NetView

User Manual

Version 1.0

December 2023

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1. Getting Started

NetView is a Windows application for easy configuration and status of JAVAD GNSS products. Before using *NetView*, use this manual to become familiar with its functions and learn how to install, launch, exit, and uninstall the program.

NetView software provides the following functionality:

1. **GNSS Receivers**

- Connections:
    - Serial, USB
    - TCP/IP (Ethernet port or Wi–Fi adapter)
    - Secure TCP/IP (SSL/TSL)
    - Bluetooth.

- Satellite display: total number and status of all visible and tracked satellites, skyplot, orientation plots.
- PVT display: real-time position, velocity, time and measurements.
- Reset GNSS: clear NVRAM, reset receiver, restore initial parameter values, reset RTK.
- Reports: general, parameters and options reports.
- Firmware Update: online from website or from a file.
- OAF: load from website or from an Option Authorization File.
- Configuration: by graphical user interface or by command line.
- Raw Data Files: Start / stop recording, delete files, downloading files.
- Terminal: send commands with prompt tips and view receiver's response.
- GNSS & Radio Spectra: collect data and display.
- Multiple Receiver Connections

2. **Modems**

- Internal Modem Configuration by Graphical User Interface or by command line.
- External Modem Configuration.
- Connect with Serial or USB.

3. Terminals

- Send commands to a device and see both command and response.
    - Serial, USB
    - TCP/IP (Ethernet ports or Wi-Fi adapter)
    - Secure TCP/IP (SSL/TSL)
    - Bluetooth

1.1 Setting up NetView

1.1.1 System Requirements

Check that you have the following required (or recommended) items before installing and using *NetView.*

Operation System Requirements:

Windows 10, Windows Server 2016, Windows Server 2012 (64–bit edition), Windows Server 2008 R2 SP1, Windows Server 2008 R2 SP1, Windows Server 2008 SP2.

Hardware Requirements:

- 1 GHz or faster processor
- 512 MB of RAM
- 850 MB of available hard disk space (x86)
- 2 GB hard drive (x64)

1.1.2 Installing NetView

Two methods of *NetView* installation are available from the JAVAD GNSS website.

To install an automatically updated version, download file setup.exe and launch it. The application will be downloaded from website and installed.

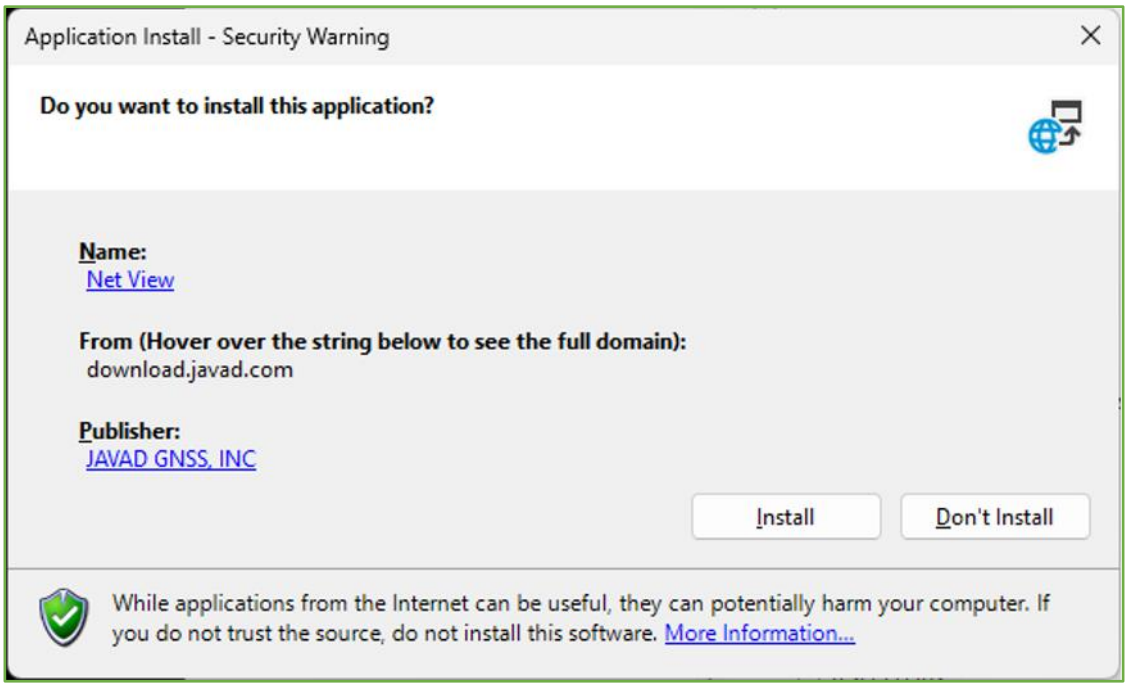


Figure 1. Installation with auto updating.

To install a version without automatically updating, download file *NetViewSetup_*.msi* and run it. Installation wizard will launch.

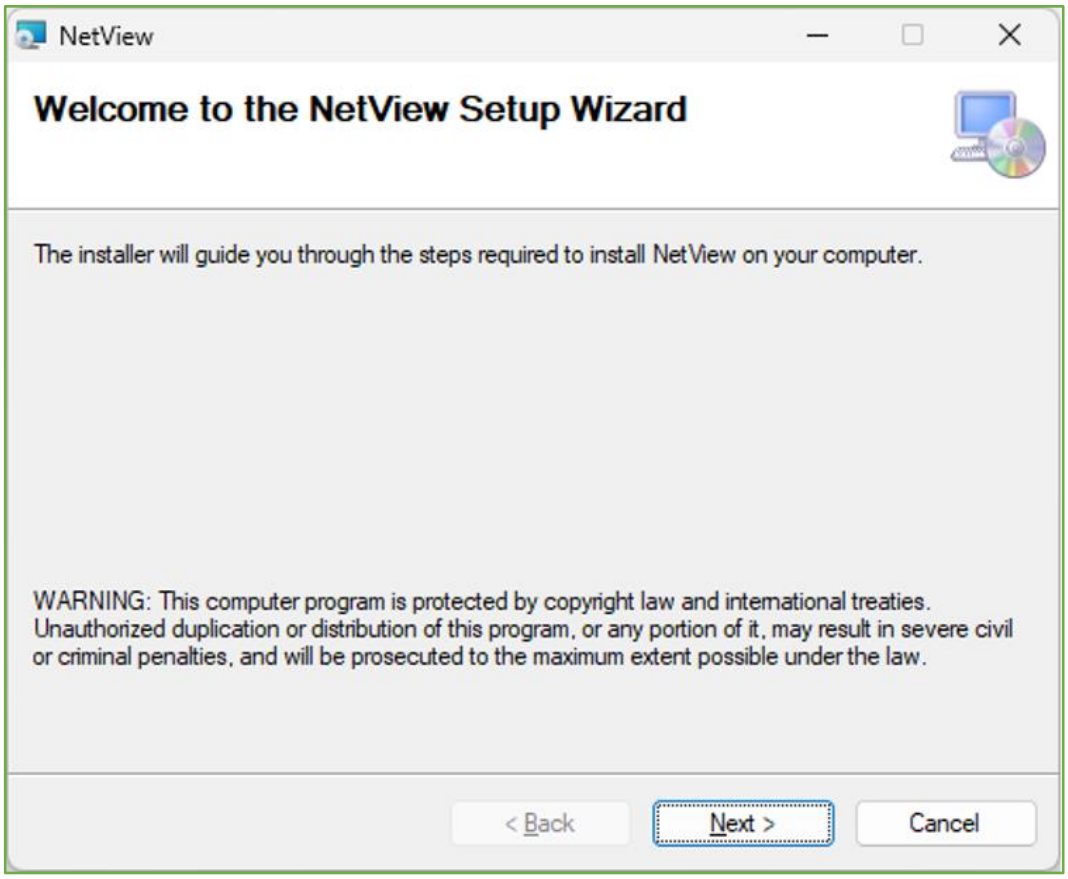


Figure 2. Installation without auto updating.

This installation method does not require an Internet connection. Both installations can operate simultaneously.

1.1.3 Uninstalling NetView

To uninstall NetView use *Start Menu* or *Settings* > *App & Features*. Find *NetView*, and click *Uninstall*. *NetView* will be uninstalled.

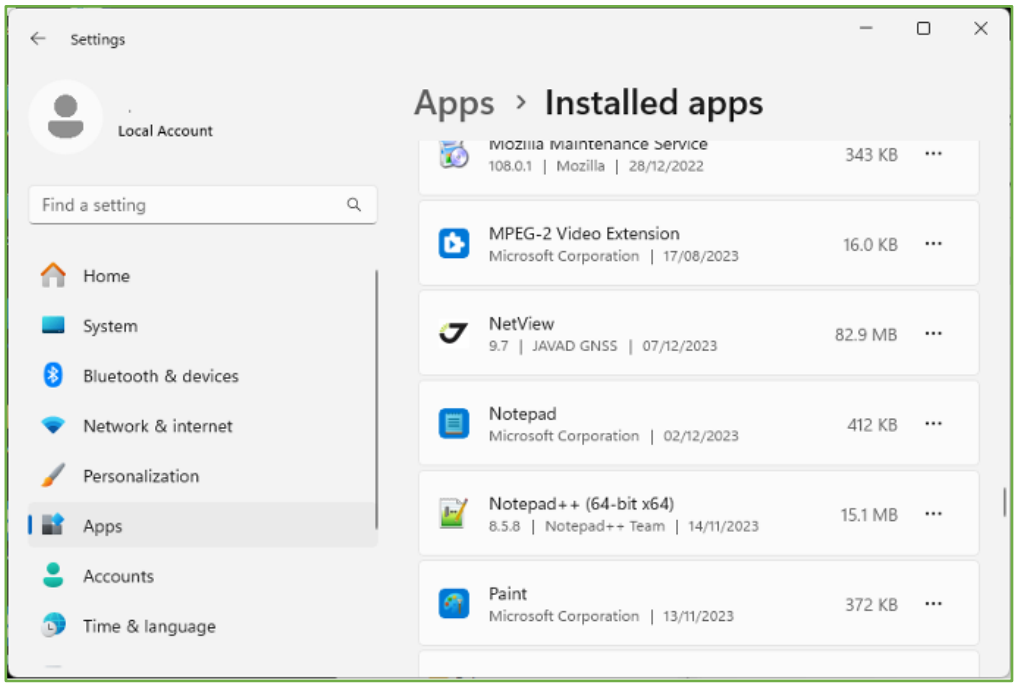


Figure 3. Uninstall.

1.1.4 Updating NetView

Automatically updated *NetView* installation checks updates after application closing. If a new version is available user will be prompted of updating when next start.

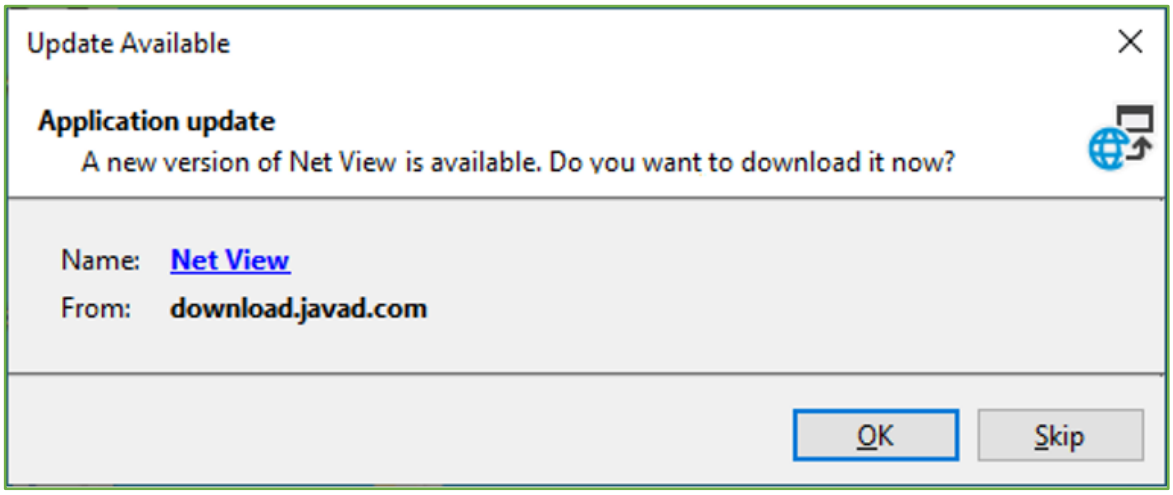


Figure 4. Update.

2. Getting Connected

2.1 Starting NetView

NetView can be launched, as any other Windows program, for example, with the *Start > All Programs > JAVAD GNSS > NetView*

Once *NetView* is launched, the *Main* window appears.

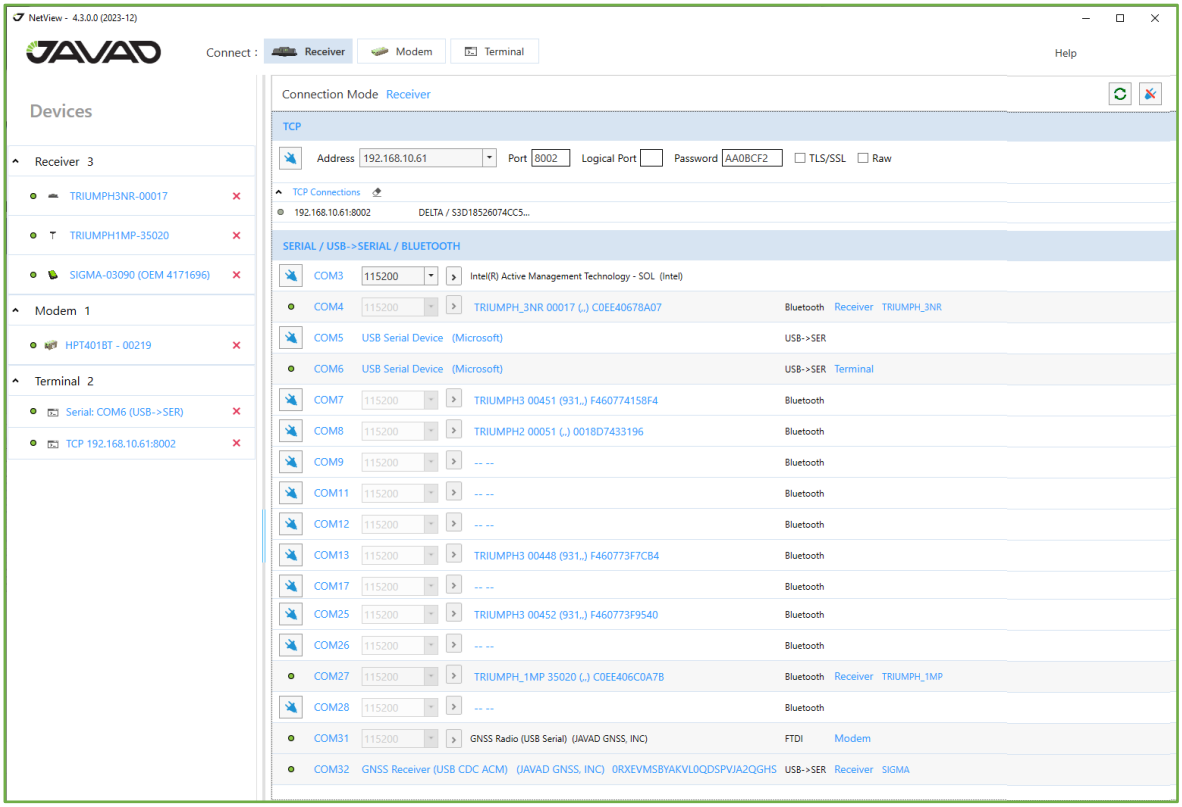


Figure 5. Main Window.

