HPT435BT JL

UHF Modem

User manual

Version 1.3

Last Revised July 13, 2020

PREFACE

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Note: Please read these Terms and Conditions carefully.

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USE – JAVAD GNSS modems are designed to be used by a professional. The user is expected to have a good knowledge and understanding of the user and safety instructions before operating, inspecting or adjusting.

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SAFETY – Improper use of HPT435BT JL can lead to injury to persons or property and/or malfunction of the product. The HPT435BT JL modem should only be repaired by authorized JAVAD GNSS warranty service centers. Users should review and heed the safety warnings in Appendix C.

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REGULATORY INFORMATION

A license may be required for operation.

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION: Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void your authority to operate such equipment.

Canadian Emissions Labeling Requirements

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Industry Canada

The term “IC:” before the equipment certification number only signifies that the Industry Canada technical specifications were met.

WEEE DIRECTIVE

The following information is for EU-member states only: The use of the symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about the take-back and recycling of this product, please contact your supplier where you purchased the product or consult.

MANUAL CONVENTIONS

This manual uses the following conventions:

Example	Description
File>Exit	Click the File menu and click Exit
Link Space	This format represents titles of dialog windows/ boxes, names of menu options, identifies program interface objects, such as checkboxes, edit boxes, radio buttons, etc.
`Temp`	This format is used to enter various string information (e.g., file and directory names) as well as operator commands.

SCREEN CAPTURES

This manual includes sample screen captures. Your actual screen can look slightly different from the sample screen due to the modem you have connected, operating system used and settings you have specified. This is normal and not a cause for concern.

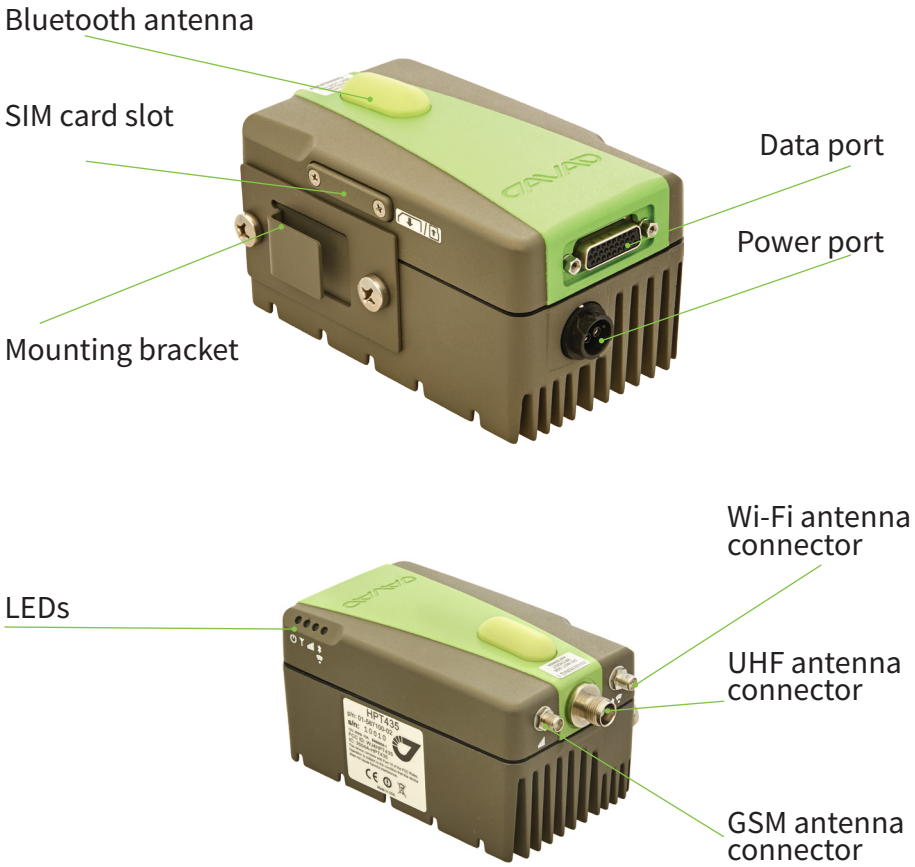
TECHNICAL ASSISTANCE

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, request technical support using the JAVAD GNSS World Wide Web site at: www.javad.com.

INTRODUCTION

GETTING ACQUAINTED

HPT435BT JL is a device designed for organizing a local network between different devices via Wi-Fi, Ethernet, and Bluetooth, connecting to the Internet using 4G cellular digital communication services.



HPT435BT JL provides a robust solution linking the field GNSS equipment to RTN, where no cell phone cover is available.

The HPT435BT JL devices contains a 35 W UHF (406 to 470 MHz) radio transceiver.

HPT435BT JL can be configured and supported using web-interface through Internet, and this makes the setup mechanism simple and accessible from anywhere in the world.

HPT435BT JL LED Functionality

The table below describes the LED indicators and device state:

LED	Symbol	Device State								
POWER		External power normal			External Power low			External power high		
								BLINK		
UHF RX			Error		RX					
		SEARCH			LOW RSSI (< -90dBm) (BLINK)			MIDDLE RSSI(-90 .. -50 dBm) (BLINK)		
								HIGH RSSI (> -50 dBm) (BLINK)		
UHF TX			Error		TX					
					LOW OUTPUT POWER(<20dBm) (BLINK)			MIDDLE OUTPUT POWER(20-27dBm) (BLINK)		
								HIGH OUTPUT POWER>(27dBm) (BLINK)		
BT/WIFI		BT			WIFI					
					Client			Access Point		
			Error	Active		Error	Active		Error	Active
				BLINK			BLINK			BLINK

Figure 1. HPT435BT JL without Battery and Cellular module.

LED	Symbol	Device State								
POWER		External power normal			External Power low			External power high		
								BLINK		
UHF		TR and RX		TX	Error	RX		TX		
		SEARCH				LOW RSSI (< -90 dBm) (BLINK)		LOW OUTPUT POWER (<20dBm) (BLINK)		
						MIDDLE RSSII (-90 .. -50dBm) (BLINK)		MIDDLE OUTPUT POWER(20..27dBm) (BLINK)		
						HIGH RSSI (> -50 dBm) (BLINK)		HIGH OUTPUT POWER(27dBm) (BLINK)		
GSM					Error	Active				
		REGISTRATION				2G (BLINK)				
		2G				3G (BLINK)				
		3G				4G (BLINK)				
		4G								
BT/WIFI		BT			WIFI					
					Client			Access Point		
			Error	Active		Error	Active		Error	Active
				BLINK			BLINK			BLINK

Figure 2. HPT435BT JL with battery and cellular module

INSTALLATION

1. Connect antennas to HPT435BT JL.

Warning: To avoid serious damage of the equipment, do not use the radio without the antenna.

2. Connect HPT435BT JL to external power supply (9…16 V).

3. Insert optional SIM card and SD card to the appropriate card slot if you would like to use GSM connection to connect to the Internet.

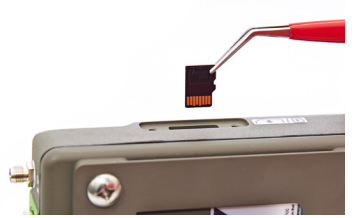


Figure 3. Optional SIM card installation

4. Plug in LAN cable if you would like to use Ethernet connection to connect to Internet.

5. Plug in COM PORT cable if you would like to use CLI interface to communicate with device.

POWERING HPT435BT

To power HPT435BT use the Battery kit 2 (p/n 99-587100-10).

Figure 4. Battery Kit 2

Warning: WARNING! Powering HPT435BT please observe polarity!

Power supply requirements

A single external power supply is necessary to operate HPT435BT. The external power supply needs to be Listed for US and Certified for EU countries, it needs also to be a Limited Power Source and rated for Outdoor Use and have an output rated for +9 ... +16V, 10A. This may not be the same range as other JAVAD GNSS products with which you are familiar.

CAUTION: To avoid the introduction of hazards when operating and installing, before connecting of the equipment to the supply, make sure that the supply meets local and national safety ordinances and matches the equipment's voltage and current requirements.

CAUTION: CAUTION: Never attempt any maintenance or cleaning of the supply while plugged in. Always remove supply from AC power before attempting service or cleaning.

Warning: If the voltage supplied is below the minimum specification, the modem will suspend operation. If the voltage supplied is above the maximum specification, the modem may be permanently damaged, voiding your warranty.

Warning: Make sure cords are located so that will not be stepped on, tripped over, or otherwise subjected to damage or stress. Do not operate equipment with a damaged cord or plug – replace immediately.

Warning: WARNING! To reduce the risk of damage to the equipment, pull by the plug body rather than the output cord when disconnecting the equipment. Do not operate the supply if it has received a sharp blow, been dropped, or otherwise damaged. Do not disassemble the supply.

Warning: WARNING! Before connecting the external power source and the modem, make sure that the power source matches the modem's voltage and current requirements.

ANTENNA INSTALLATION

Select the type of antenna that best fits your application and the one that offers the highest dB gain. In addition, setup your system in the highest possible location to minimize obstacles between the transmitting and receiving systems. Always place the antenna on the highest point available. At a minimum, set the antenna to at least ten feet above the terrain using an antenna mast.

Some antennas intended to be attached to the pole mount adapter are designed to be operated with a ground plane and some without it. Antennas operating without ground plane marked in our catalogue as NGP, e.g. UHF NGP Antenna 1/2, 2.4 dB gain, NMO:

- UHF NGP Antenna 406-430 MHz, 1/2, 2.4 dBd gain, NMO
- UHF NGP Antenna 430-450 MHz, 1/2, 2.4 dBd gain, NMO
- UHF NGP Antenna 450-470 MHz, 1/2, 2.4 dBd gain, NMO

Theses antennas are NO GROUND PLANE antennas with gain 2.4 dB and NMO specified connector type with should match with your antenna adapter (pole mount or magnet mount).

