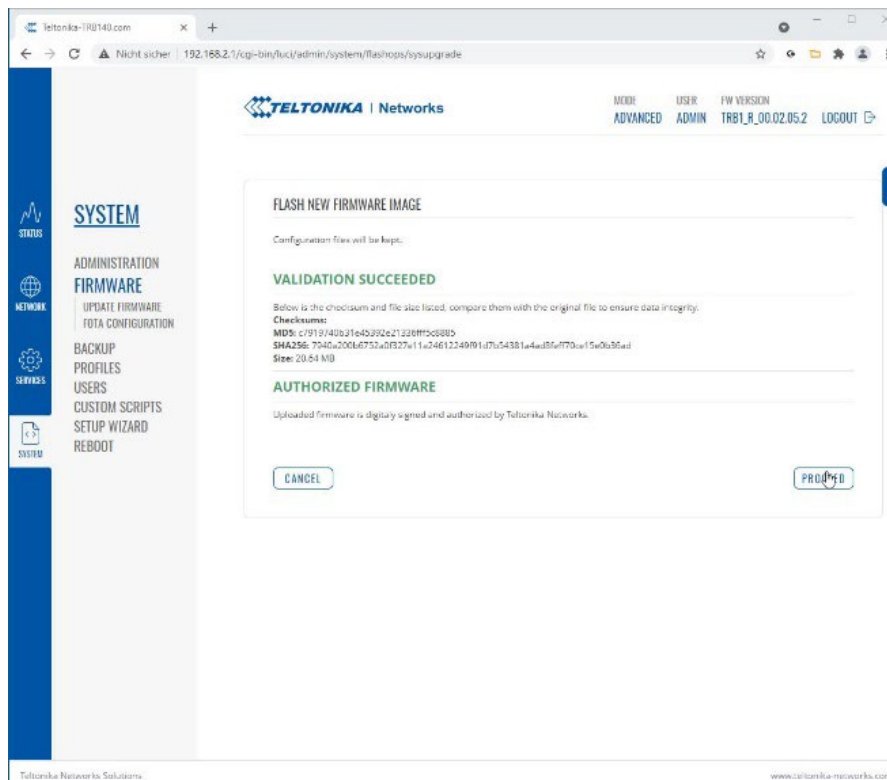
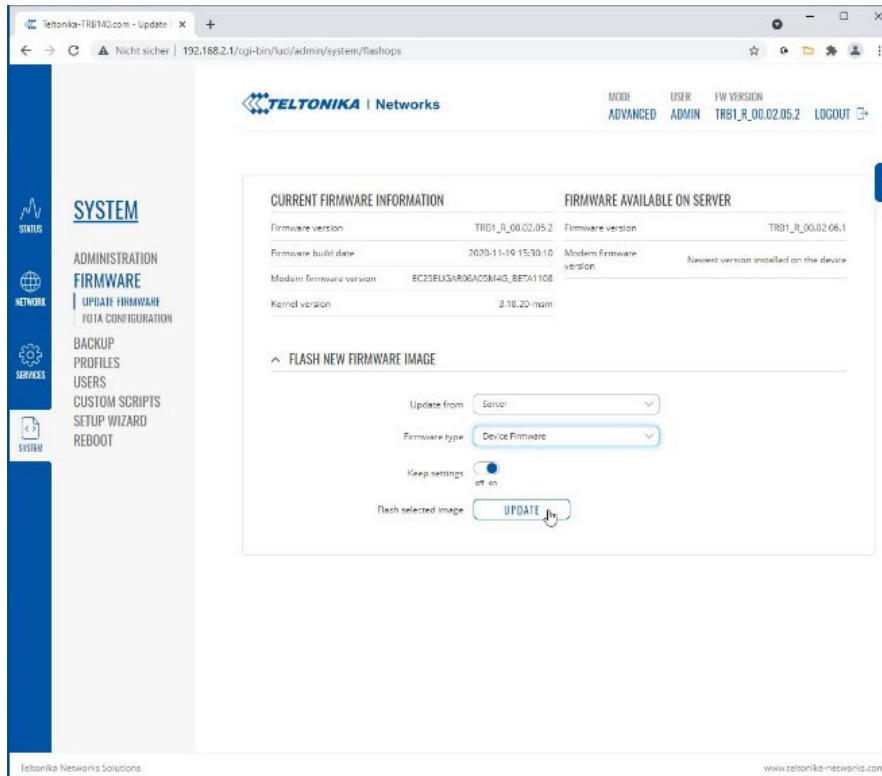
3.3.5 Activating data roaming

If a data connection is yet to be established, it may be necessary to activate the "Data Roaming" function, depending on the mobile network operator. However, it is important to make sure that the gateway does not connect to third-party cellular networks, which can result in extra costs, particularly in areas close to a national border.



3.3.6 Software update

An online software update can be initiated for the gateway as soon as its online connection has been established. It is important to keep in mind that the update includes two parts: the software for the gateway and the device software.



3.4 One gateway for several inverters

If a single gateway needs to be used for more than one inverter, a suitable network switch is required because the inverter and gateway only have one network port each. It is important to make sure that the gateway and switch are not connected to the same inverter and that an additional power supply is used. Simultaneous supply of both components via one inverter would result in an excessively large load and would deactivate the power supply.