It contains *Connection Switcher, Connection Board*, *Devices* pane and *Help Menu*.

- *Connection Mode Switcher* – Receiver, Modem and Terminal buttons accordingly switch connection mode.

- *Connection Board* – Displays available communication interfaces and provides the ability to open a connection.
- *Devices Pane* – Contains list of connected devices grouped by *Receiver, Modem and Terminal.*
- *Help Menu* – Contains the links to *Drivers* page, Software *Manual and Application* page.

2.2 Connection Mode Switcher

Figure 6. Connection Mode Switcher.

- *Receiver Button* – Enables the GNSS Mode. It means that connection is established using GREIS protocol and the graphical interface to control JAVAD GNSS Receiver is provided.
- *Modem Button* – Enables the Radio Mode. The connection is established using the specific protocols and the graphic interface to control JAVAD GNSS Radio is provided. Radio mode allows only the serial communication interface.
- *Terminal Button* – Enables the Terminal Mode. The connection is established as is and the panel for the communication is provided.

2.3 Connection Board

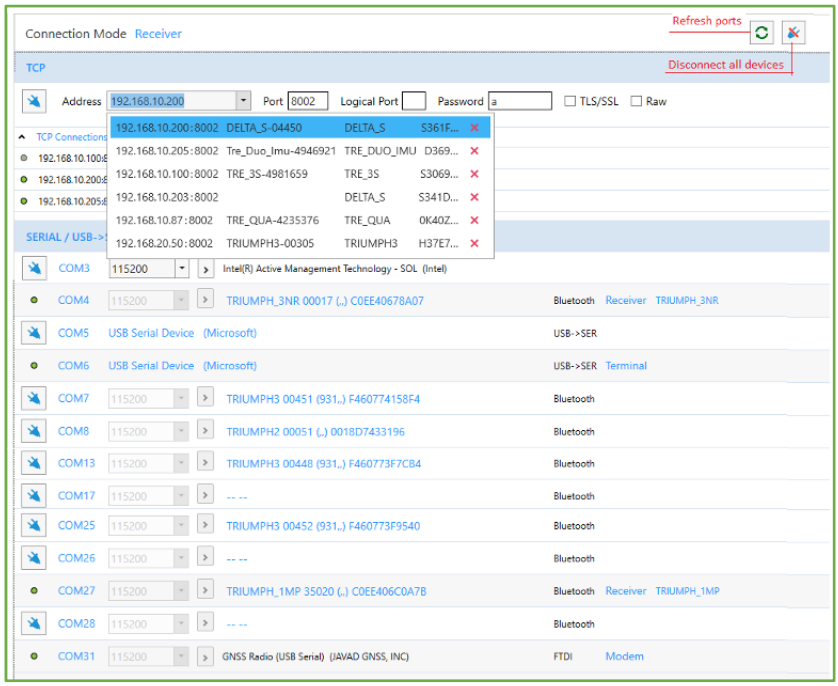


Figure 7. Connection Board.

Connection board provides access to available communication interfaces.

- *TCP* – Used to connect your computer and remote device. Disabled for the Modem mode.
- *SERIAL / USB > SERIAL / BLUETOOTH* – Used to connect via serial or virtual serial ports.

In the upper right corner, there are:

- *Refresh Button* – Refresh list of available interfaces.
- *Disconnect Button* – Close all the opened connections and clear *Devices* pane.

Please see below the detailed description of each communication interface settings:

TCP Panel

TCP Panel allows establishing bidirectional connection to receiver which is configured as *TCP* server (see *C [2, 4.4.6 TCP Server Configuration]*) via *LAN* (local area network), *WLAN* (wireless LAN) or Internet.

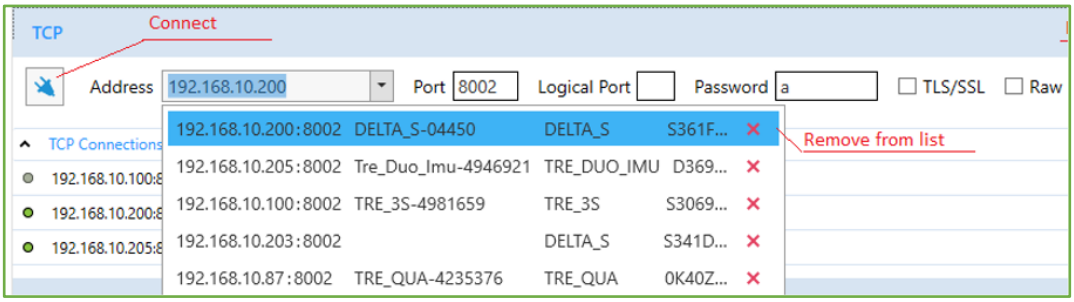


Figure 8. TCP Connection panel.

The following fields should be filled.

- *Address* – Host name or IP address of the receiver.
- *Port* – TCP port of the receiver. This is the port on which the receiver listens for telnet–like connections. The receiver allows up to five simultaneous telnet–like connections.
- *Logical Port* – One of the five logical port mapping (A, B, C, D, E). If the value is empty, then the connection is established with the first free logical port.
- *Password* – An arbitrary sequence of characters. If the receiver is configured to bypass the login/password authentication you may simply leave this field blank.
- *TLS/SSL* – Enables/disables the encrypting with cryptographic protocols that provide communications security over the Internet. This parameter should correspond with the receiver settings.
- *Raw* – Connection without authorization. It is used to connect via serial adapters.

By clicking *Connect,* the connection establishes.

The successfully established connections are stored and can be selected from the drop–down next time.

The expandable list displays all connections with application startup time. The green circle marks alive connection, gray closed ones.

Default LAN Settings

The JAVAD GNSS receivers have the next factory LAN– settings:

***IP* 192.168.2.2**

***Mask* 255.255.255.192**

***GW* 192.168.2.1**

The Receiver TCP Server default Configuration:

***Port* 8002**

The password is seven symbols of the receiver ID ending with the penultimate (ex. 03B0RGGQNDYWZ1UDNV9W8X36HZ –> 9W8X36H)

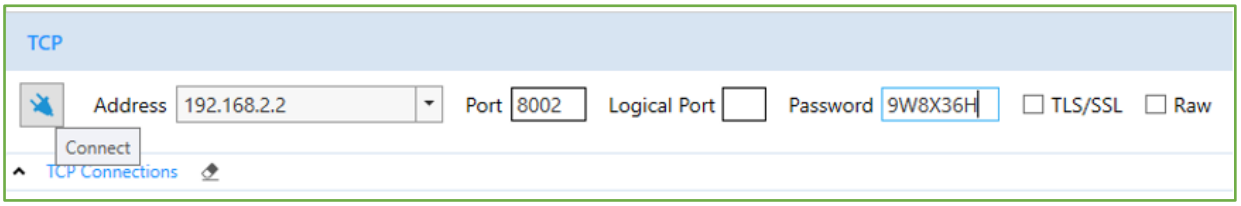


Figure 9. First TCP Connection.

To connect the receiver with PC for the first time, the PC Ethernet Adapter must be configured as:

Receiver IP Address: 192.168.2.3 (“3” – can be any in range of 3–63)

Network mask: 255.255.255.192

Default Gateway: 192.168.2.1

Serial Panel

Bidirectional communication with the device connected to the computer via the RS–232(422), USB cable or Bluetooth is established using Serial or Virtual Serial port.

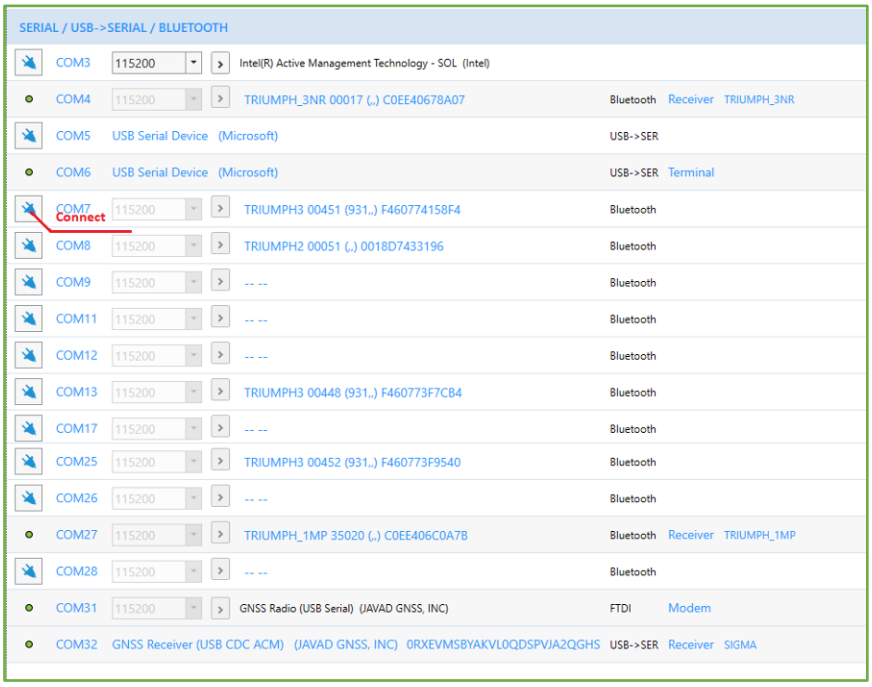


Figure 10. Serial Connection panel.

Serial panel provides the list of the existing Serial and Virtual Serial ports.

Information about connected device and driver are available for the virtual ports.

Set the following parameters for the physical serial and FTDI ports:

- *Baud Rate* – Specifies how fast data is sent over a serial line. *NetView* may not work well on the lowest rates. The rates higher than 115200 speeds must be enabled in OAF.
- *Advanced >Rts/Cts* – Transfer flow control parameter (request to send/ clear to send).
- *Connect* – Establishes the selected connection.

The successfully established connections are marked by the green circle and are completed by the information about the device.

Virtual Serial Ports for the Bluetooth are created by the operating system automatically.

Before connecting a *USB* equipped JAVAD GNSS devices with PC *USB* port, make sure that the *USB Port* option enabled in the receiver and the JAVAD GNSS *USB* driver installed on the computer. The drivers are available on the JAVAD GNSS website update page ***[***JAVAD GNSS update page***]***.

Installing Driver

The driver installation procedure varies slightly depending on the operating system used. In general, the installation procedure is as follows:

1. Visit the JAVAD GNSS website. Download the *USB* driver.
2. Unpack the archive into a separate, empty folder.
3. Run jgnssusb_x64L.exe or jgnssusb_x86L.exe depends on PC Operating System Type.
4. Connect the receiver to the computer through the supplied *USB* cable. Turn the receiver on.
5. Windows will automatically detect the new hardware device. Follow the on–screen instructions to finish installation process.

After Windows finishes installing the driver, you will be able to communicate the receiver connected with the computer via USB using virtual serial port.

Some receivers do not require a USB driver.

2.4 Devices Pane

After connecting successfully, the device is added to the corresponding group of *Devices* pane.

The Device item displays:

- *Connection State* – green circle – connected, gray – disconnected.
- *Name* – By default is created from the *Model* and *Identifier* of the receiver or modem. Double click to change. Name is stored and will be used next time.
- *Close Button* – Disconnect from the device, close device page and remove the device from the list.

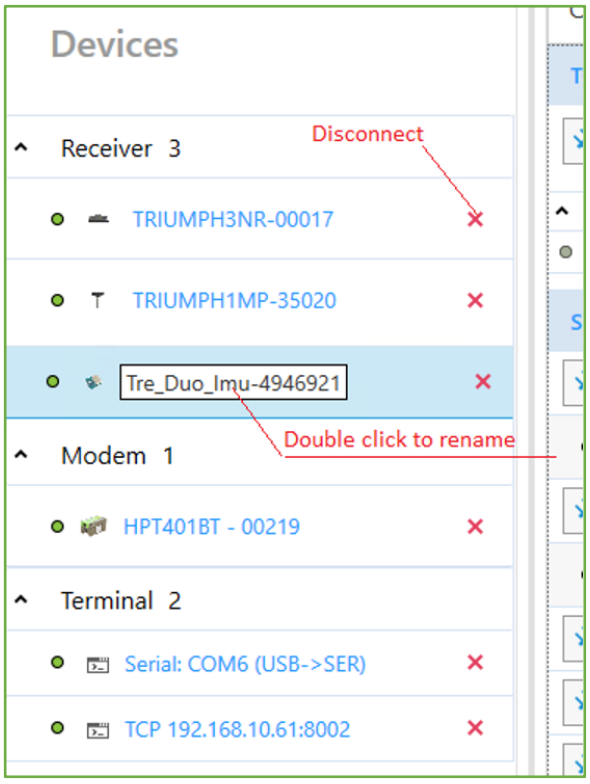


Figure 11. Devices pane.

Clicking on an item opens a device page in the right pane.

To disconnect from all the devices and clear *Devices* pane, click the *Disconnect* button on the *Connection Board*.

2.5 Closing NetView

To disconnect from the receiver, click the *Disconnect* button on the *Receiver* page or on the *Devices Pane*.

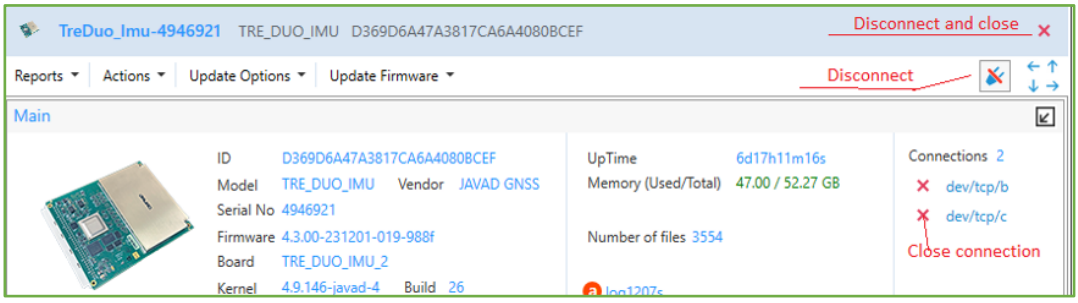


Figure 12. Disconnect and Close using the receiver page.