Antennas designed to be operated with ground plane

- UHF Antenna 406-430 MHz, 5/8, 5 dBd gain, NMO
- UHF Antenna 430-450 MHz, 5/8, 5 dBd gain, NMO
- UHF Antenna 450-455 MHz, 5/8, 5 dBd gain, NMO
- UHF Antenna 455-460 MHz, 5/8, 5 dBd gain, NMO
- UHF Antenna 460-465 MHz, 5/8, 5 dBd gain, NMO
- UHF Antenna 465-470 MHz, 5/8, 5 dBd gain, NMO

provide better gain, but to achieve the best performance of your

antenna, add a UHF Antenna Ground Plane Disk (p/n 10-587400-01) to the bottom of the antenna for a ground plane. UHF antenna Ground Plane disk improves VSWR and as result increase RF power delivered from transmitter to antenna and system distance range.

To install antenna with ground plane disc (see pictures below):

- Unscrew the cone-shaped cable part;

- Place the ground plane disc between cable parts and screw all parts together;

- Attach cable with ground plane to the UHF antenna;

- Place the antenna on the pole.

Use coaxial cable and connectors that are impedance-matched with the radio equipment, and make sure to use the shortest length of cable to move the signal between the radio and the antenna:

- UHF Ant Cable TNC/Pole Mount, 12ft
- UHF Ant Cable TNC/Magn Mount, 12f
- UHF Ant Cable TNC/Mini-Magn Mount, 12ft

FAN FOR RADIO

The most efficient way to increase duty cycle of the HPT435BT JL transceiver is using the Fan kit (p/n 02-587101-31) shown on the picture below:

Figure 5. Fan for radio

How to install the Fan see http://www.javad.com/downloads/javadgnss/how-to/hardware/Fan_For_Radio_install_and_use.pdf

Note: The fan automatically turns on when the temperature reaches 75 degrees, and turns off at a temperature of 65 degrees.

SETUP AND CONFIGURATION

1. Turn on power of HPT435BT JL.

2. Wait for complete loading. When it is complete, Power LED will blink.

3. Connect to the device and configure it using a web-browser.

Connection can be established in one of the following ways:

- via Bluetooth interface: the device (PC, handheld/pad) should be with Bluetooth interface with PAN profile support. HPT435BT JL Bluetooth-interface is in visibility mode, has the name “HPT435BT JL” and PIN code 0000. When connection is established open the web-browser and enter the address 10.1.11.1:8080.
- via Wi-Fi interface: The device (PC, handheld/pad) should be with Wi-Fi interface. HPT435BT JL Wi-Fi-interface has the name “HPT435BT JL” and password “testtest”. When connection is established open the web-browser and enter the address 10.1.10.1:8080.
- via Ethernet: HPT435BT JL LAN static IP address is 192.168.0.200 and network mask is 255.255.255.0. On the PC connected to the same LAN, open the web browser and enter the address 192.168.0.200:8080. The dialog window appears with login/password request. Enter login and password (jlink/jlink).

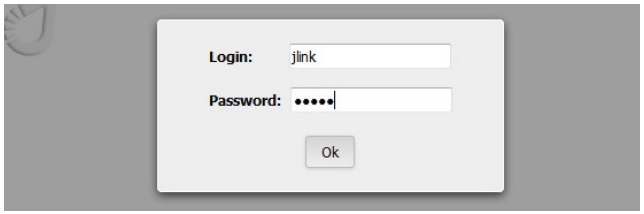


Figure 6. Login and password entering

Thereafter the device is ready for setup and configuration.

4. Select the interface which will be used to connect to Internet and configure it. The following interfaces are available:

Ethernet: Configure Ethernet interface in the Communication/LAN tab. Set the network parameters and reboot the device using Reboot button in the Administration/Management tab see figure below.

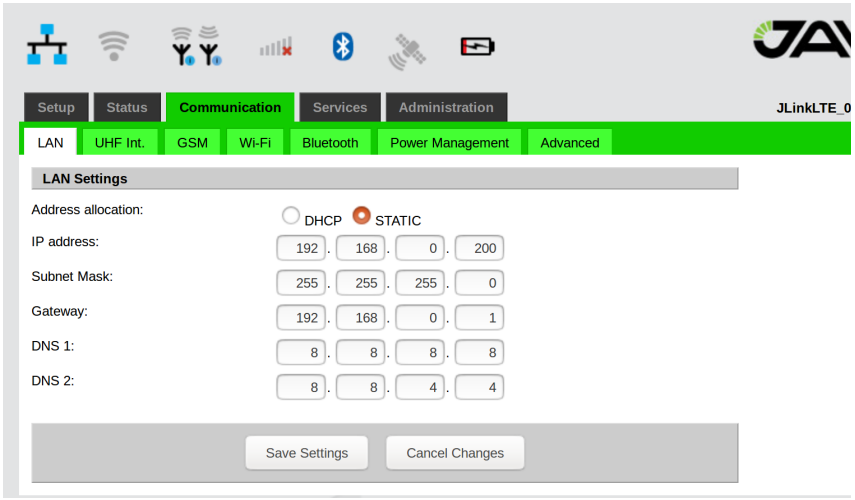


Figure 7. LAN configuration tab

GSM/LTE/4G: Configure this interface using Communication/GSM tab. Set the APN parameters (if necessary) and select the SIM-card slot. In the Communication/Power Management tab activate the interface and wait for registering in the network and Internet access availability. More detailed connection status you can check in Status/GSM tab see below.

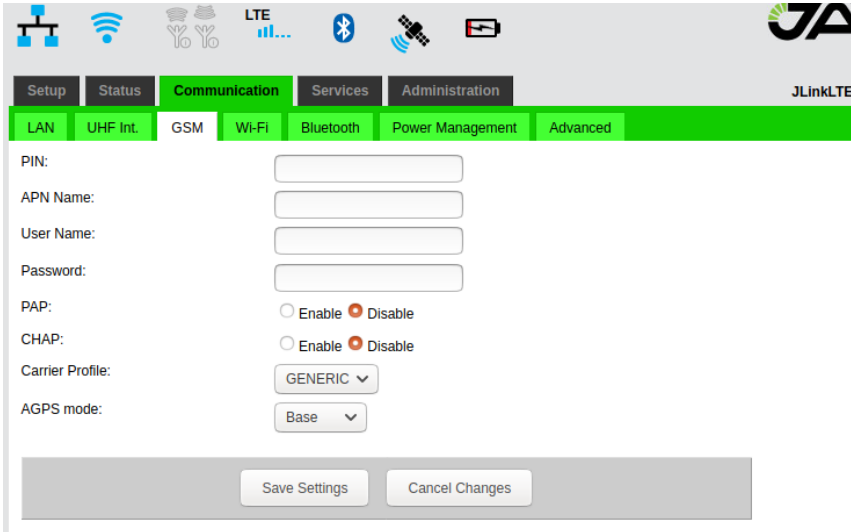


Figure 8. GSM configuration tab

Wi-Fi client: In the Communication/Wi-Fi it is necessary to switch the interface to the client mode. In the Communication/Power Management tab turn the Wi-Fi interface on. Select the network you would like to connect in the Communication/Wi-Fi tab, enter password to get access and wait for the connection see below. More detailed connection status you can check in Status/Wi-Fi tab.

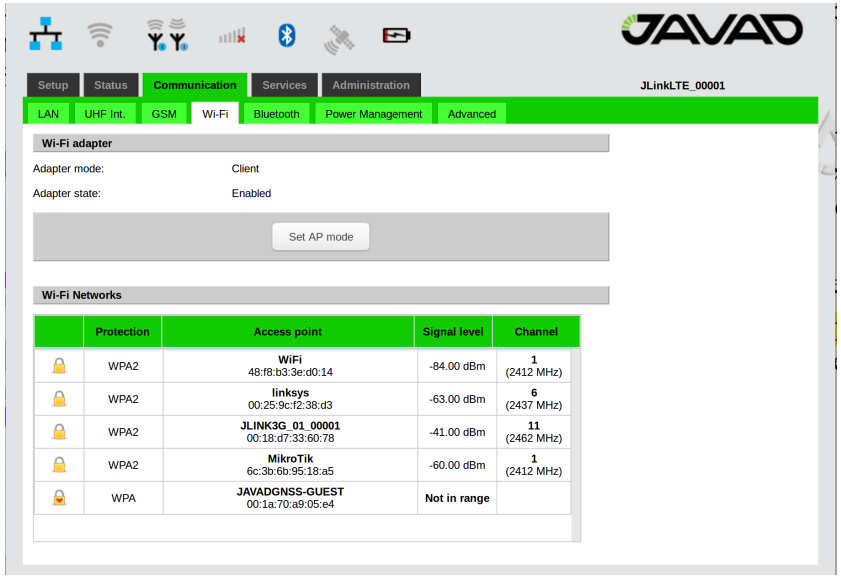


Figure 9. Wi-Fi client configuration tab

Access to Serial port via Network: In the Communication/Advanced tab it is necessary to select Serial port as Console (see figure below) and reboot deice from Administration/Management or do power cycle. After reboot the device is ready for connection to serial port CLI interface with user name “jlink” password “jLTEXXXXX” where “XXXXX” is serial number of device which is written in device label. For connecting to HPT435BT JL serial port needed to setup with following parameters:

- Baudrate 115200
- Parity none
- Data Bits 8
- Stop Bits 1
- Handshake hardware

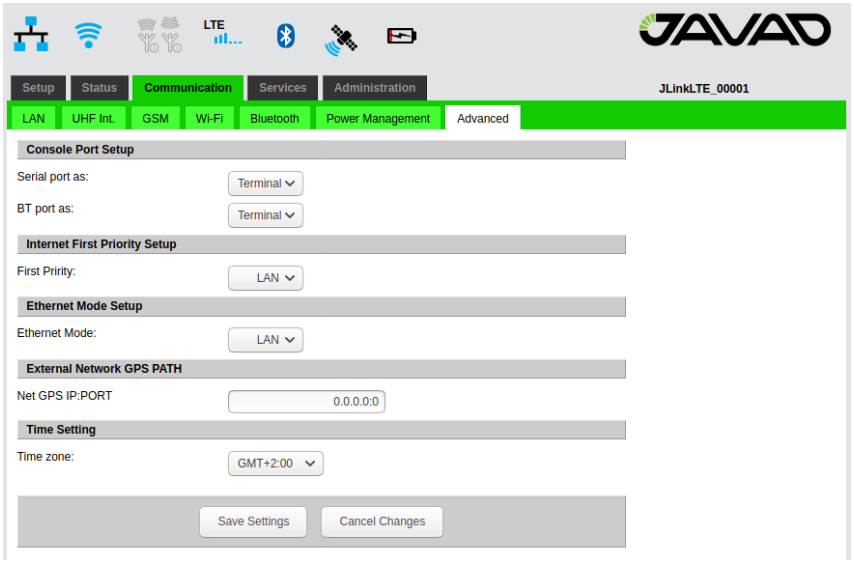


Figure 10. Advanced configuration tab

Access to Serial port via Network: In the Communication/Advanced tab it is necessary to select Serial port as Network (see figure below) and reboot device from Administration/Management or do power cycle.

After reboot device is ready for telnet connection to serial port using “Ser2Net” as login and “jlinklte” as password. For connecting to HPT435BT JL serial port needed to setup with following parameters:

- Baudrate 115200
- Parity none
- Data Bits 8
- Stop Bits 1
- Handshake hardware

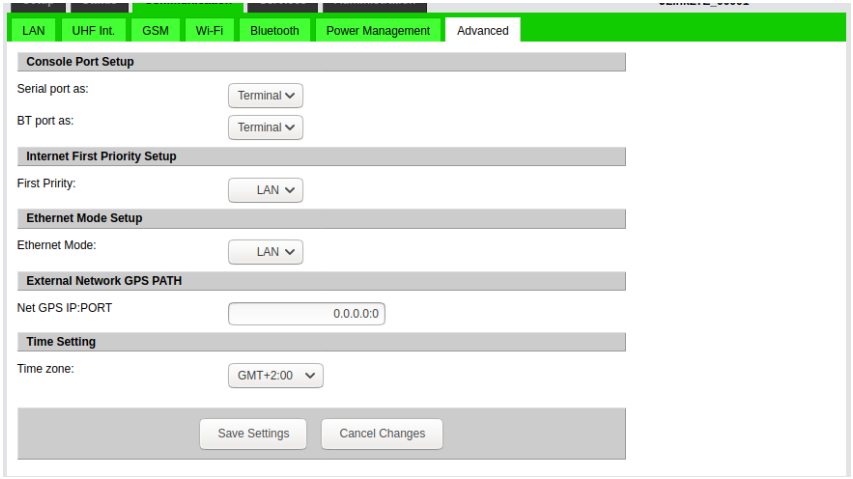


Figure 11. Advanced configuration tab

HOW TO...

...Setup HPT435BT JL to provide RTK data received via NTRIP Client to Serial Port

1. Connect to HPT435BT JL via web interface as described above.

2. Configure the Cellular (GSM): in the Communication/GSM tab set the PIN code and APN parameters (if necessary);

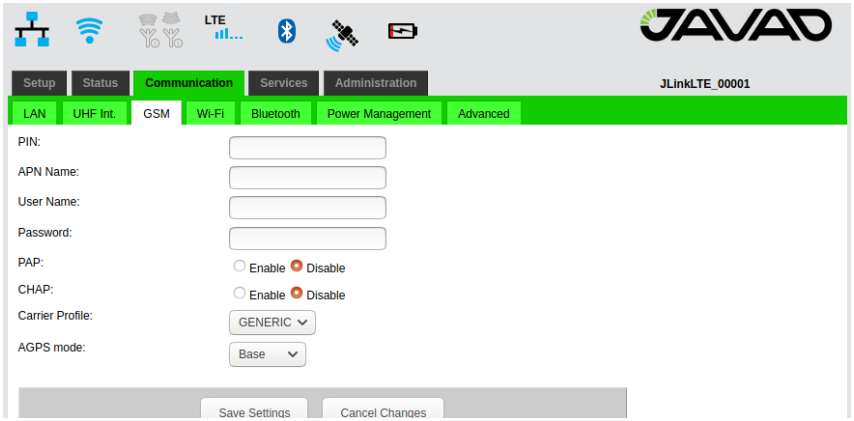


Figure 12. GSM configuration tab

3. Use tweezers to install or remove micro SIM card. Insert the SIM card to its slot. The first slot from the green top cover is for micro SIM, the second slot is for micro SD.

4. In the Communication/Power Management tab activate the GSM interface.

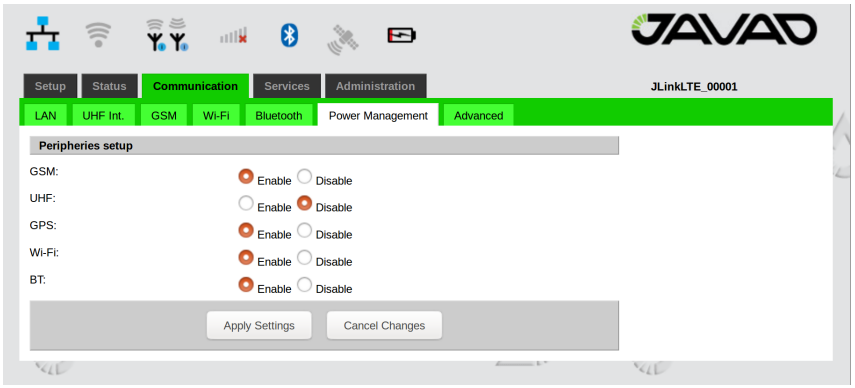


Figure 13. HPT435BT JL Power Management tab

Wait for registering in the network and Internet access availability. The detailed connection status can be checked in Status/GSM tab.

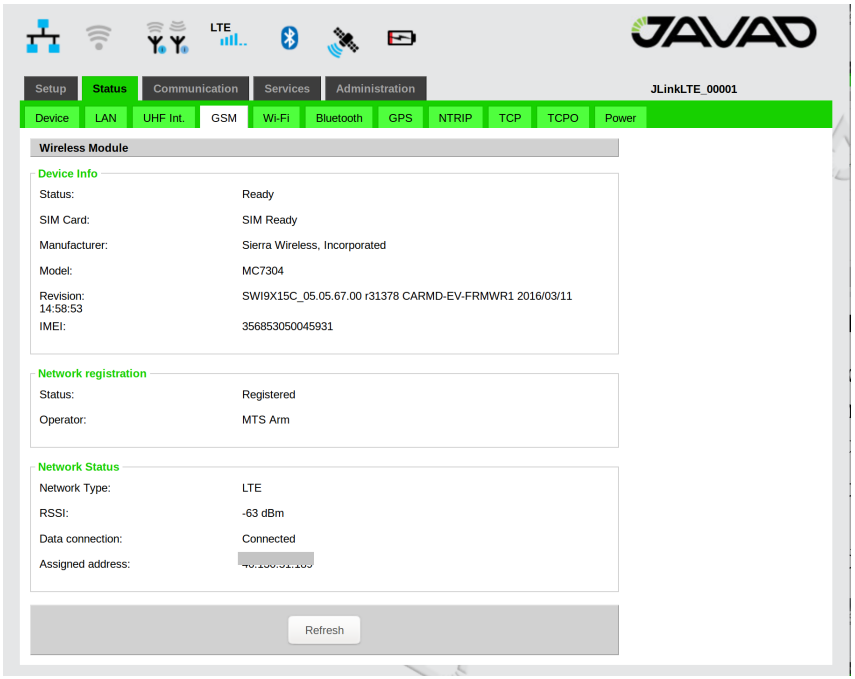


Figure 14. GSM Status tab

It is possible also to connect HPT435BT JL to Internet via LAN or Wi-Fi using any Wi-Fi router, MiFi device or even smart-phone configured in hot spot mode.

4. Setup Serial Port. In the Communication/Advanced tab select “Serial port as” parameter as Terminal. Click “Save Setting” button and wait until finish.