4 DATA VOLUME / PROVIDER

4.1 GEN24/Tauro & SnapINverter Generation (Datamanager) data volume

GEN24/Tauro

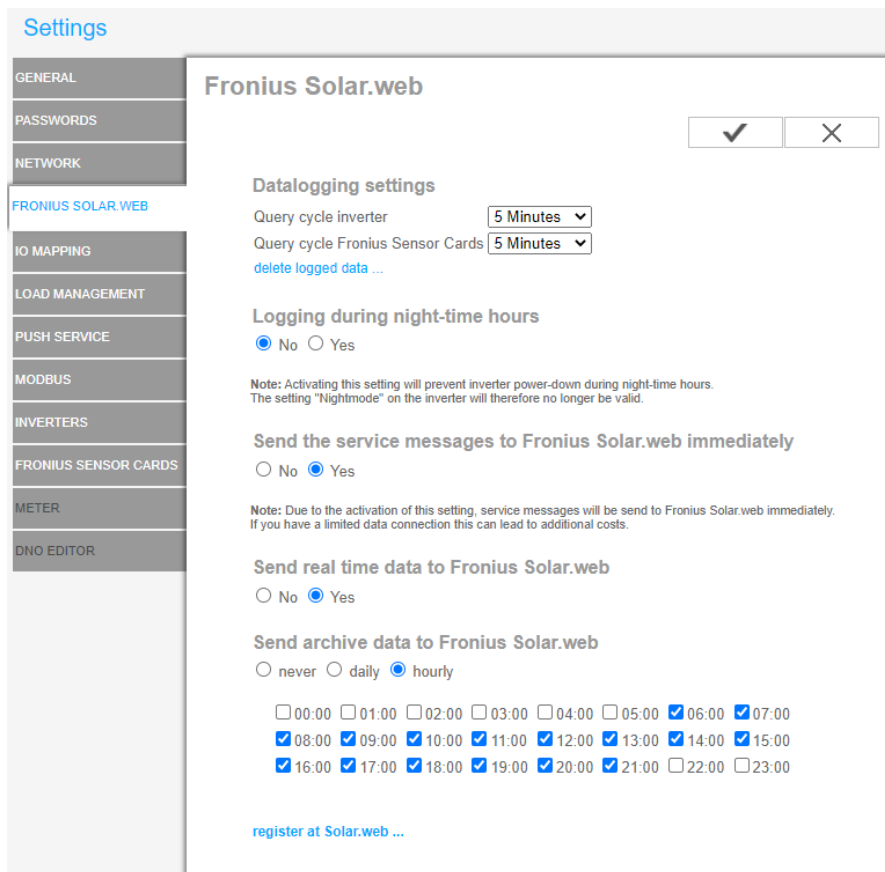
We recommend a data plan with a data volume of at least 2 GB per month for a gateway with a Fronius GEN24/Tauro inverter. Data consumption varies widely according to the design of the installation (inverter, Smart Meter and/or battery, as well as service messages on the inverter). An update requires a data volume of approx. 120 MB (up to four update files may be released per year).

If more than one GEN24 or Tauro needs to be connected with a single gateway, the data volume must be increased accordingly.

SnapINverter, Symo Hybrid, Datamanager:

Data consumption varies very widely according to the installation design (inverter, inverter with Smart Meter, inverter with battery and Smart Meter as well as AFCI function and service messages on the inverter). An update requires a data volume of approx. 100 MB (up to four update files may be released per year). For SnapIN generation inverters, Fronius recommends a data volume of at least 1 GB per month. If additional inverters are operated within the Solar Net ring, the data volume needs to be increased accordingly.

It is possible to adjust the settings regarding data logging, service messages and the transfer of current and archive data via the inverter web interface (Datamanager) under "FRONIUS SOLAR.WEB" to reduce the resulting data volume (see figure below).



If necessary, the expected data volume can be reduced by applying the following settings:

- / Extend the inverter query cycle (>15 min)
- / Deactivate immediate dispatch of service messages (service messages are all sent together when log data is uploaded)
- / Deactivate the transfer of current data
- / Daily transfer of archive data

An overview of the data volume reduction can be found in the Datamanager 2.0 operating manuals.

4.2 Choosing a provider

Before you choose a provider and purchase a SIM card, the on-site reception situation (installation site of the gateway) must be checked. This enables you to ensure that the signal quality is sufficient for data transfer, that the connection is stable and that the gateway is working correctly.

- / Furthermore, you must check that the right size of SIM card is used (the requirements can be taken from the gateway which is used. The following SIM card (Mini SIM (2FF) is required for the Teltonika gateway)

5 SECURITY SETTINGS

For the admin password, use a secure password that contains letters, symbols and numbers. Moreover we also suggest to change it on a regular basis.

If you are using a router with a WLAN connection, position it such that the signal is strong enough and can guarantee a stable connection.

It is also recommended that you choose a password that contains letters, symbols and numbers to prevent unwanted access to the WLAN network.

In the course of router/gateway updates, follow the recommendations of the router/gateway manufacturer

Activate the gateway's firewall settings to protect the local network. It is not recommended to forward the network port of the web interface to the WAN interface. Please use Fronius Solar.web to make the data from your inverter or photovoltaic system accessible via the Internet.