To disconnect from all the devices, click the *Disconnect* button on the *Connection Board*.

If the device has not been disconnected by the time the program is terminated, the connection will be automatically broken before *NetView* is closed.

If the receiver is in the file transferring mode or connection is captured by the Greis Commands terminal, the application cannot close the connection and the warning will be displayed.

Note: It is strongly recommended to close the connection with the device prior to switching the receiver off and disconnecting the cable.

3. GNSS Receiver

3.1 Operation

Connect to the receiver as described in *Getting Started*.

Click on the item in *Receivers* list on *Devices* pane. The *Receiver* page will appear.

Receiver page allows controlling the different aspects of receiver's functionality and will be detail described in the next chapters.

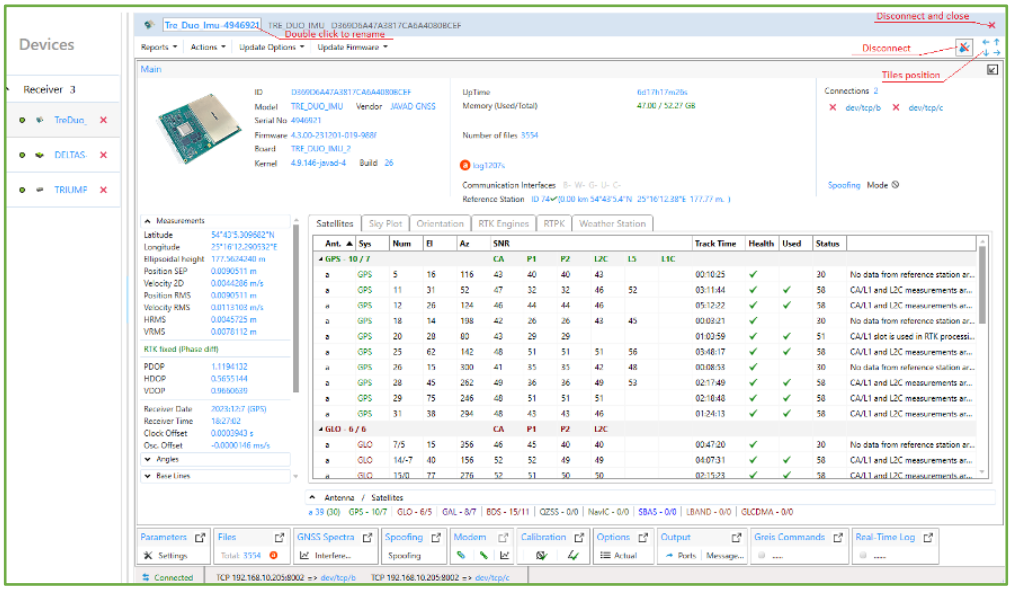


Figure 13. Receiver Page.

Receiver page consists of the *Header*, *Menu Bar*, *Tile View* and *Status Bar*.

Header:

- *Name* – Assigned by default first time. Double click to change. Name is stored and used next time.

- *Model, Identifier* – *Model* and ID of the receiver.
- *Close Button* – Disconnect from the device, close device page and remove device from the list on *Devices* pane.

Menu Bar:

- *Reports Menu* – Main info, options and parameters reports.
- *Actions Menu* – Performs reset, init parameter, clear NVRAM, init file system, reset RTK actions to the receive.
- *Update Options* – Allows update receiver options online from JAVAD GNSS website or from Option Authorization File.
- *Update Firmware* – Allows update GNSS firmware online from JAVAD GNSS website or from a file.
- *Disconnect Button* – Disconnect from the device.
- *Tile Position Button* – Arrange collapsed tiles to the chosen position.

Tiles:

- *Main* – Receiver info, status parameters, connection state, measurements, satellites table, sky plots, orientation, RTK engines, RTPK, weather station.
- *Parameters* – Graphic interface for the configuring of the receiver.
- *Files* – Workings with the files in receiver memory.
- *Spectra* – Graphic interface for the collecting of the GNSS spectra.
- *Spoofing* – Table of the spoofing indicators for all satellites.
- *Modems* – Graphic interface for the configuring of the communication module, pairing with the external radio and collecting radio spectra.
- *Calibration* – Graphic interface for the calibrating IMU–module, compass and gyroscope.
- *Greis Commands* – Manual mode terminal for the GREIS commands (see *[2]***.**)
- *Real–Time Logging* – Logging jps or rtcm data to the PC memory.

To expand (collapse) a tile click on the arrow at the top right corner.

The *Modems* and *Calibration* tiles are only available for receivers that have the appropriate modules.

Status Bar is located at the bottom of the page and displays connection state, current operation and progress of the operation.

3.1.1 Reports

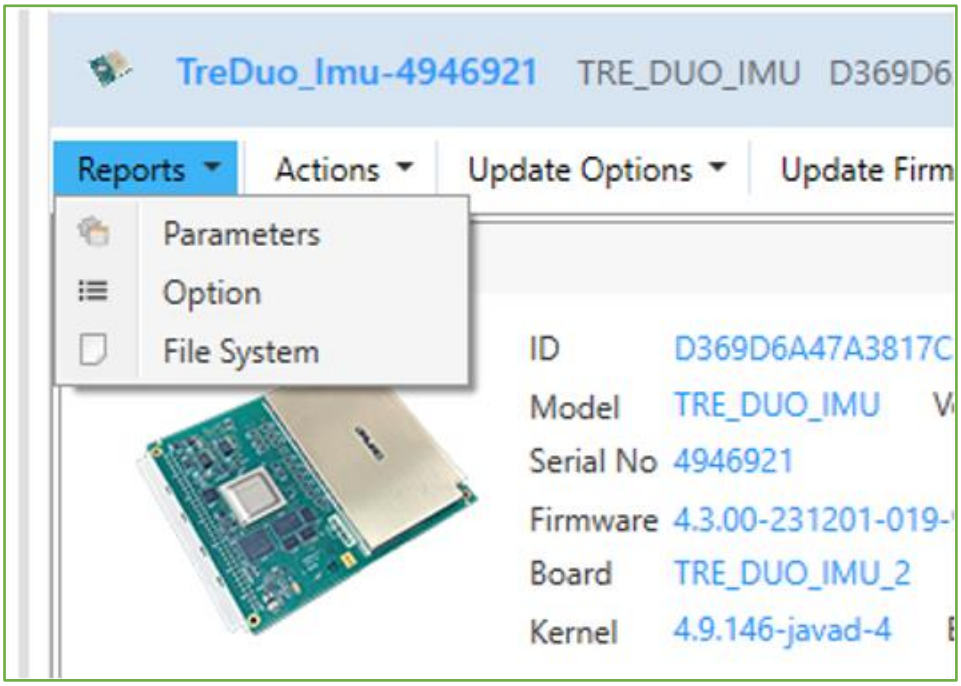


Figure 14. Reports.

The following reports on the receiver can be generated:

- *Parameters* – The receiver's characteristics and list of all the parameters with values.
- *Options* – The receiver's characteristics and list of options with current statuses (*Receiver Options* tile).
- *File System* – The receiver's characteristics and list of all the files (name, size, modified date).

Select the desired report from the *Reports Menu* and the location for report saving in the *Save File Dialog* which will be opened. The report will be created and saved in a text file.

3.1.2 Actions

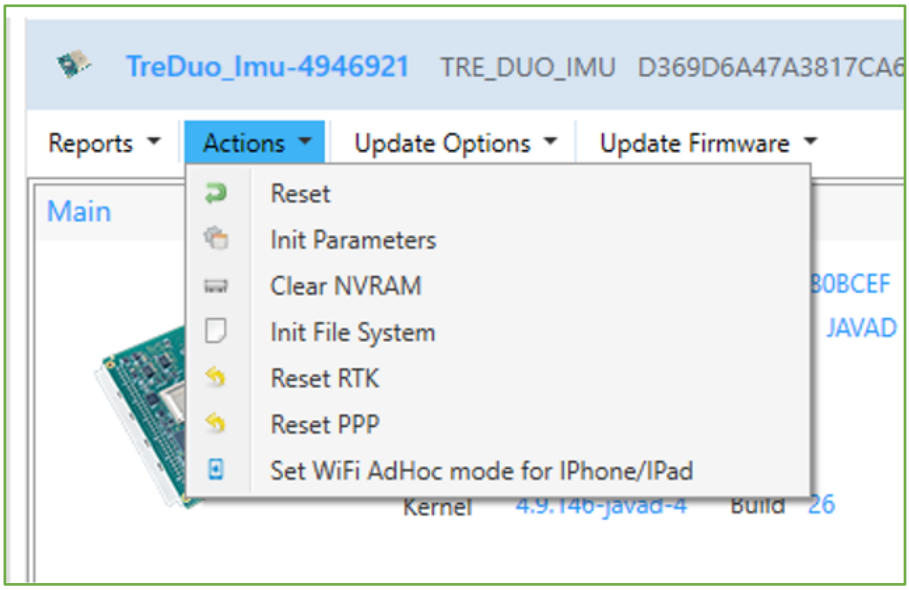


Figure 15. Actions.

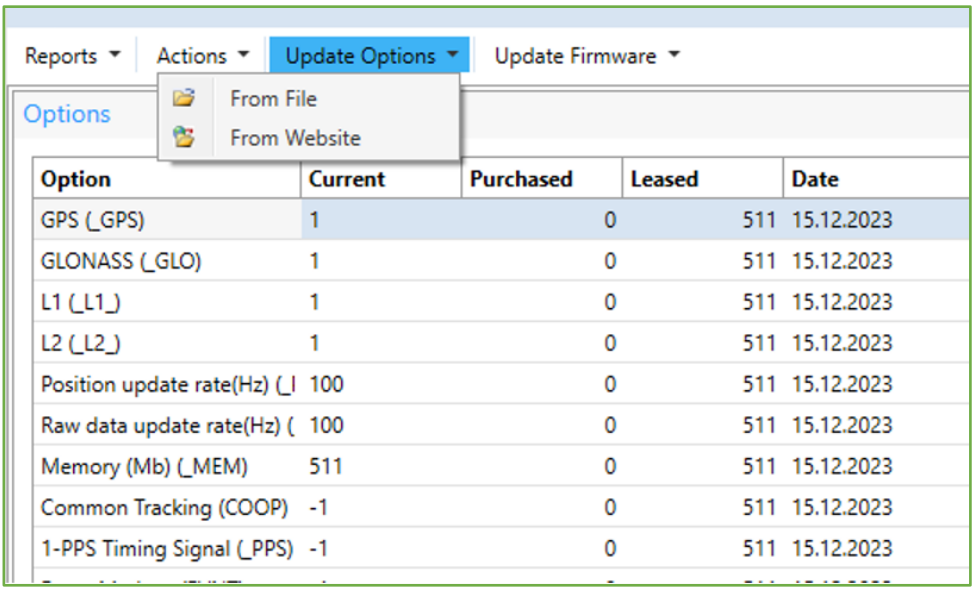
Initialization of the receiver can be performed using the following actions from the menu *Actions*:

- *Reset* – Reset (reboot) the receiver. From a functional point of view, the reset is equivalent to turning the power off and then back on.
- *Init Parameters* – to set all the receiver parameters to their default values:
- *Clear NVRAM* – to clear NVRAM and reboot receiver. All the data stored in the NVRAM (almanacs, ephemeris, etc.) will be lost; all the parameters will be set to their default values after reboot.
- *Init File System* – to initialize the file system (i.e., reformat the underlying medium). All files stored in the receiver will be lost. The operation can take some time depends of the memory size. Its progress is shown in the bottom status bar.
- *Reset RTK* – to reset RTK engine.
- *Reset PPP* – to reset RTK engine.
- *Set WiFi Ad Hoc mode for iPhone/iPad* – to configure receiver as WiFi Ad Hoc.

3.1.3 Update Options

Receiver options can be updated via Internet or from *OAF*–file.

To see actual options expand *Options* tile. Clicking *Refresh* button requests options at the receiver and fills the list.



Option	Current	Purchased	Leased	Date
GPS (_GPS)	1	0	511	15.12.2023
GLONASS (_GLO)	1	0	511	15.12.2023
L1 (_L1_)	1	0	511	15.12.2023
L2 (_L2_)	1	0	511	15.12.2023
Position update rate(Hz) (_I	100	0	511	15.12.2023
Raw data update rate(Hz) (	100	0	511	15.12.2023
Memory (Mb) (_MEM)	511	0	511	15.12.2023
Common Tracking (COOP)	-1	0	511	15.12.2023
1-PPS Timing Signal (_PPS)	-1	0	511	15.12.2023

Figure 16. Options Updating.

Uploading OAF from File

Click *From File* button and select **.jpo* or **.opt* file in *Open Options File* window. File name must correspond to the receiver identifier. Otherwise, the warning will be shown.

Uploading the options from file is happening the same way as via Internet.

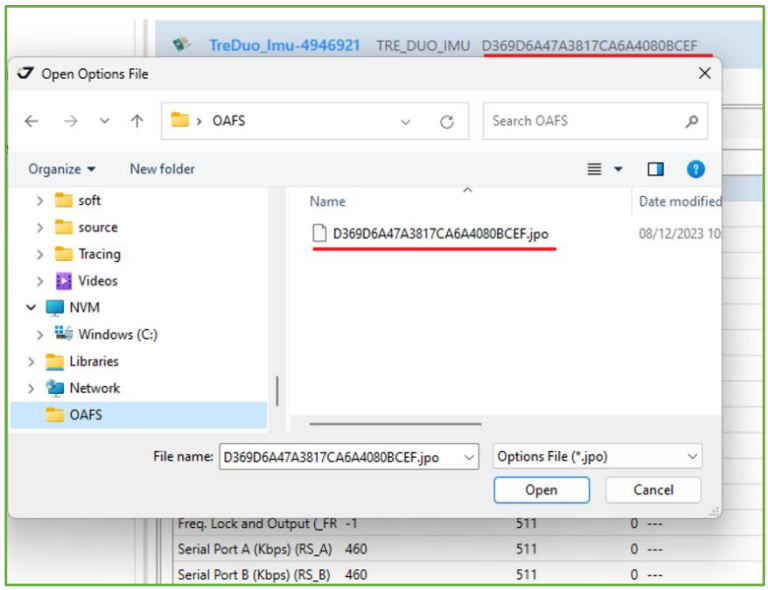


Figure 17. Updating Options from jpo–file.