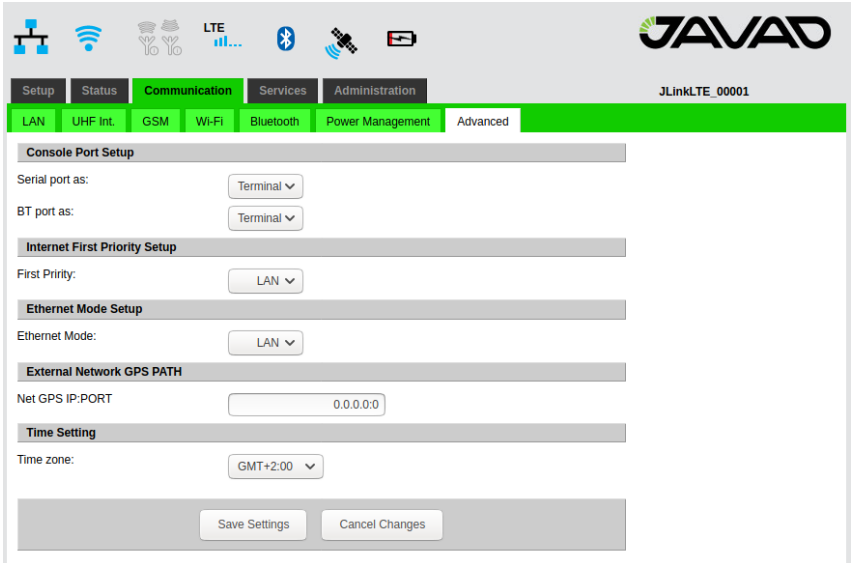


Figure 15. Advanced tab

5. Reboot device by clicking “Reboot” in the Administration/Management tab.

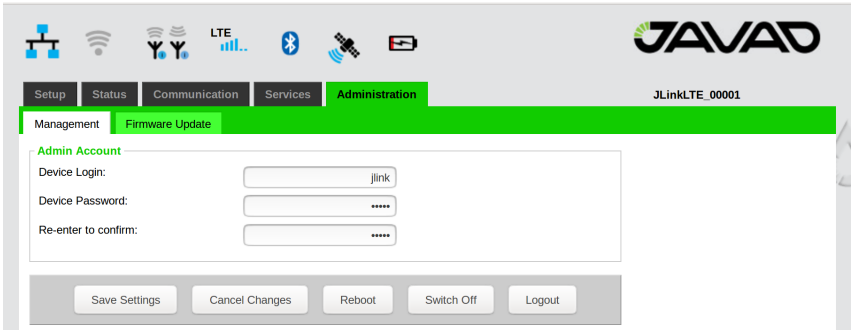


Figure 16. Administration Management tab

6. Set up the Router. In the Setup/Router tab select the following parameters: “NTRIP Client” as Source and “Serial port“ as Destination. Click “Save Settings” and wait until finish.

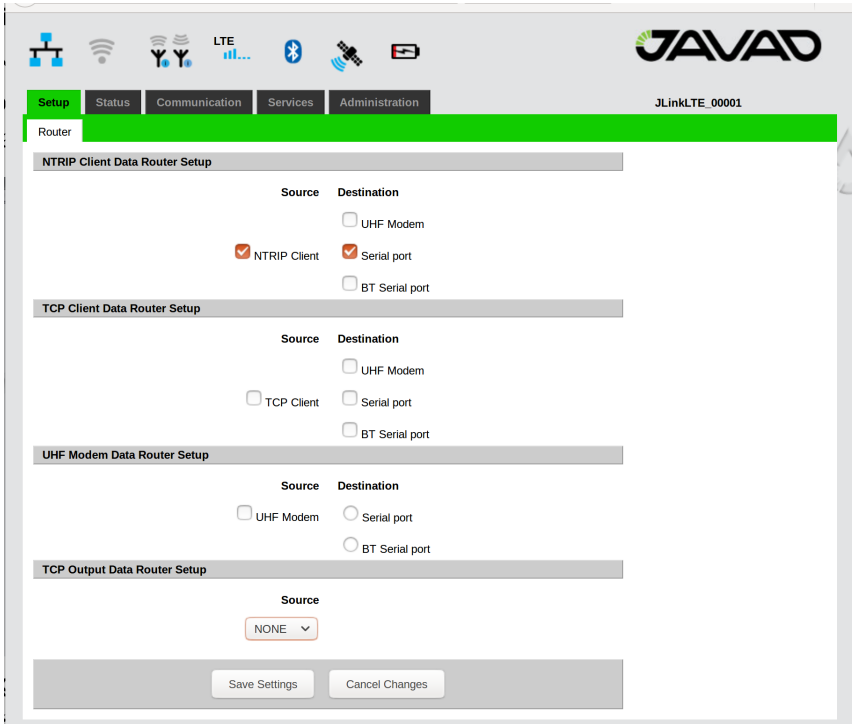


Figure 17. NTRIP Data Router tab

6. Setup NTRIP Client. In the Services/NTRIP tab set following parameters: “Server name/address”, “Port”, “User” , “Password” .

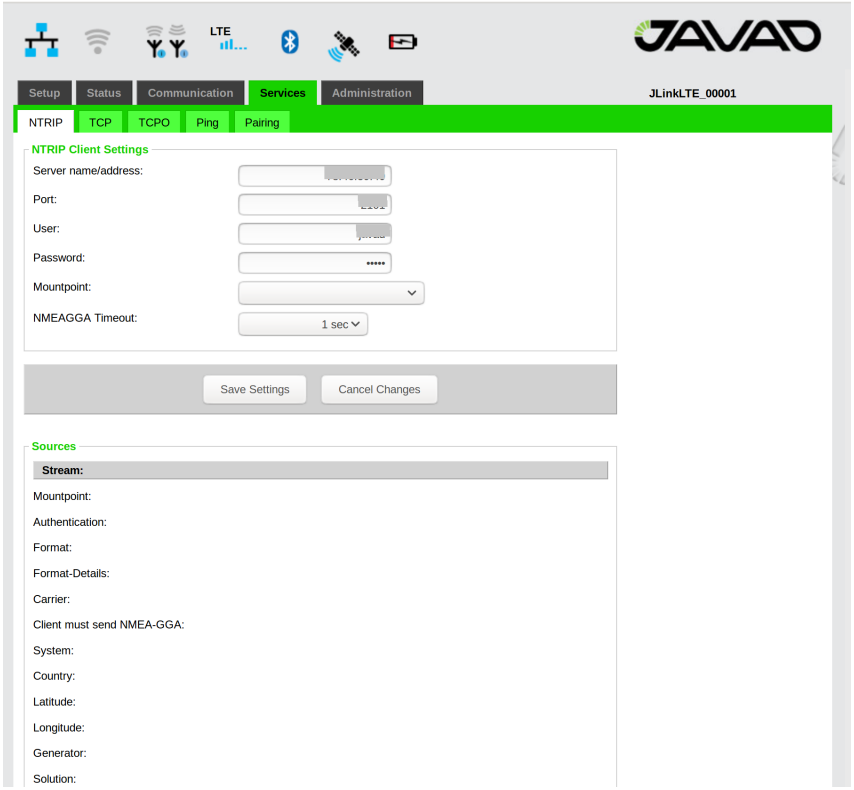


Figure 18. NTRIP configuration tab

- Click “Save Settings” and wait until finish.
- Click ‘”Update” and select “Mountpoint”.
- Click “Save Setting” and wait until finish. Detailed connection status you can check in Status/NTRIP tab:

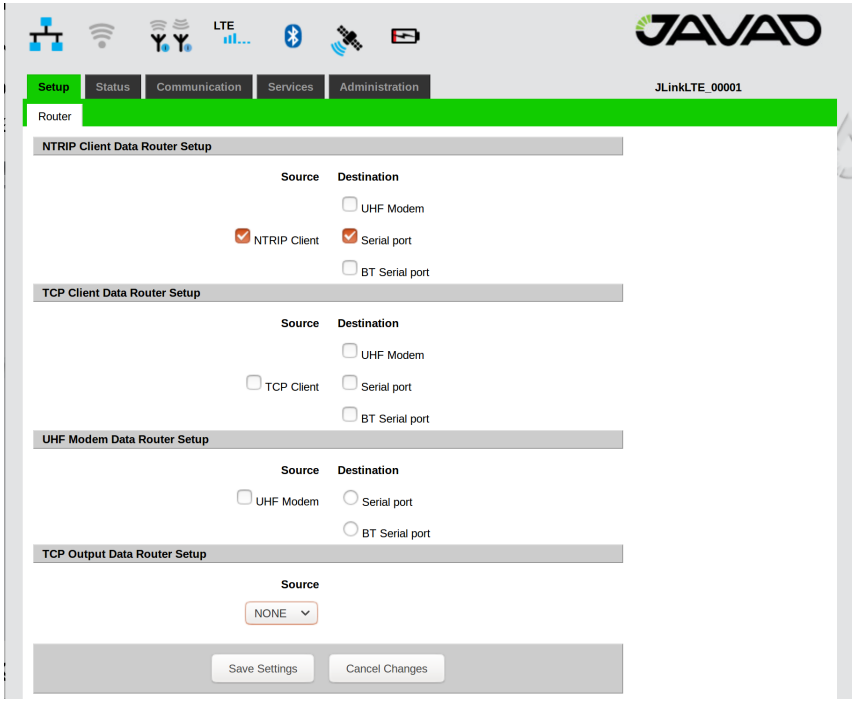


Figure 19. Status NTRIP tab

7. Connect Serial Port. Use any application to connect serial port of HPT435BT JL using the following parameters:
   - Baudrate 115200
   - Parity none
   - Data Bits 8
   - Stop Bits 1
   - Handshake hardware

...Setup HPT435BT JL to provide RTK data received via UHF channel (in Satel mode) to Serial Port

1. Connect to HPT435BT JL via web interface as described above.

2. UHF configuration in Satel mode:

In the Communication/UHF Int. tab:

- select operating frequency or add new frequency to the list
- select Protocol type Satel
- select channel bandwidth (spacing) either 25.0 or, 20.0, or 12.5 kHz

verify FEC (Forward Error Correction) state is correct

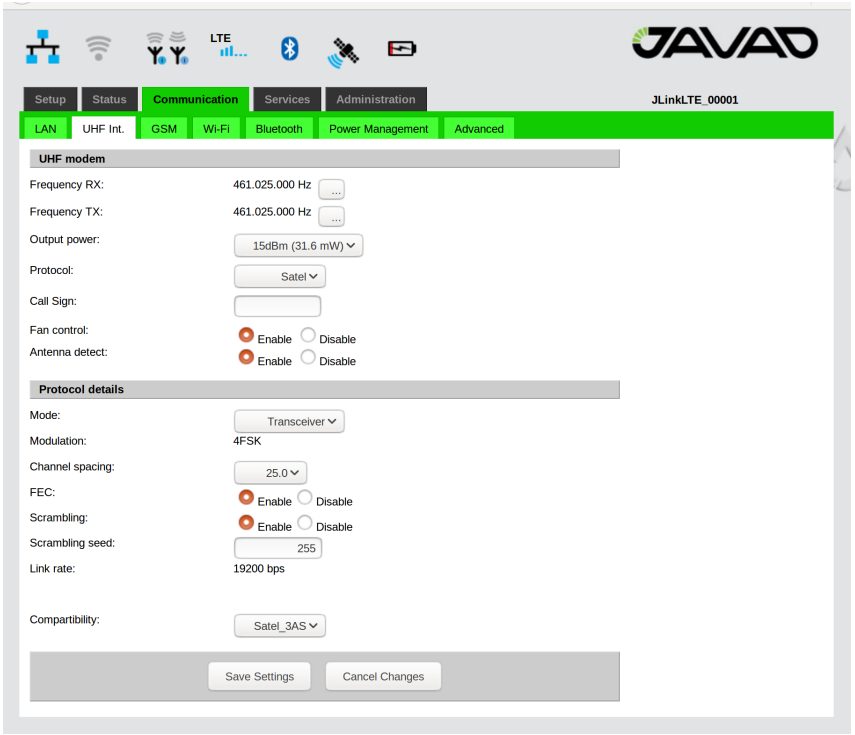


Figure 20. UHF parameters configuration tab

In the Communication/Power Management tab activate the UHF interface:

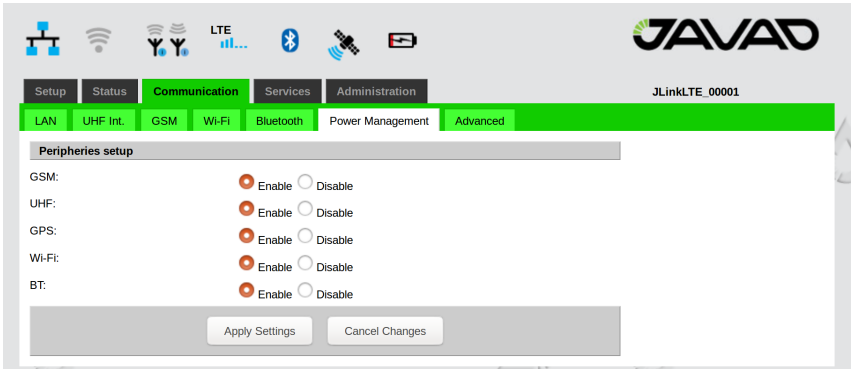


Figure 21. Power Management tab

The detailed connection status can be checked in Status/UHF int. tab

Figure 22. UHF Int. Status tab

3. Setup Serial Port

In the Communication/Advanced tab select “Serial port as” parameter as Terminal.

Click “Save Settings” and wait until finish.

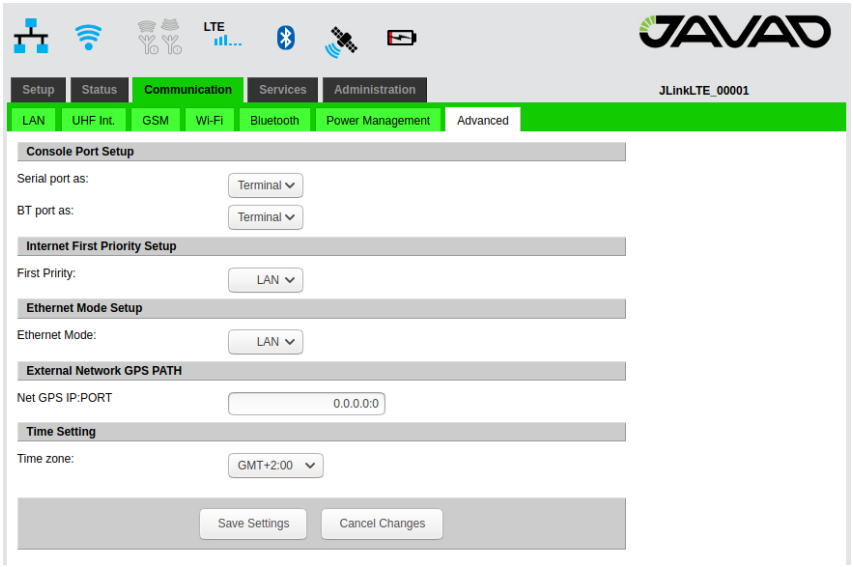


Figure 23. Advanced tab

4. Reboot device

In the Administration/Management tab click “Reboot” button and wait until reboot.

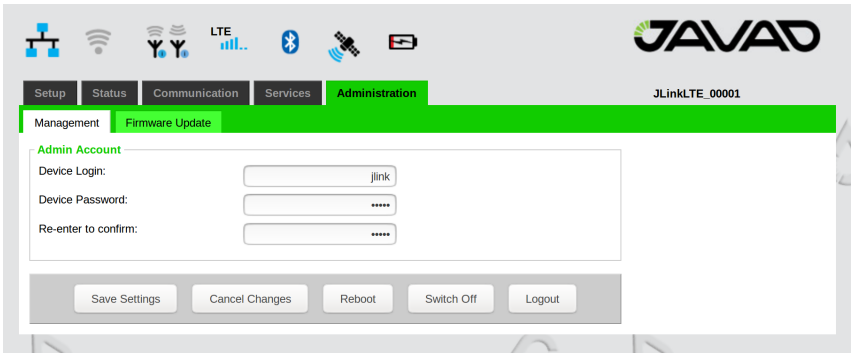


Figure 24. Administration Management tab

5. Setup Router

In the Setup/Router tab select following parameters “UHF Modem” as Source and “Serial port“ as Destination.

Click “Save Settings” and wait until finish.

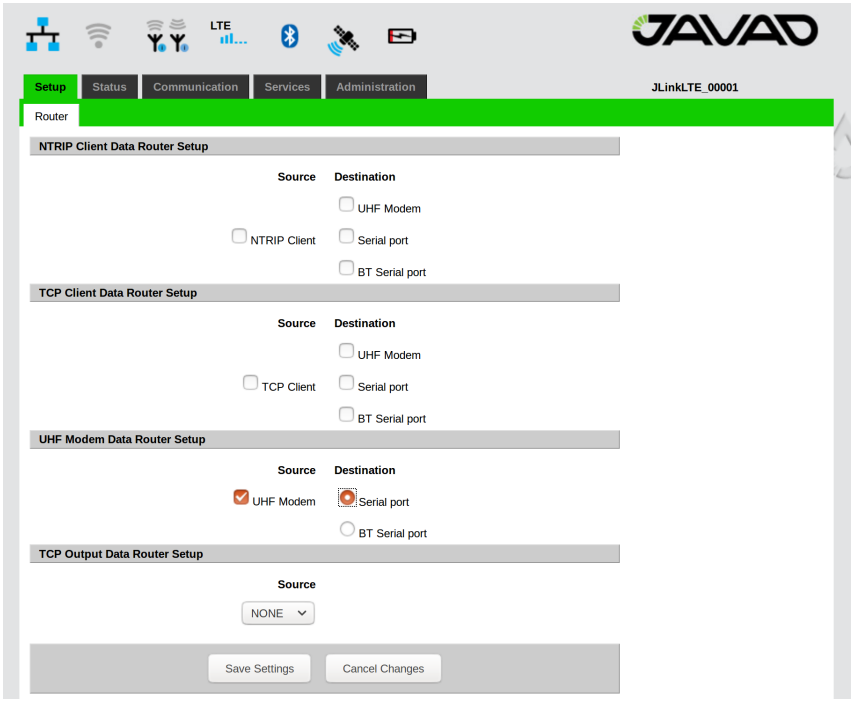


Figure 25. UHF Modem Router tab

6. Connect Serial Port

Use any application to connect serial port of HPT435BT JL with following parameters:

- Baudrate 115200
- Parity none
- Data Bits 8
- Stop Bits 1
- Handshake hardware

...Configure TRIUMPH-2 and HPT435BT JL to provide TRIUMPH-2 services through Internet

In this configuration HPT435BT JL will share its internet connection (established by GSM interface) with TRIUMPH-2 connected to HPT435BT JL as a Wi-Fi client.

1. Connect to HPT435BT JL via web interface.

2. GSM configuration:

In the Communication/GSM tab set the APN parameters (if necessary) and insert the SIM card to its slot(SIM card must by provide Static IP).

In the Communication/Power Management tab activate the GSM interface and wait for registering in the network and Internet access availability. Detailed connection status you can check in Status/GSM tab.

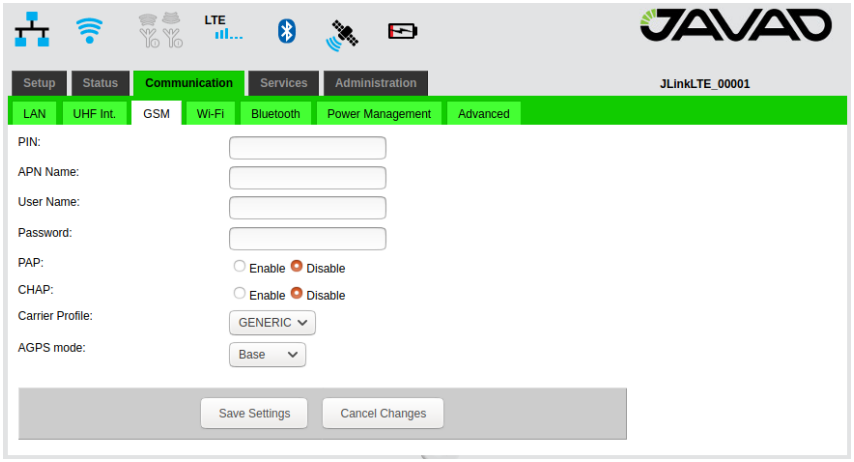


Figure 26. GSM configuration tab

3. Setup Wi-Fi configuration:

In the Communication/Wi-Fi tab click on the “Set AP mode” to switch the interface to the AP mode and set following AP parameters: SSID (Wi-Fi Accesses pointname), Protection (WPA2) and Security passphrase (“password”) .