Uploading OAF via Internet

Click *From Website* button to upload options from Internet and confirm the intention.

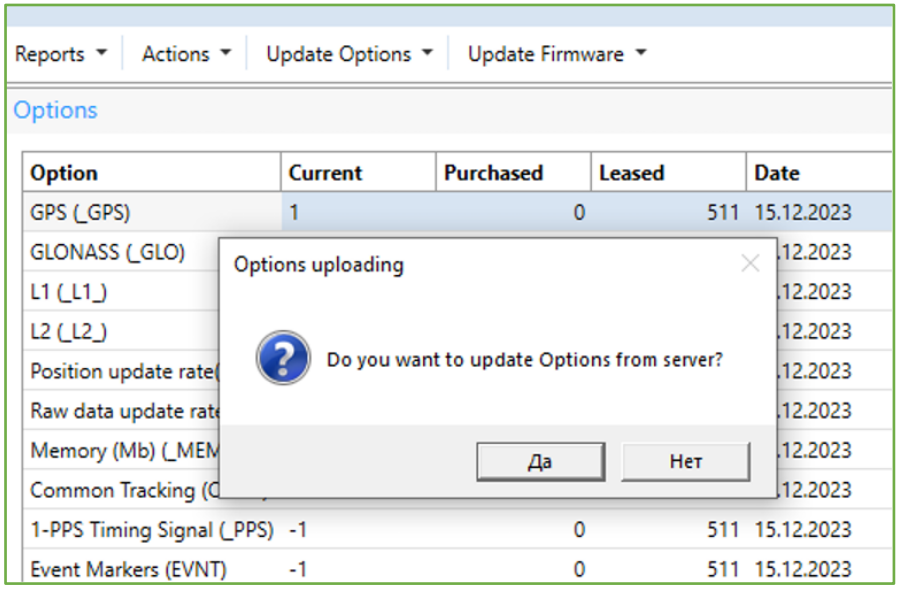


Figure 18. Updating Options via Internet.

The status of the uploading is displayed in the status bar.

After *Options* is uploaded receiver *NVRAM* is cleared and then it is reset.

To see updated *Options* click *Refresh* button after receiver reconnects.

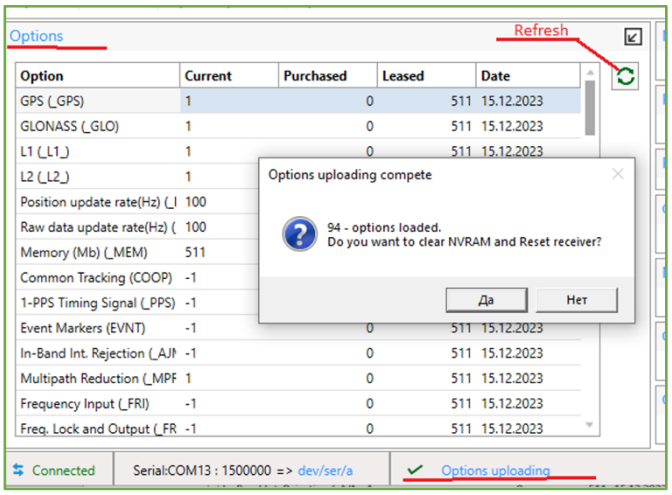


Figure 19. Options are uploaded.

Update Firmware

Firmware of the receiver can be updated from file or via Internet.

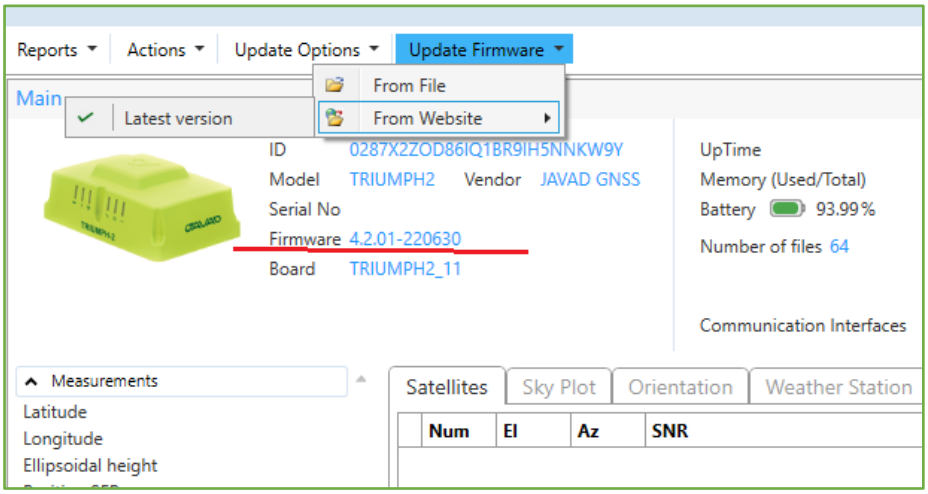


Figure 20. Update Firmware.

Updating from File

Select From File and choose firmware file in *Open File Dialog*. If firmware is suitable to the receiver model and has higher version file uploading will be started. Otherwise, the warning appears.

Updating from Internet

Select *From* Website>Last *version* to load last available firmware. Last version is available on JAVAD GNSS website ***[3]***.

After firmware file is downloaded from the site and has higher version file uploading will be started. Otherwise, the warning appears.

Status bar at the bottom of the window shows process progress after every part of the firmware uploaded receiver reboots and reconnects.

To cancel firmware downloading/updating click *Cancel FW Downloading* / *Cancel File Transfer* button.

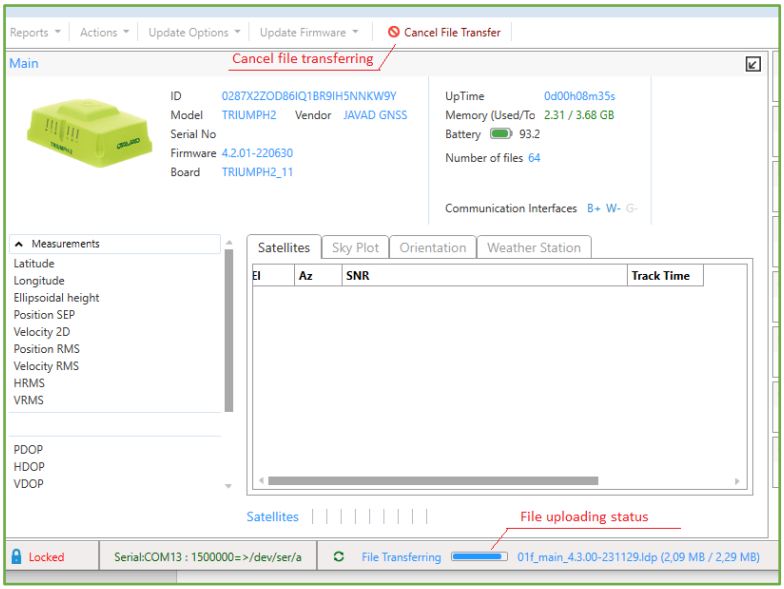


Figure 21. Firmware Updating.

3.2 Monitoring

Main Tile shows the appearance of the receiver, its characteristics, available connections, and set of the panes and tabs for monitoring the measurements such as: *Measurements*, *Links*, *Satellites, Sky plots*, *Orientation*, *Angle and Base Lines, RTK engines, RTPK and Weather Station*.

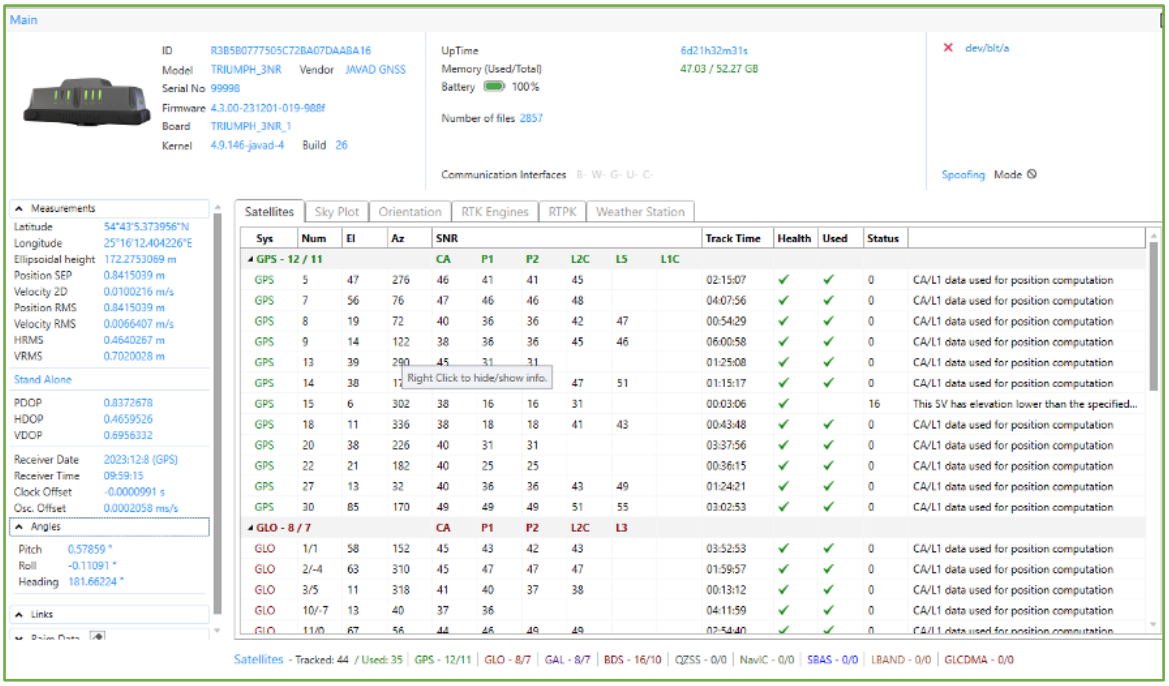


Figure 22. Receiver Main Tile.

3.2.1 Receiver Info

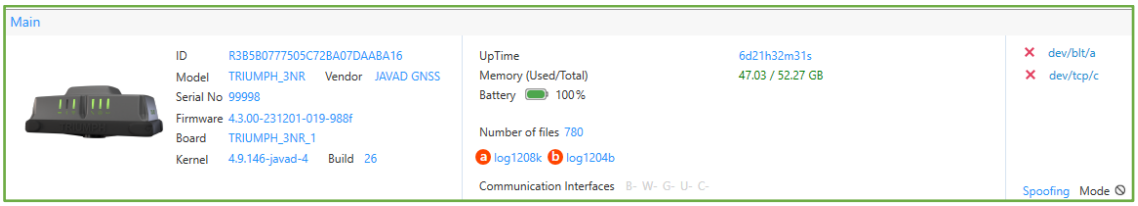


Figure 23. Receiver info.

Receiver *Main Tile* provides the following information:

- *Image* of the receiver
- *Receiver Id* – Receiver's identifier
- *Model* – The model of the receiver, e.g., TRIUMPH1
- *Vendor* – JAVAD GNSS
- *Serial Number* – A number assigned to the receiver on the factory
- *Firmware Version*
- *Board Version*
- *Kernel – lnux kernel version*
- *UpTime* – Time elapsed since last receiver reboot
- *Memory* (Used/Total) – Used/Available Memory
- *Battery* – Battery charge status
- *Number of files* – Number of files in the receiver memory and recording status
- *Communication interfaces* – Indicates whether the following communication interfaces are available and enabled:
    - B – Bluetooth
    - W – Wi–Fi
    - G – GSM
    - U – UHF / FH
    - C – Communication Board (for TVS)

- *Reference station* – Reference station ID, distance, position and GPS validity are displayed if corrections are received.
- *Connections* – Amount and type of not locked connections. Connections are locked for the file transferring, manual mode, daisy chain, real time logging. Locked connections cannot be closed and displayed in the status bar (dark blue for the file transferring, red for others.)

Note: The static parameters can be copied to clipboard by double clicking.

3.2.2 Measurements

Measurements pane displays the basic tracking information for the locked satellites. It shows the receiver target point current position, coordinates, and the time–frequency parameters describing the behavior of the receiver's local oscillator.

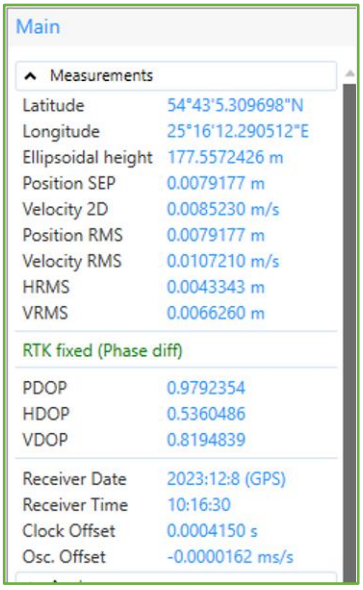


Figure 24. Measurements.

Navigation information

- *Latitude, Longitude, Ellipsoidal height* – geodetic coordinates.
- *Position SEP* – Spherical Error Probable.
- *Velocity 2D* – Geodetic Velocity (m/s).
- *Position RMS* – position RMS error (m).
- *Velocity RMS* – velocity RMS error (m/s).
- *HRMS* – horizontal position RMS error (m).
- *VRMS* – vertical position RMS error (m).
- *Solution type* – Standalone / DGPS /RTK float / RTK fixed .
- *PDOP* – Position dilution of precision.

- *HDOP* – Horizontal dilution of precision.
- *VDOP* – Vertical dilution of precision.
- *Receiver date* – “Date” part of the full receiver time representation (*[RD]* message).
- *Receiver time* shows the receiver’s current time within day. This value is taken from the message [~~]. For more information about [~~]

Note: Currently the message [~~] reports the time within day in the GPS time scale only.

- *Clock offset* – describes the time derivative of (*Trr* – *Tr*), where Tr designates the receiver time, *Trr* designates the receiver reference time.This parameter is obtained from the *[TO]* message and is expressed in seconds.
- *Osc. Offset* is derived from the message *[DO]* and it is expressed in ppt. The parameter describes the difference between the *VCO* nominal and quiescent frequencies.

For detailed description of the messages used for navigation information see ***[****2 Chapter 3. Receiver Messages]*.

Angles, Base Lines

Available for multi–antenna receivers, models with IMU–module and/or compass and gyroscope, and receivers in hd–mode.