In the Communication/Power Management tab turn the Wi-Fi interface on.

The detailed connection status can be checked in the Status/Wi-Fi tab.

Here HPT435BT JL provides port forwarding mechanism from internet (GSM interface) to Wi-Fi clients.

The port forwarding mechanism works in a following way: HPT435BT JL receives data from internet and redirects it to its Wi-Fi clients. Data packets received by 1110-1119 ports will be redirected to Wi-Fi.

Wi-Fi client which IP address is 10.1.10.110. Data packets received by 1120-1129 ports will be redirected to Wi-Fi client which IP address is 10.1.10.120.

To receive the redirected data of HPT435BT JL the TRIUMPH-2 unit should be connected to HPT435BT JL through Wi-Fi interface and TRIUMPH-2’s IP address should be set to 10.1.10.110 or 10.1.10.120 (the default gateway is 10.1.10.1).

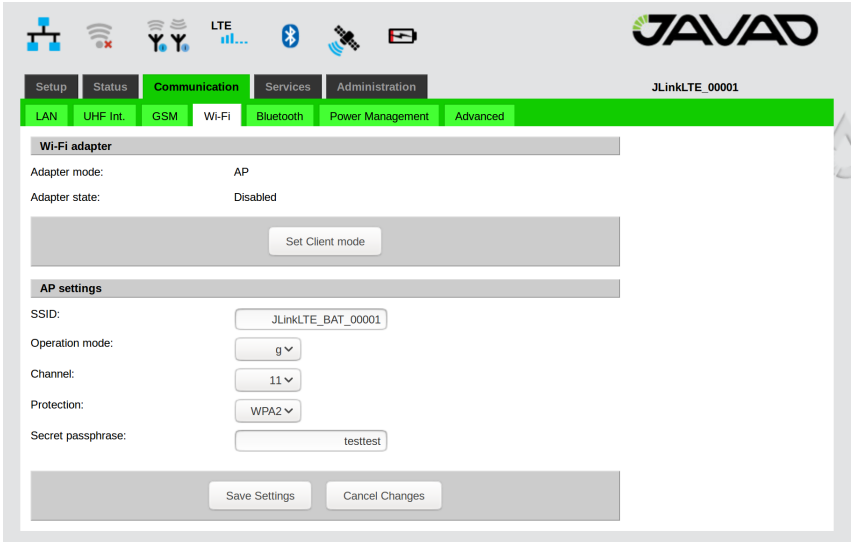


Figure 27. Wi-Fi configuration tab

TRIUMPH-2 configuration steps are the following:

1. Connect TRIUMPH-2 to PC via USB or Bluetooth interface and start NetView&Modem.

2. Click Connection, select the port, specify the COM port the receiver is connected to. Click Connect to connect to the receiver.

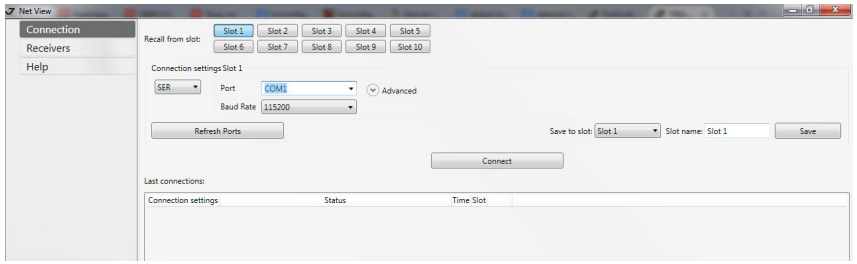


Figure 28. NetView connection tab

3. Select the receiver from the list of the connected receivers and click Parameters/Networking/Server , to setup Service port.

- Set the TCP/FTP parameter: TCP Port (1125).
- Set the TCP/FTP parameter: TCP Output Base Port (1120).
- Click “Apply”.

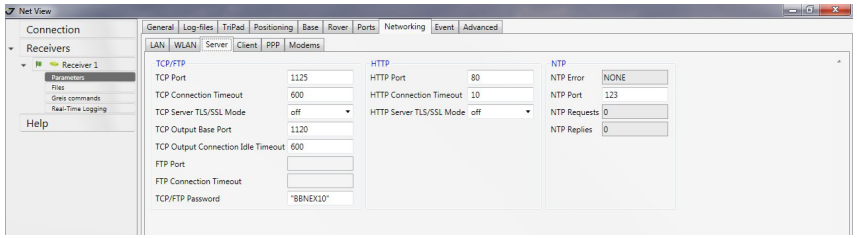


Figure 29. NetView Server tab

4. Select the receiver from the list of the connected receivers and click Parameters/Networking/WLAN, to setup the Wi-Fi connection.

- Set the following IP parameters: WLAN Receiver IP Address(10.1.10.120), WLAN Default Gateway (e.g, 10.1.10.1), and WLAN Network Mask (e.g, 255.255.255.0).
- Set the AccessPoint parameters: WLAN Access Point ID (enter SSID of HPT435BT JL), WLAN AP mode(wpa).
- Set the WPA parameter: WLAN WPA Passphrase (enter passphrase of HPT435BT JL).
- Set the WLAN Mode to on and click “Apply”.

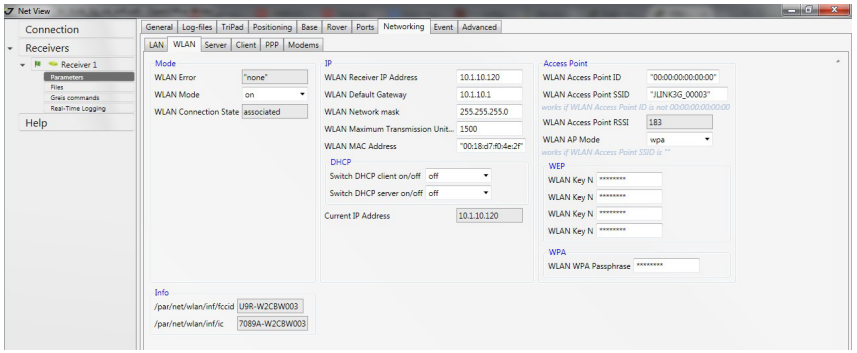


Figure 30. NetView WLAN configuration tab

After restarting the device you can check the Wi-Fi connection in the web interface Status/Wi-Fi tab of HPT435BT JL.

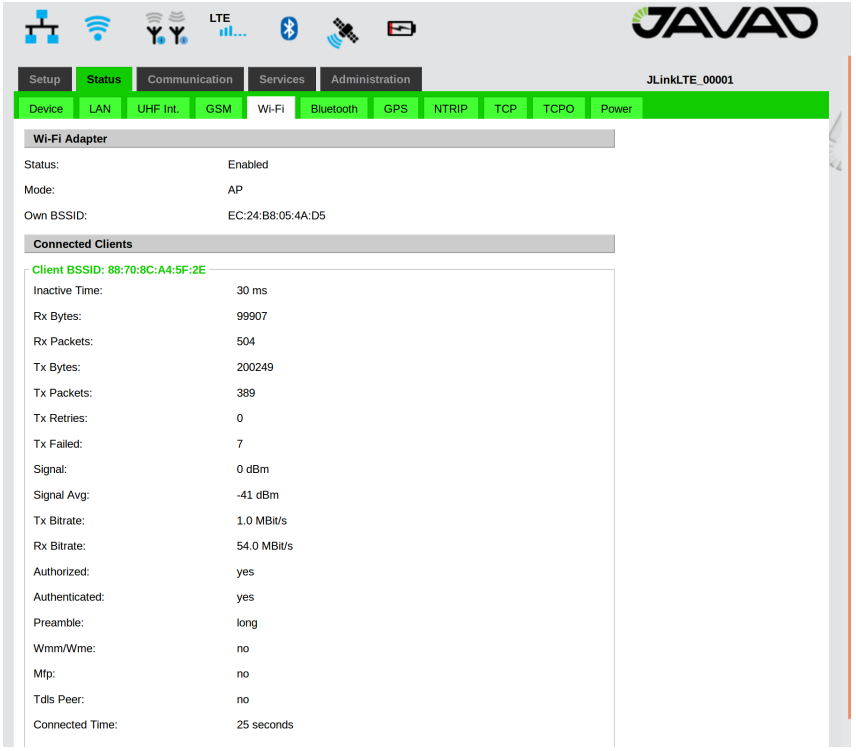


Figure 31. Wi-Fi status tab

Now TRIUMPH-2 can provide the services trough the Internet by 1120-1125 port.

...Update firmware of HPT435BT JL

1. Connect to HPT435BT JL via web interface..
2. DHCP configuration:
   - In the Communication/LAN tab. Select the “Address allocation” parameter to DHCP (see Picture 1).
   - Apply settings clicking “save settings” button.