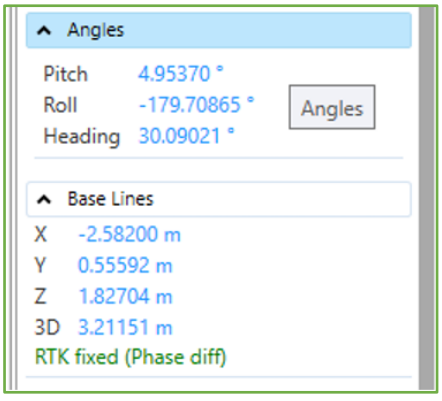


Figure 25. Angles. Base Lines.

The following parameters are shown and obtained from the messages – *[AR]([ha], [ar])*:

- *Pitch* **–** pitch angle [deg] (graphically presented on the left plot)
- *Roll* **–** roll angle [deg]
- *Heading* **–** heading angle [deg] (graphically presented on the right plot)

[mr] ([BL]) – Baseline vectors:

- *X* **–** baseline vector M–S0 in the current epoch[m]
- *Y* **–** baseline vector M–S1 in the current epoch[m]
- *Z* **–** baseline vector M–S2 in the current epoch[m]
- *Solution*

Links

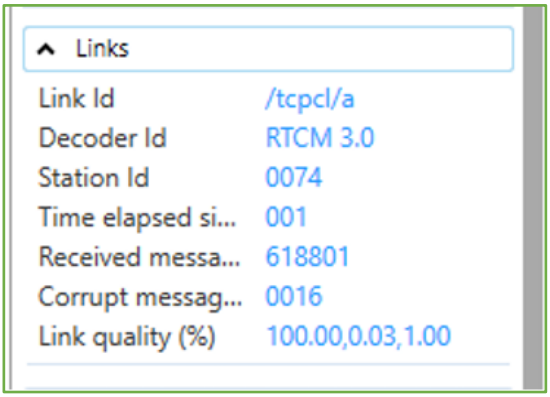


Figure 26. Links.

Links pane displays the status of the data links associated with the corresponding serial ports/modem.

For each link the following fields are shown:

- *Link Id* – Corresponding stream.
- *Decoder Id* – RTCM / RTCM 3.0 / CMR / JPS / SISNeT.
- *Station Id* – Reference station identifier.
- *Time elapsed since…* – Time [in seconds] elapsed since receiving last message (maximum value = 999). Estimated with an accuracy of ±1 second.
- *Received messages* – Number of received messages (between 0001 and 9999). If no message has been received, this data field contains zero.
- *Corrupt messages* – Number of corrupt messages (between 0001 and 9999). If no corrupt messages have been detected, this data field is set to zero.
- *Link quality* (%) – Data link quality in percent (0–100)

3.2.3 Number of Satellites

Figure 27. Number of Satellites.

Number of satellites pane shows:

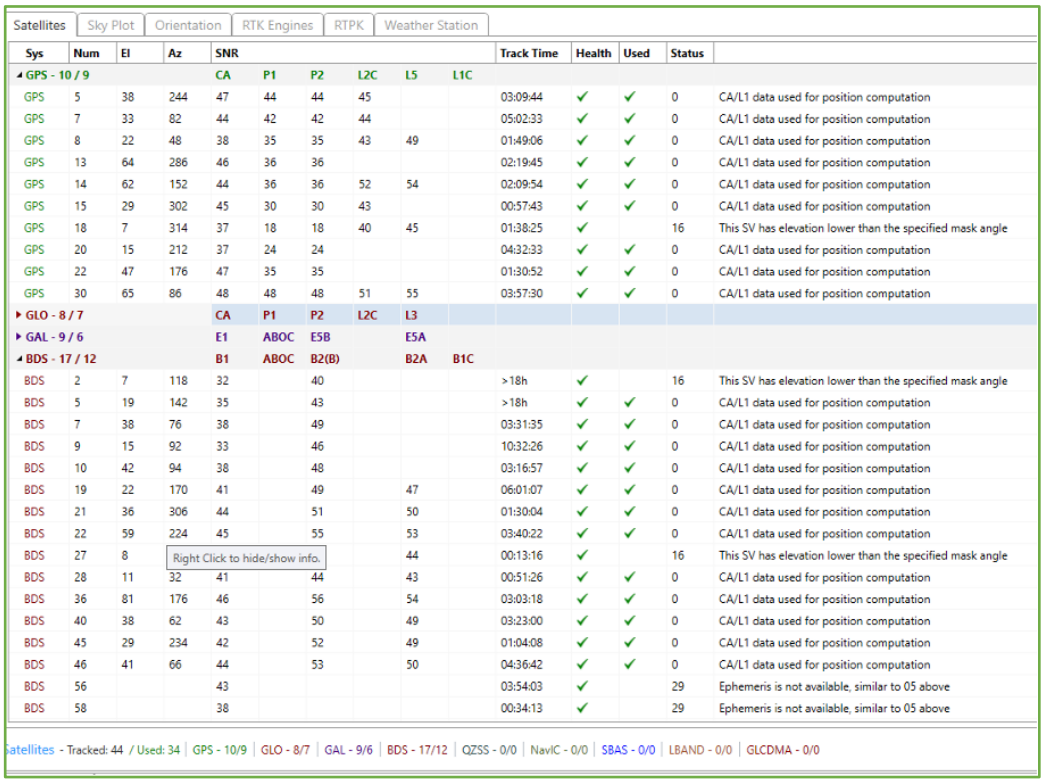
- Total number of the locked satellites.
- Total number of the satellites used in the position calculating.
- The number of the locked satellites for each satellite system.
- The number of satellites used in the position calculating (after slash).

For multi antenna receiver number of satellites pane contains information for each antenna.

Figure 28. Multi Antenna Number of satellites.

3.2.4 Satellite Table

Satellite table shows all tracked satellites, their elevation, azimuth, signal–to–noise ratio and status. Satellites are grouped by the constellation. Each column of the table can be sorted.



Sys	Num	El	Az	SNR						Track Time	Health	Used	Status	
GPS - 10 / 9				CA	P1	P2	L2C	L5	L1C					
GPS	5	38	244	47	44	44	45			03:09:44	✓	✓	0	CA/L1 data used for position computation
GPS	7	33	82	44	42	42	44			05:02:33	✓	✓	0	CA/L1 data used for position computation
GPS	8	22	48	38	35	35	43	49		01:49:06	✓	✓	0	CA/L1 data used for position computation
GPS	13	64	286	46	36	36				02:19:45	✓	✓	0	CA/L1 data used for position computation
GPS	14	62	152	44	36	36	52	54		02:09:54	✓	✓	0	CA/L1 data used for position computation
GPS	15	29	302	45	30	30	43			00:57:43	✓	✓	0	CA/L1 data used for position computation
GPS	18	7	314	37	18	18	40	45		01:38:25	✓		16	This SV has elevation lower than the specified mask angle
GPS	20	15	212	37	24	24				04:32:33	✓	✓	0	CA/L1 data used for position computation
GPS	22	47	176	47	35	35				01:30:52	✓	✓	0	CA/L1 data used for position computation
GPS	30	65	86	48	48	48	51	55		03:57:30	✓	✓	0	CA/L1 data used for position computation
GLO - 8 / 7				CA	P1	P2	L2C	L3						
GAL - 9 / 6				E1	ABOC	E5B		E5A						
BDS - 17 / 12				B1	ABOC	B2(B)		B2A	B1C					
BDS	2	7	118	32		40				>18h	✓		16	This SV has elevation lower than the specified mask angle
BDS	5	19	142	35		43				>18h	✓	✓	0	CA/L1 data used for position computation
BDS	7	38	76	38		49				03:31:35	✓	✓	0	CA/L1 data used for position computation
BDS	9	15	92	33		46				10:32:26	✓	✓	0	CA/L1 data used for position computation
BDS	10	42	94	38		48				03:16:57	✓	✓	0	CA/L1 data used for position computation
BDS	19	22	170	41		49		47		06:01:07	✓	✓	0	CA/L1 data used for position computation
BDS	21	36	306	44		51		50		01:30:04	✓	✓	0	CA/L1 data used for position computation
BDS	22	59	224	45		55		53		03:40:22	✓	✓	0	CA/L1 data used for position computation
BDS	27	8						44		00:13:16	✓		16	This SV has elevation lower than the specified mask angle
BDS	28	11	32	41		44		43		00:51:26	✓	✓	0	CA/L1 data used for position computation
BDS	36	81	176	46		56		54		03:03:18	✓	✓	0	CA/L1 data used for position computation
BDS	40	38	62	43		50		49		03:23:00	✓	✓	0	CA/L1 data used for position computation
BDS	45	29	234	42		52		49		01:04:08	✓	✓	0	CA/L1 data used for position computation
BDS	46	41	66	44		53		50		04:36:42	✓	✓	0	CA/L1 data used for position computation
BDS	56			43						03:54:03	✓		29	Ephemeris is not available, similar to 05 above
BDS	58			38						00:34:13	✓		29	Ephemeris is not available, similar to 05 above

Figure 29. Satellite Table.

Parameter	Description
Sys	Satellite System: • *GPS* • *GLO* – GLONASS • *GAL* – GALILEO • *SBAS* • *QZSS* • *BDS* – BeiDou (COMPASS) • *NavIC* • *GLCDMA* Satellite systems are marked by different colors
Num	SV PRN SV PRN / SV Frequency Number for GLONASS. If the character "*" is shown next to PRN in the column, this means that almanac data are unavailable for the corresponding satellite
EL	Elevation angle in degrees.
AZ	Azimuth in degrees
SNR	Signal–to–noise ratio [dB*Hz] for all signals.
Track Time	Time elapsed since the last loss–of–lock in the C/A channel for the corresponding satellite. This time is given in minutes or, if the symbol ":" is specified in the column, in seconds.
Health	Green check mark if healthy, otherwise, red exclamation
Used	Green check mark if used in the position calculated.
Status	Satellite navigation status. For a complete description of the satellite navigation status structure, see *[2, Table 3–4. Satellite Navigation Status]*.
Status description	Complete description of the satellite navigation status according *[2, Table 3–4. Satellite Navigation Status]*.

Table 1 Tracking Parameters.

Satellite table for multi antenna receiver has also antenna column supporting sorting.

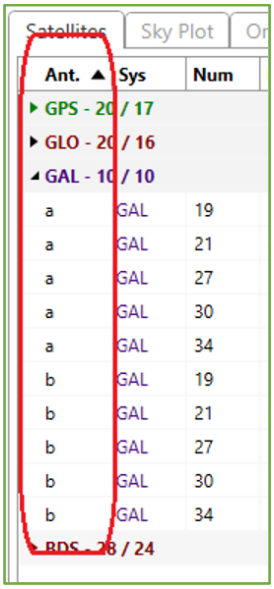


Figure 30. Multi Antenna Satellite Table.

3.2.5 Sky Plots

The *Sky Plot* tab shows graphic representation of the satellite positions in the sky.

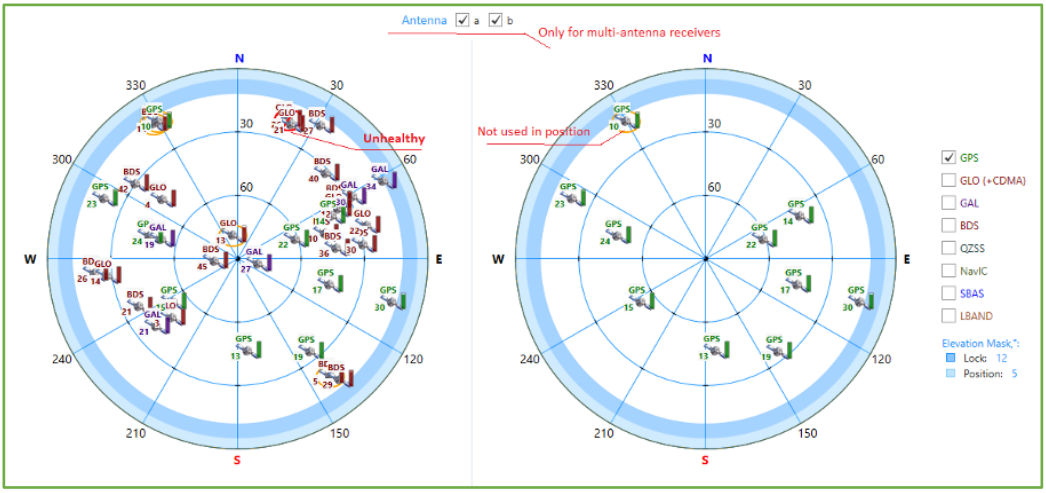


Figure 31. Sky Plots

Each concentric circle represents the elevation angle above the horizon. The outermost circle corresponds to 0 degrees above the horizon. The center of the sky plot represents 90 degrees above the horizon.

Satellite markers for different systems are shown by the different colors. The degree of filling of marker reflects the value of the signal–to–noise ratio. Satellite info is shown when mouse is over it. Elevation masks for the tracking and used in the position calculating are marked in the blue light blue correspondingly. Unhealthy satellites are displayed in a red crossed circle. Satellites that are not used in the calculated position are in an orange circle.

The flags on the right allow the user to select the desired systems to be displayed on the right plot.

For multi–antenna receivers, sky plots allow to display satellites for each antenna.

3.2.6 Orientation

This presentation is available for multi–antenna systems, receivers with IMU–module or/and compass, or in hd–mode and displays the orientation of the system.

There are two graphs on the tab: pitch–roll and heading.

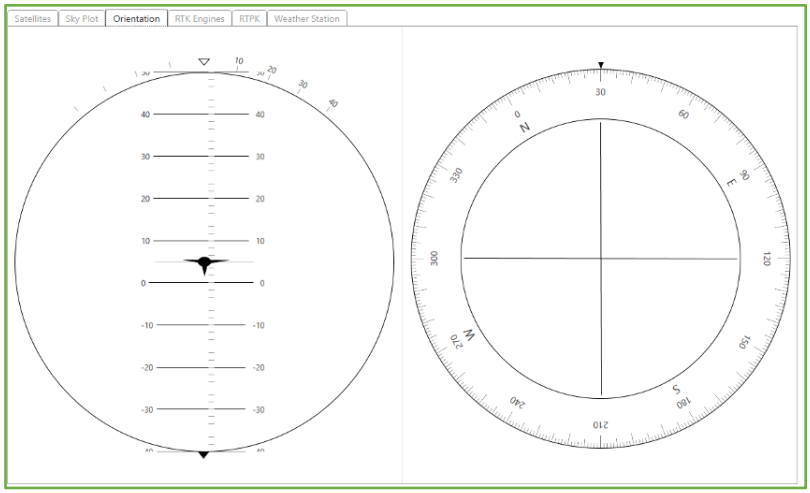


Figure 32. Orientation tab.

3.2.7 Multi–RTK

RTK Engines tab is available if Multi–band RTK mode is on and RTCM3 corrections are receiving.