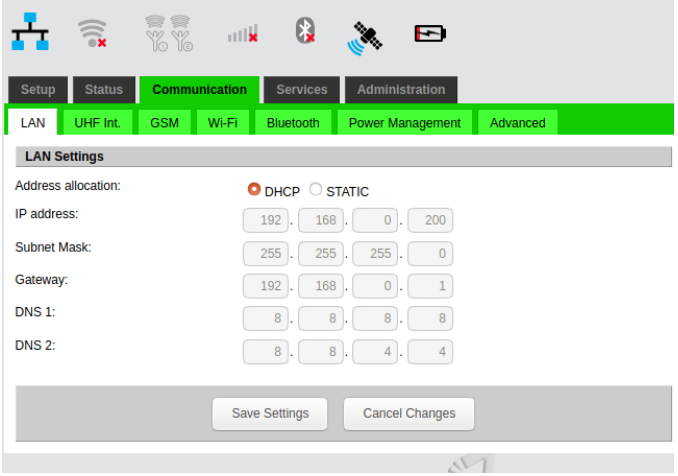


Figure 32. LAN configuration tab

3. FW Update:
   - In the /Administration/Firmware Update tab select Versions Branch and Firmware’s for update.
   - Click “Check for update” button to see version of FW.
   - Click “Update” button and wait until process will finished.

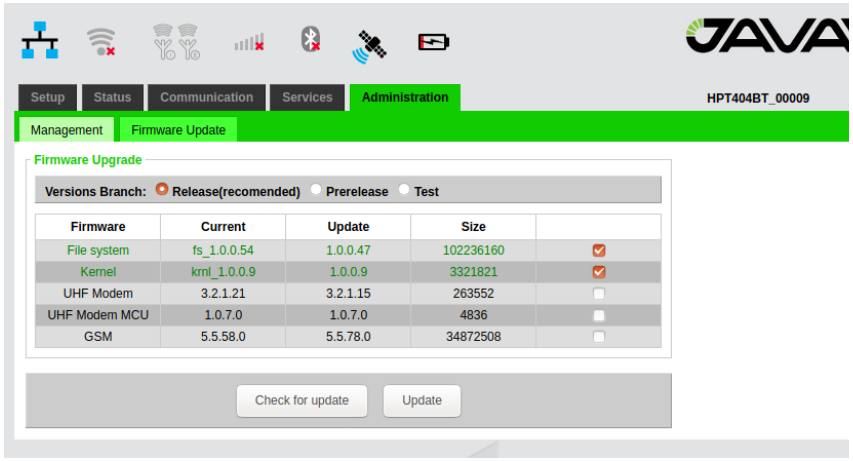


Figure 33. FW update tab

4. Reboot the Modem: in the /Administration/Management tab click “Reboot” . After the reboot is complete, the device is ready for use.

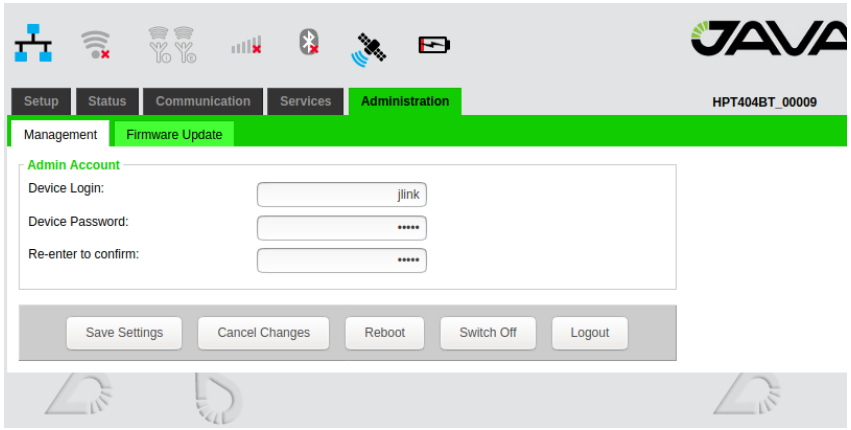


Figure 34. Management tab

...Setup HPT435BT JL internal GNSS module

1. Connect to HPT435BT JL via web interface.

2. If using GNSS “Base” or “Assisted” modes is necessary to insert the SIM card.

3. GSM/GNSS configuration in the Communication/GSM tab (see picture below):

- Set up the AGPS mode if needed.
- Set up the GSM network configuration parameters if needed.

Note: This steps are not needed if the GNSS mode is Standalone.

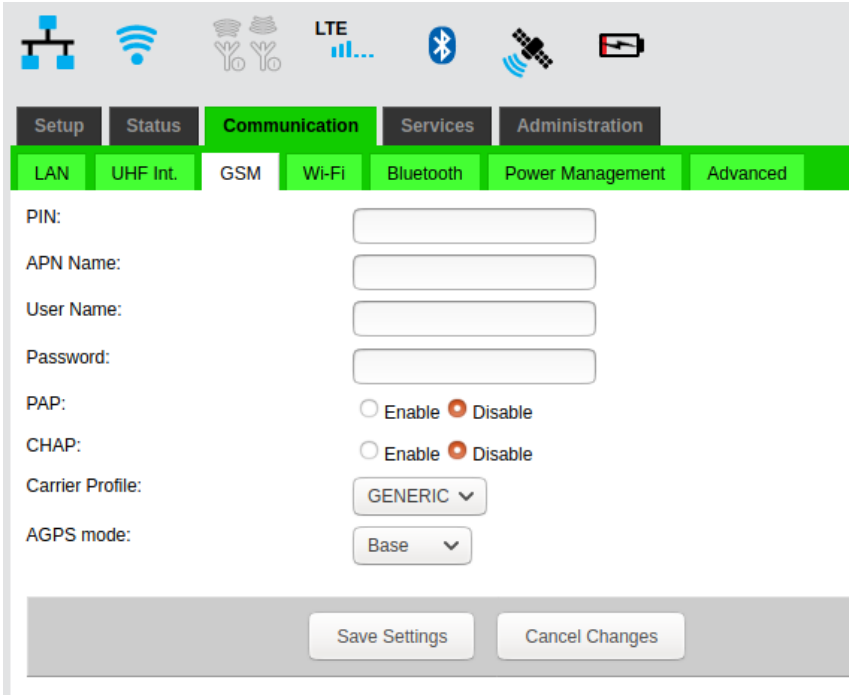


Figure 35. GSM parameters configuration tab

In the Communication/Power Management tab activate the GSM/GNSS module (see picture below):

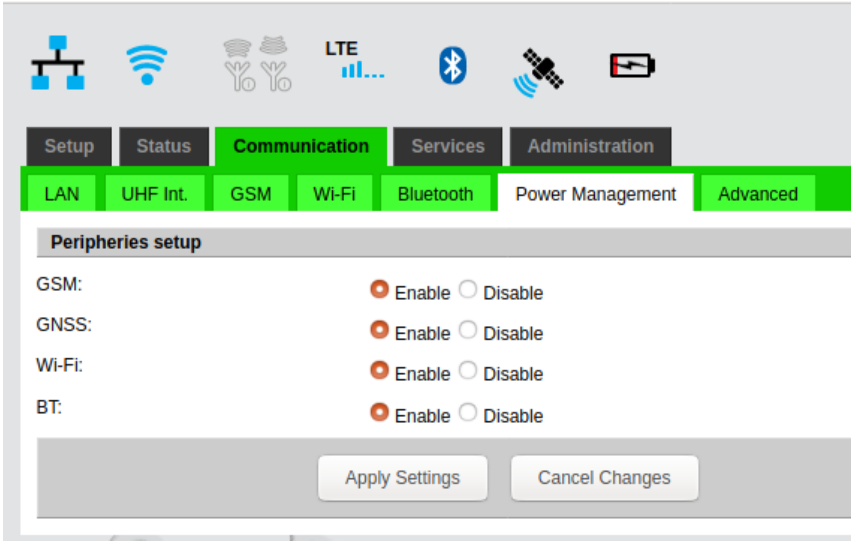


Figure 36. Power Management tab

The detailed connection status can be checked in the Status/GSM tab (see picture below):

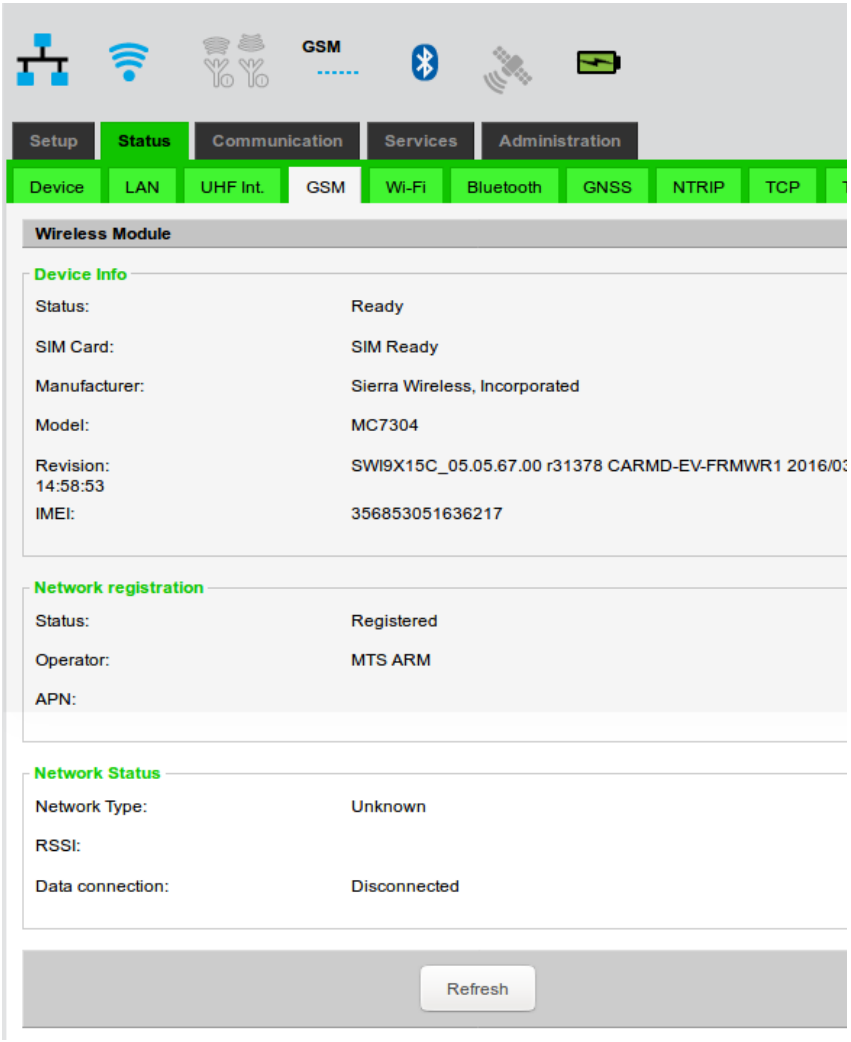


Figure 37. GSM Status tab

Figure 38. GNSS Status tab

The detailed status of the GNSS module can be checked in Status/GNSS tab (see picture below):