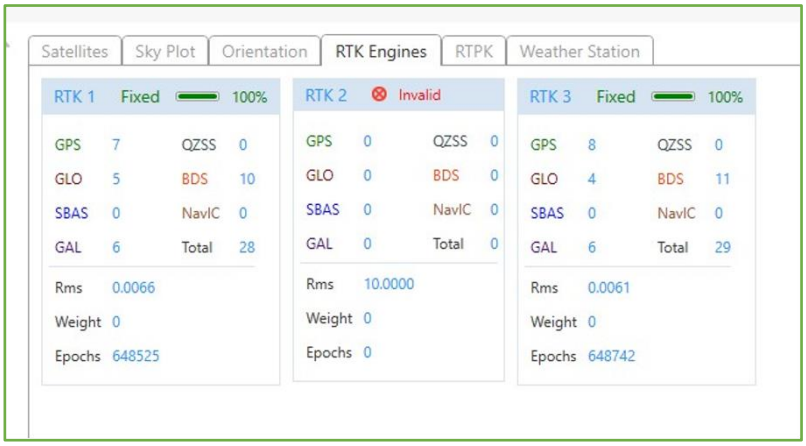


Figure 33. RTK Engines tab.

Each engine is shown in separate box and the following data are provided:

- Engine number.
- Solution.
- Progress (%).
- Satellite count for each satellite system used by engine.
- RMS value.
- Weight of the engine in the resulting solution.
- Epoch count.

3.2.8 RTPK

RTPK – Real Time Post–processed Kinematics (RTPK) solution – is available for firmware beginning with 4.0.2.0 and requires the RTPK option. User interface is provided in NetView 2.2.5.4 or higher.

Short Description of RTPK

Receiver supports running phase–differential post–processing engine and gathering its results. Only static occupations could be meaningfully processed this way.

Current requirement is availability of suitable RTCM3 corrections.

This is performed by storing all the needed data into a file on receiver, processing of the file by RTPK engine tool, monitoring the process and result, and finally downloading RTPK report file from receiver.

RTPK Option

RTPK is available if RTPK option is loaded. Option can be checked on the tile “Options”.

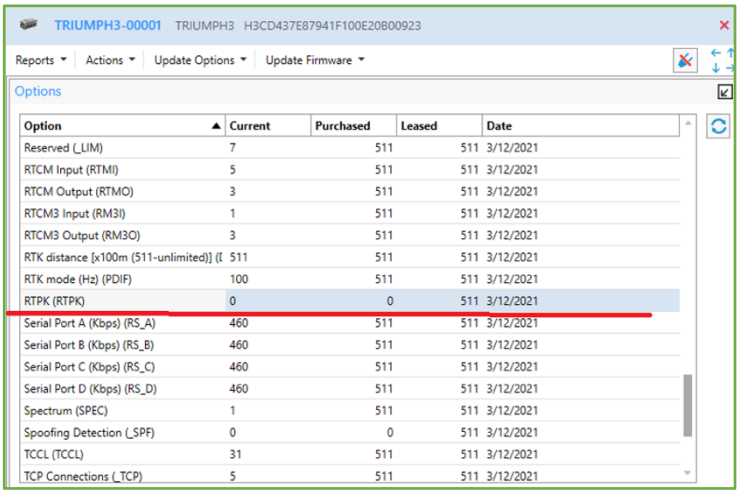


Figure 34. RTPK option.

User interface for RTPK is on Main tile > tab RTPK.

RTPK Tab

Select Main tile. Make sure that rover receives RTCM3 corrections from a reference station and the quality of the link is high. Select RTPK tab.

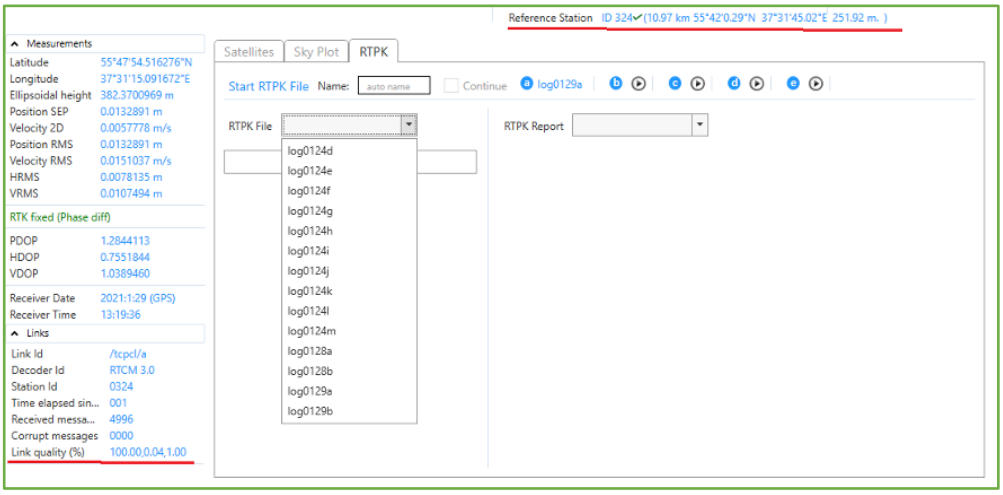


Figure 35. RTPK tab.

The following functionality is provided:

- Start new RTPK–file on any free port.
- Continue existing RTPK–file.
- Process RTPK–file.
- Get RTPK–report.
- Download RTPK–report.

To start new RTPK type name to the Name textbox or leave auto name and click Start button near desirable free file–port (A, B, C, D, E).

To continue RTPK–file type name of the existing RTPK–file, check Continue flag and click Start button near desirable file–port. If Continue flag is not checked file will be overwritten.

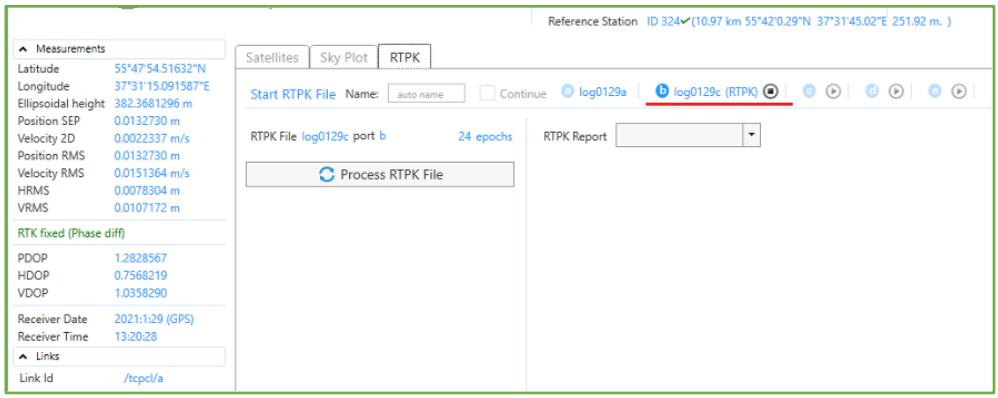


Figure 36. RTPK–File log0129c is recorded on the port b. It is available for the processing.

If the RTPK–file is currently being recorded, only it can be processed. Otherwise, first select the file from the dropdown list. Click button “Process RTPK–file”.

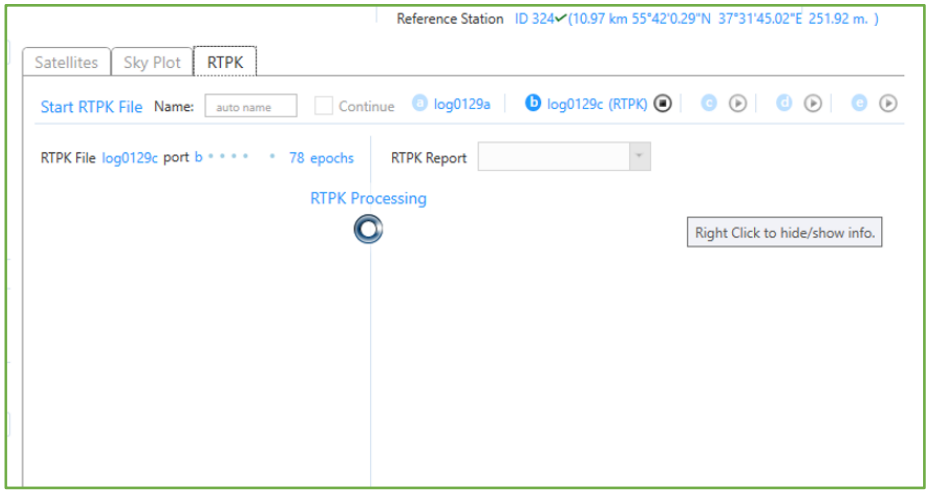


Figure 37. RTPK–File processing.

After processing is finished RTPK information about result, BLH and raw report is output. NumFixed > 0 means that fixed epochs are in the file.

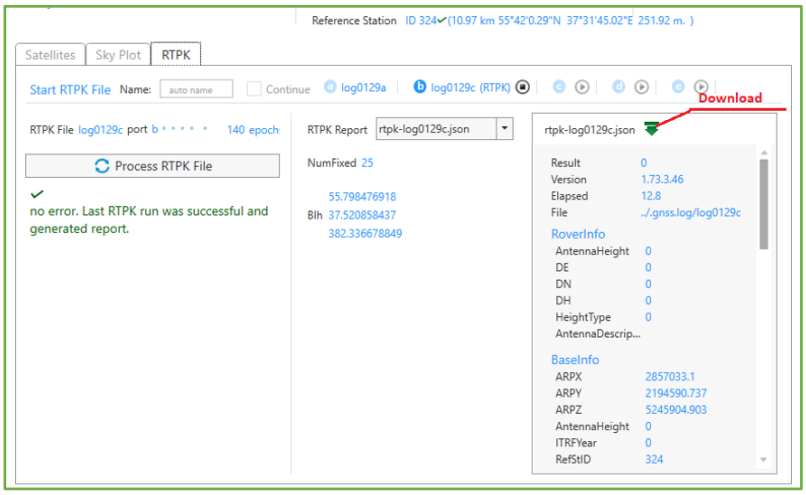


Figure 38. RTPK–File processed. No error information, BLH and raw report.

If processing is unsuccessful the following error code can be output.

31: "RTPK tool does not exist or is not executable"

32: "input file for RTPK does not exist or is not readable"

33: "error creating working environment for RTPK (e.g., dedicated working directory or changing there)"

40–50: "exit code of RTPK tool"

Download button is in the header of the raw report. Report is saved as json–file.

3.2.9 Weather Station

You can connect a compatible weather station to the receiver. The data it will receive is displayed on the *Weather Station* tab. The receiver can also output its own weather data, calculated based on the internal model. These data (temperature, humidity, etc.) are displayed in two tables respectively.

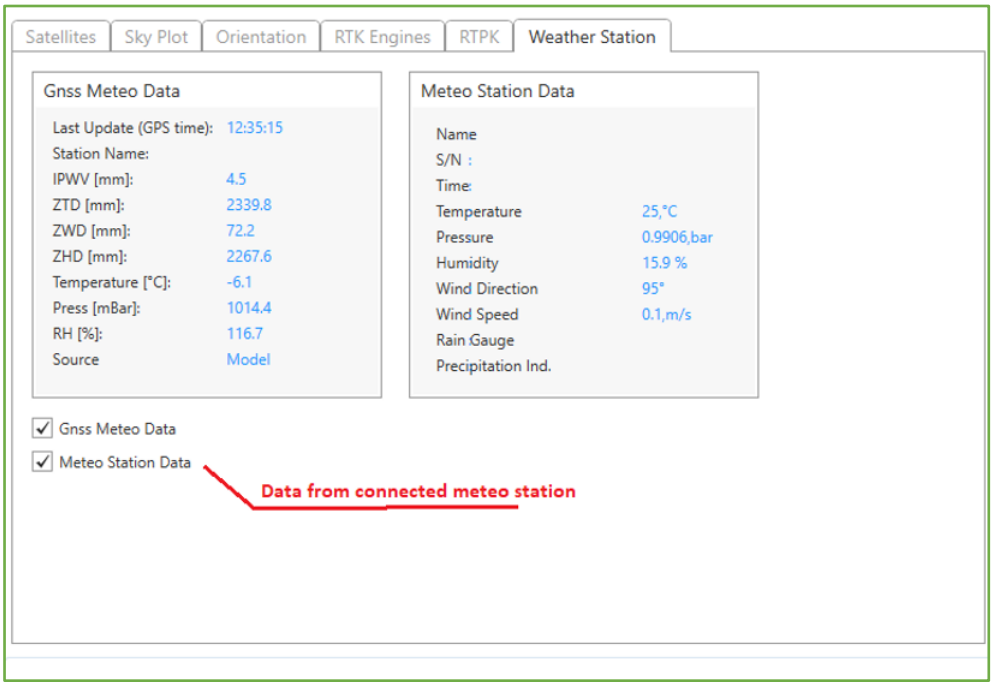


Figure 39. Weather Station tab.

To enable/disable data from the receiver or weather station, use the corresponding checkboxes.

3.3 Configuring the Receiver

Expand *Parameters Tile* of the receiver to open *Parameters* window.

Parameters window provides the convenient graphic interface to view and change the settings of the receiver. All the parameters are grouped on the tabs according to the aspect of the behavior and fully match to *Greis Manual [2]*.

Graphical User Interface for Working with the Receiver Parameters

Expand the *Parameters* Tile of the receiver to open the *Parameters* window.

The *Parameters* window provides the convenient graphical interface to view and change the settings of the receiver.

Note: All parameters are grouped on the tabs according to the aspect of the behavior and fully match to GREIS Manual [2]. The graphical user interface for working with the receiver parameters.

The representation of each parameter is determined by the type, facility of access and availability. The detailed description coincides with Greis Manual [2] and appears when the mouse is over the parameter. Read–only parameters are gray. Parameters which are not available for this model of the receiver are gray and empty.

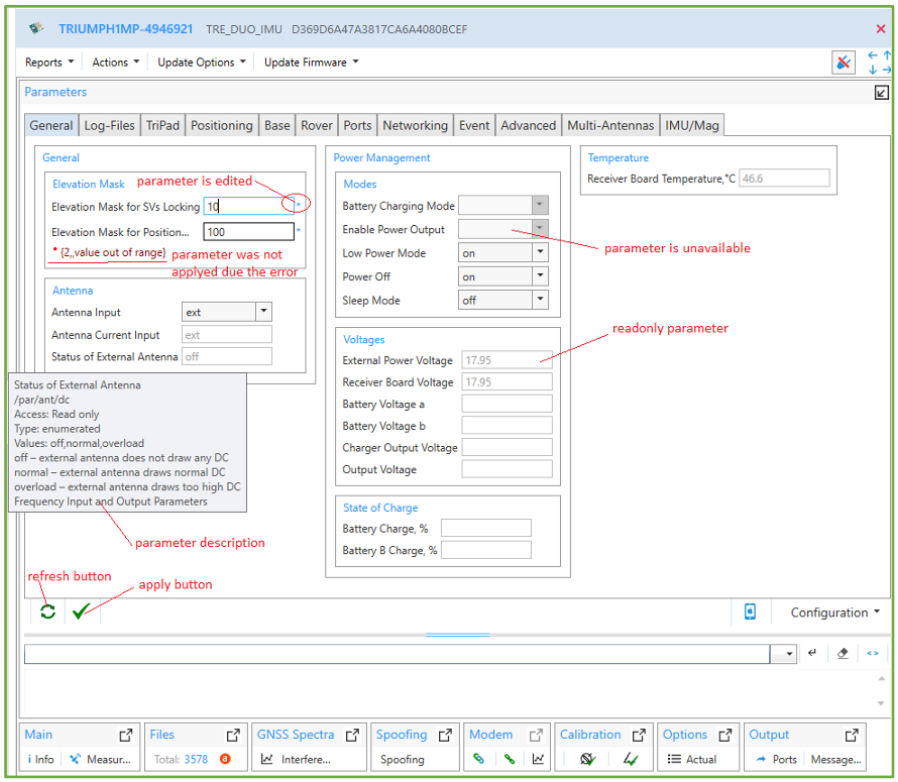


Figure 40. Parameters Tile.

Depending on the type of the parameter, a new value can be typed to text box, selected from the drop–down or checked. Edited parameter is marked by the *–sign and it is not set to the receiver until Apply button clicked. Apply action sets all edited parameters of all tabs to the receiver. If the receiver is not able to set new value error response is displayed under the parameter and warning box appears. Some settings come into effect after restarting. The confirmation dialog appears in this case. If it is confirmed receiver resets and reconnects.

To get the current values for the parameters on the selected tab click Refresh. Read–only parameters are refreshed every 10s even without manual refreshing.

The *Configuration* button saves/loads all parameters to the tcl–script. It is described below.

The location of the parameters on the tab varies when resizing the main window.

3.3.1 Parameter Tabs

Each parameter tab is detail described below. The references to relevant chapters of the *Greis Manual* are given for each group of parameters as *[2, Chapter …]*.

General

The tab *General* shows the most common settings.

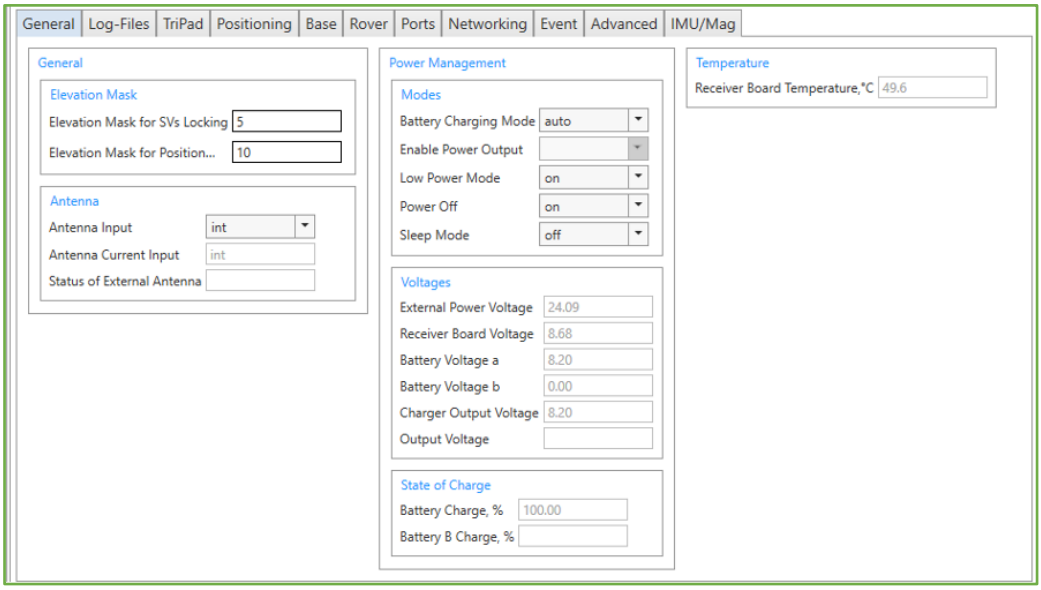


Figure 41. General parameters.

- General – *[2, 4.4.5. Measurements Parameters]*
  - Elevation mask – Elevation masks for SVs locking and for Position Computation – *[2, Satellites Tracking Parameters].*
  - Antenna – *[2, Antenna Input Parameters].*
- Power Management – *[2, 4.4.32 Advanced Power Management]*
  - Modes – power control modes.
  - Voltages – power statuses (all are read–only).
  - State of Charge

- Temperature – board temperature (C °, read–only) – *[2, 4.4.44 Miscellaneous parameters].*

Log–Files

Log–files tab contains parameters for file managing *[2, 4.4.24 File Management, 4.4.20 Parameters of Generic GREIS Messages].*

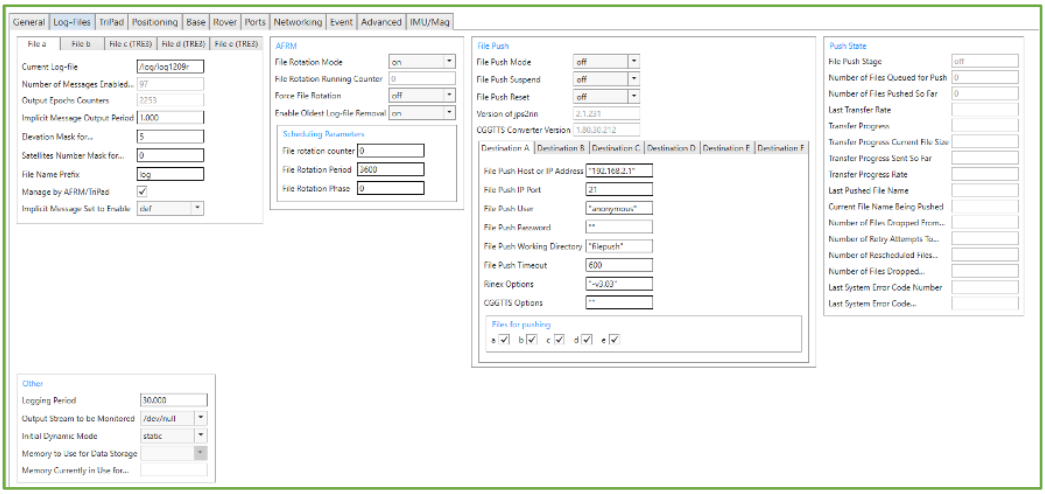


Figure 42. Log–File parameters.

The following parameter groups are available:

- *File a, File b, File c, File d, File e* – setting for configuring the output to File A (B, C, D, E) – *[2, Existing Files, Current Log–files, Masks and Counters, Implicit Output, Automatically Generated File Names Parameters].*
- *AFRM* – settings for automatically rotating the log–files according to the user–defined schedule. *[2, Automatic File Rotation Mode (AFRM)].*
- *FTP Push* – settings for automatically putting log–files to an external server. – *[2, File Push Parameters].*
- *Push State* – read– only parameters aid in monitoring and troubleshooting of File Push operation. – *[2, File Push Parameters].*
- *Other* – settings for history logger, initial mode, int (internal), ext (SDCARD) Data Storage. *[2, Logging History, 2, 4.4.33 TriPad, 2, File–system Parameters].*

Tri Pad

TriPad tab provides the parameters for configuring *TriPad* interface of the receiver.

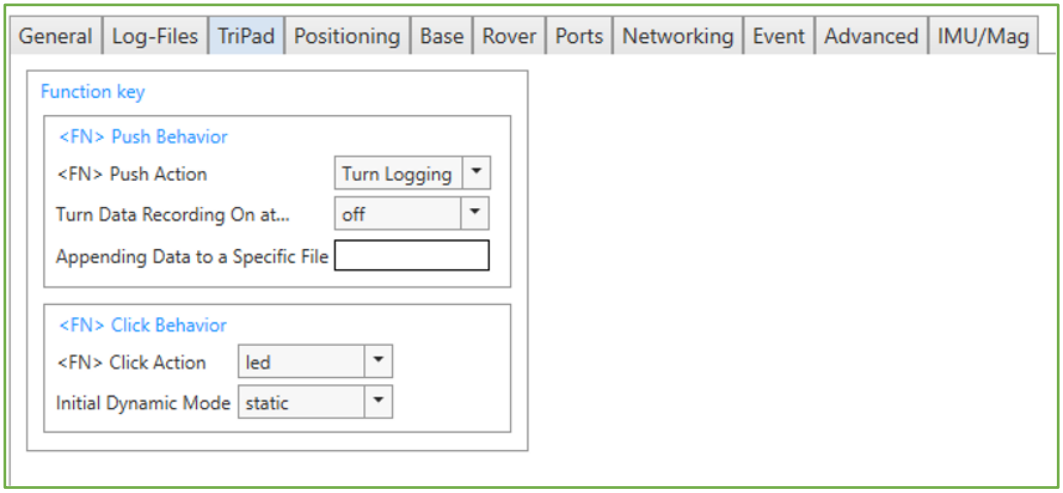


Figure 43. Tri Pad parameters.

- *Function key* – *[2, 4.4.33 TriPad Parameters].*

Positioning

Positioning tab allows the user to select satellites to track, to specify which measurements to use in position computation and to enable solution mode. Since most of these parameters are described in the chapter *[2, 4.4.8 Positioning Parameters]* only the subtitles are shown below.

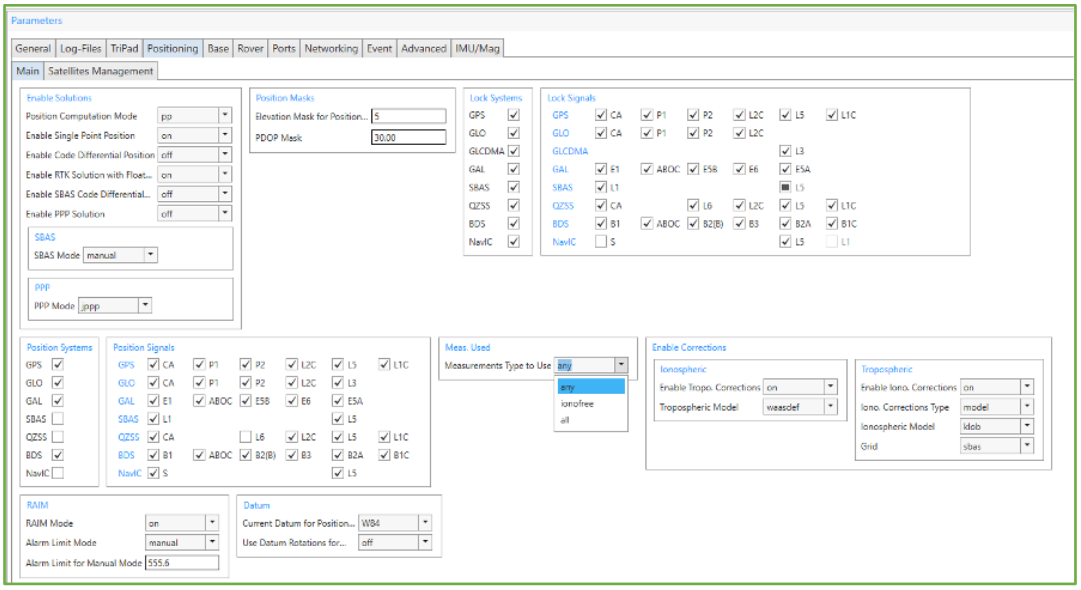


Figure 44. Positioning Main parameters.

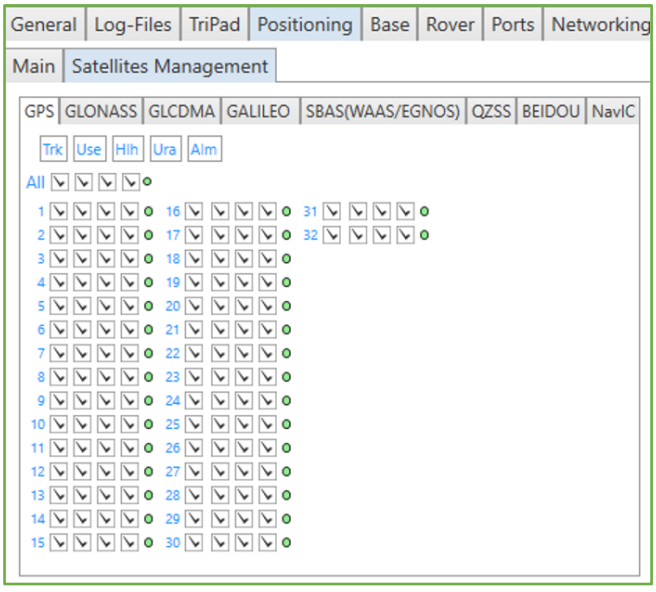


Figure 45. Positioning Satellites Management parameters.

The following parameters can be queried and changed:

- *Enable Solution* – configure the position computation. – *[2, Generic Positioning Parameters].*
- *Position Masks* – elevation mask for satellites and PDOP limited the position computation. – *[2, Generic Positioning Parameters].*
- *Lock Systems* – select satellite constellation(s) used for position computation. – *[2, Generic Locking Parameters].*
- *Lock Signals* – select satellite constellation(s) used for position computation. – *[2, Generic Locking Parameters].*
- *Positions Systems* – select satellite constellation(s) used for position computation. – *[2, Enable Satellite System].*
- *Positions Signals* – select satellite constellation(s) used for position computation. – *[2, Enable Applicability of Measurements by Signal].*
- *Meas. Used* – specifies which measurements receiver will use for single point position computation. *[2, Generic Single Point Parameters].*
- *Enable Corrections* – receiver will correct the measured pseudo–ranges for enabled corrections. *[2, Generic Single Point Parameters].*
- *RAIM* – settings for the receiver autonomous integrity monitoring. *[2, RAIM Parameters].*
- *Datum* – settings of the datum that will be used for position computation. *[2, Datums].*
- *Satellite Management* – set of the similar tabs for each GNSS system. The tabs contain check boxes for enabling/disabling
    - *Lock* – the receiver to track satellites by their PRN. *[2, Satellites Tracking Parameters].*
    - *Use* – using of GNSS satellite number N for position computation. – *[2, Generic Positioning Parameters].*
    - *Health* – excluding satellite number N from position computation when the satellite is unhealthy. – *[2, Generic Positioning Parameters].*
    - *Ura* – exclude satellite number N from position computation when URA value exceeds the limit specified by URA mask parameter**.** – *[2, Generic Positioning Parameters].*

- *Alm* – Green circle to the right of the check boxes indicates that the almanac is available for the satellite. *[2, 4.4.7 Almanac Status].*

Base

Base tab provides the capabilities to configure the receiver as a *Reference Base Station* and also allows getting receiver coordinates. Most of these parameters are described in ***[2, 4.4.12 Reference Parameters, 4.4.17 RTCM 2.x Parameters, 4.4.18 RTCM 3.x Parameters]*** and these references are passed.