...Setup HPT435BT JL with external GNSS via network

1. Connect to HPT435BT JL via web interface.
2. Setup the External GNSS path (IP address and PORT).
   - In the Communication/Advanced tab set the correct path of the GNSS module (parameter Net GPS IP: PORT see at the picture below.)
   - Reboot the device from Administration/Management tab.

The detailed status of GNSS module can be checked in the Status/GNSS tab (see picture below).

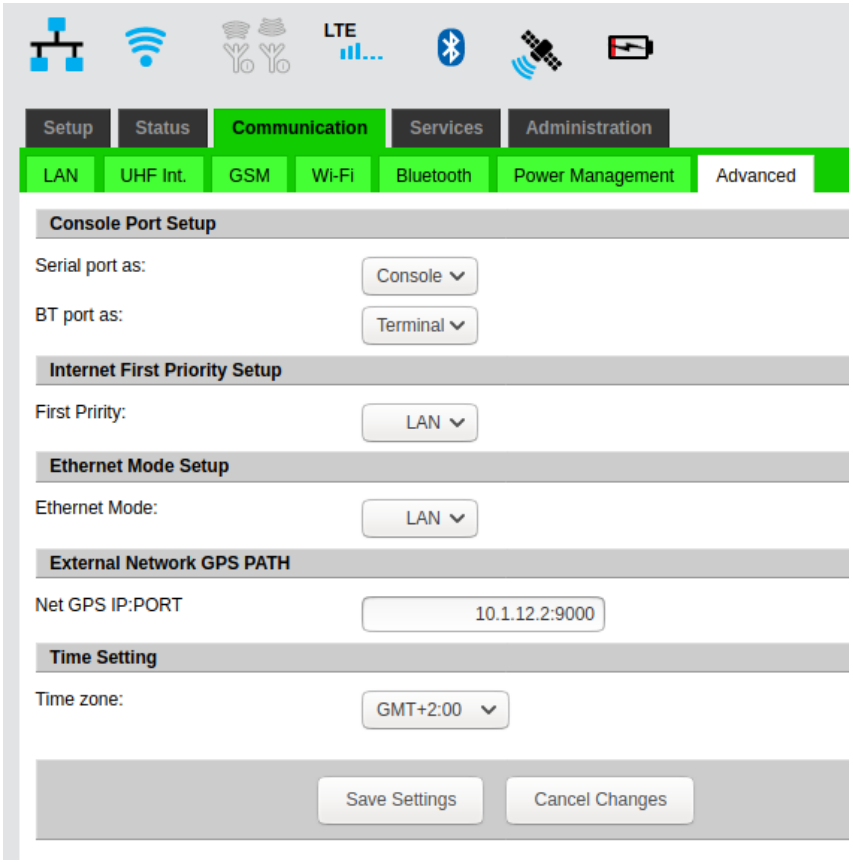


Figure 39. Advanced configuration tab

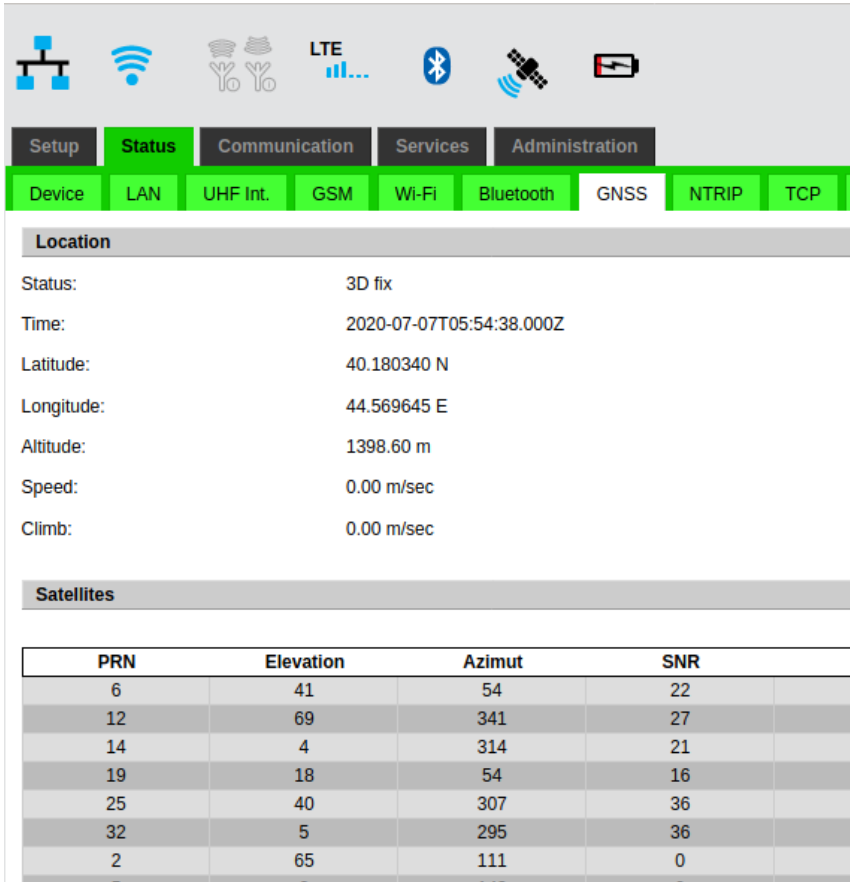


Figure 40. GNSS Status tab

...Setup HPT435BT JL Ethernet Bridge

1. Connect to HPT435BT JL via a web interface.

2. Setup the Ethernet as a Bridge.

Reboot the device from Administration/Management tab.

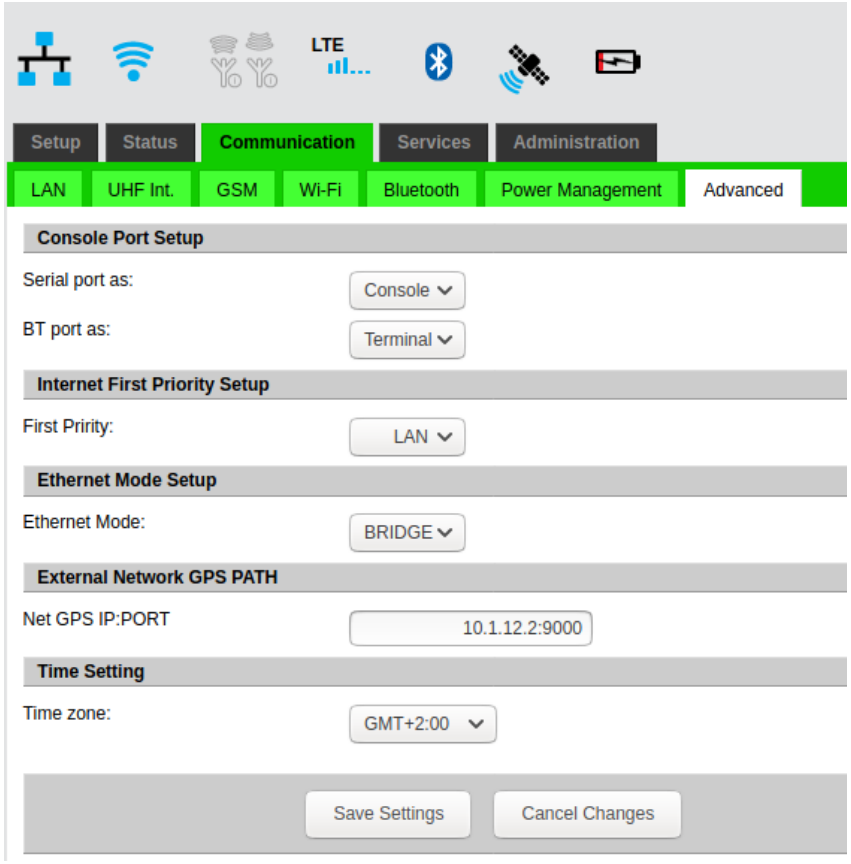


Figure 41. Advanced configuration tab

3. After the reboot, the device can be connected to HPT435BT JL via LAN cable.

The LAN configuration of the device needs the DHCP or static IP.

- If the static IP will be used, the IP address must be 10.1.12.2.
- In case when configured the DHCP, the HPT435BT JL will provide the IP address 10.1.12.2 to the device.

In the Bridge mode the port forwarding mechanism also is enabled (port from 1160 to 1169 will forward to device's IP).

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