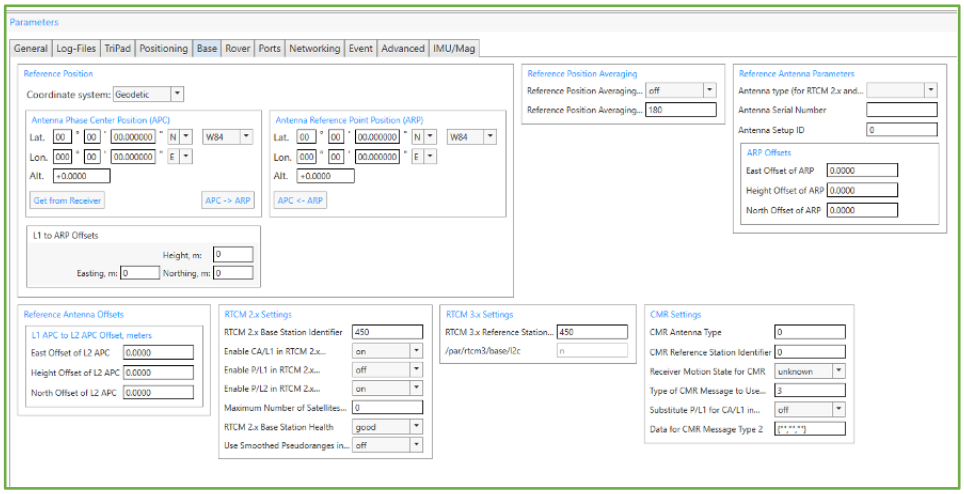


Figure 46. Base parameters.

The following parameters can be set using *Base* tab:

- *Reference position* – the coordinates for *L1 Antenna Phase Center* (*APC*) and *Antenna Reference Point (ARP)*. *[2, Reference Station Coordinates].*
- The *APC* and *ARP* coordinates in the receiver are entirely independent. To calculate one from another click *APC > ARP* or *ARP > APC* buttons. Calculating is carried out using *L1 to APR Offsets* – the vector offset between *L1 phase center* and *ARP*, which is determined by the selected *Antenna Type* but can be changed manually.
- If the coordinates of *APC* and *ARP* are unknown, they can be collected from the receiver by clicking *Get from Receiver* button. The *APC* coordinates will be filled using (*[PG]* –message but this way should not use for real *Reference Station.*

- The RTCM 2.x message 24 as well as *RTCM 3.x* standard requires that *APC* and *ARP* coordinates to be transmitted from reference station to rover receivers.
- *Reference Position Averaging* – Settings automatically calculating and setting reference position when precise position is unknown. *[2, Reference Position Averaging].*
- *Reference Antenna Parameters* – The settings of the antenna and the vector components between a surveyed point (landmark) and the *ARP*. *[2, Reference Antenna Parameters].*
- *Reference Antenna Offsets* – Parameter specifies the vector components between *L1 Antenna Phase Center (APC)* and *L2 APC*. *[2, Reference Antenna Parameters].*
- *RTCM 2.x Settings* – Settings for configuring *RTCM* (Radio Technical Commission for Maritime Services) 2.x corrections. *[2, RTCM 2.x Reference Station Parameters, 3.5.3 RTCM 2.x Messages].*
- *RTCM 3.x Settings* – Settings for configuring RTCM (Radio Technical Commission For Maritime Services) 3.x corrections. *[2, RTCM 3.x Reference Station Parameters, 3.5.4 RTCM 3.2 Messages].*
- *CMR Settings* – Settings for configuring Compact Measurement Record (CMR) corrections. *[2, CMR Reference Station Parameters, 3.5.5 CMR Messages].*

Rover

Rover tab allows configuring the receiver as a *rover and* mostly useful for RTK operation. Parameters are described in the chapters *[2, 4.4.9 Code Differential (DGPS) Parameters, 4.4.10 Phase Differential (RTK)]*.

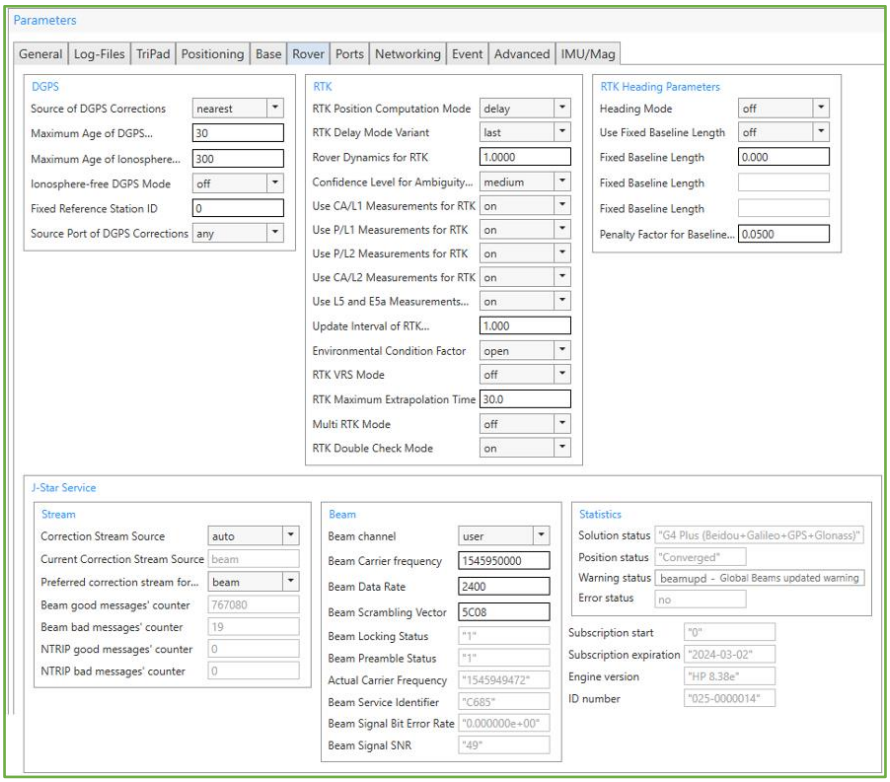


Figure 47. Rover parameters.

Available parameter groups:

- *DGPS* – Settings for differential corrections using *[2, Generic DGPS Parameters].*
- *RTK* – Settings for RTK–engine *[2, Generic RTK Parameters].*
- *RTK Heading Parameters* – Settings for configuring *RTK* – engine to compute heading, pitch and orientation in the multi–antenna's receiver *[2, RTK Heading Parameters],* documentation on Duo and Quattro.
- *J–Star Service* – these parameters govern JAVAD implementation of Precise Point Positioning service, or J–Star. *[2, 4.4.11 Precise Point Positioning (PPP) Parameters].*

- *Attitude Parameters*– mode and initial values for calculating vectors in the multi–antenna's receiver *[2, Attitude Parameters]*, documentation to Duo and Quattro receivers.

Ports

Tab *Ports* contains the nested tabs for configuring all the available *input/output* interfaces of the receiver.

For each interface can be query/set:

- *Input Mode* – Specifies what type of incoming data to accept (excluding TCPO) *[2, 4.4.27 Generic Communication Parameters (Basic Operation Mode)].*
- *Output Mode* – Periodic output. The messages can be selected from the predefined sets of messages (see *Appendix 1. Predefined sets of messages.* The list of the messages in the set is displayed when mouse is over the item of drop–down. If ordered output does not match any set it is shown as *User Defined.*

Most of the interfaces require additional settings.

The nested tabs are following:

Serial Tab

Serial tab – Contains parameters for configuring *serial A, B, C, D, E, F* ports such as *Baud Rate* and *RTS/CRS Handshake,* and so on *[2, 4.4.28 Serial Port Parameters. (Hardware Settings)].*

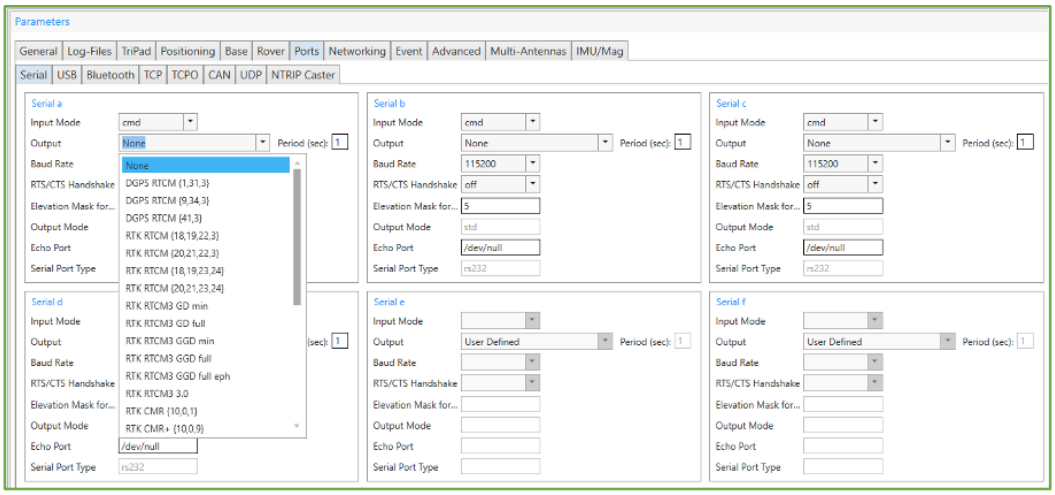


Figure 48. Serial ports parameters.

USB Tab

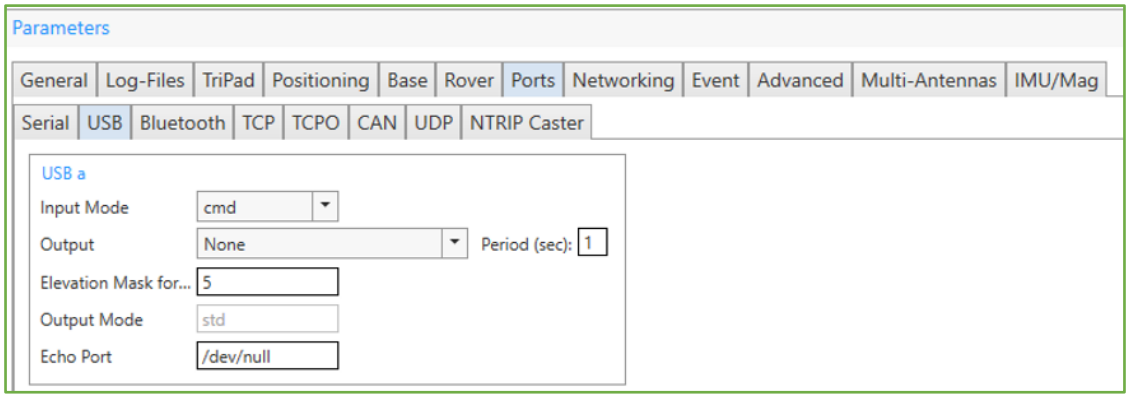


Figure 49. USB port parameters.

Bluetooth Tab

Bluetooth tab – Allows setting input/output for the available *Bluetooth* ports and also provides *Hardware Settings* to configure *Bluetooth* module *[2, 4.4.31 Bluetooth Parameters].*

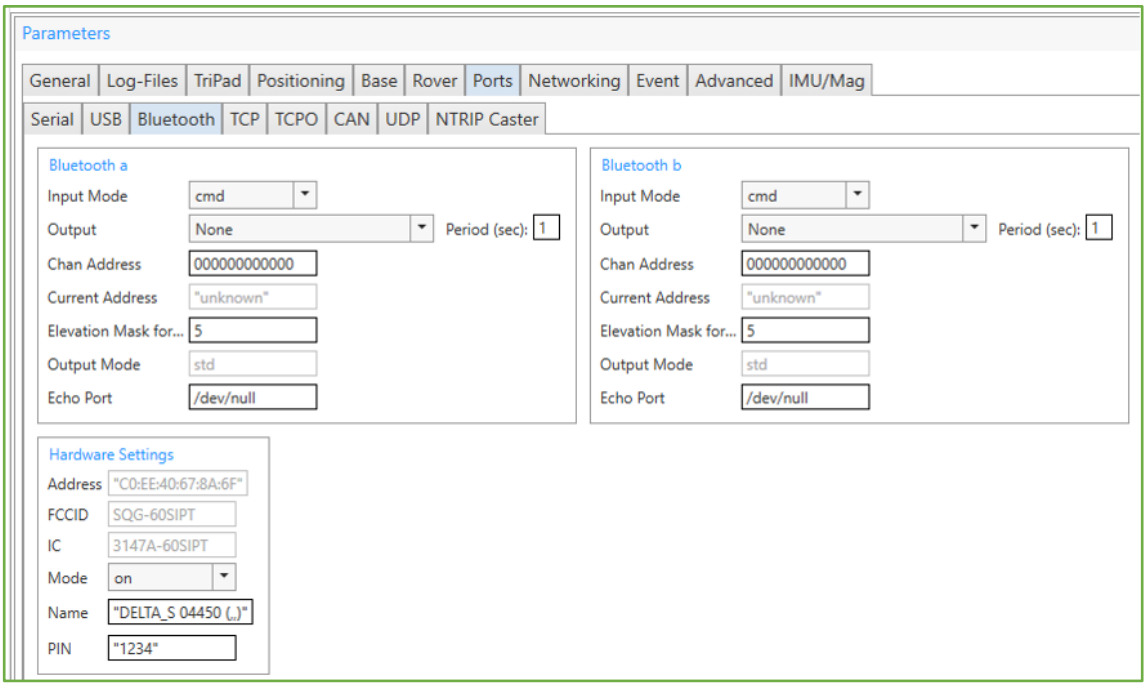


Figure 50. Bluetooth ports parameters.

TCP Tab

Receiver provides the TCP server functionality which allows establishing bidirectional TCP connections and also it is capable to operate as TCP client for different kinds of TCP servers.

TCP tab – Contains input/output settings for all types of the TCP ports and statistics on the use of TCP server ports. ***[2, 4.2.2 Input and Output Ports Notations].***

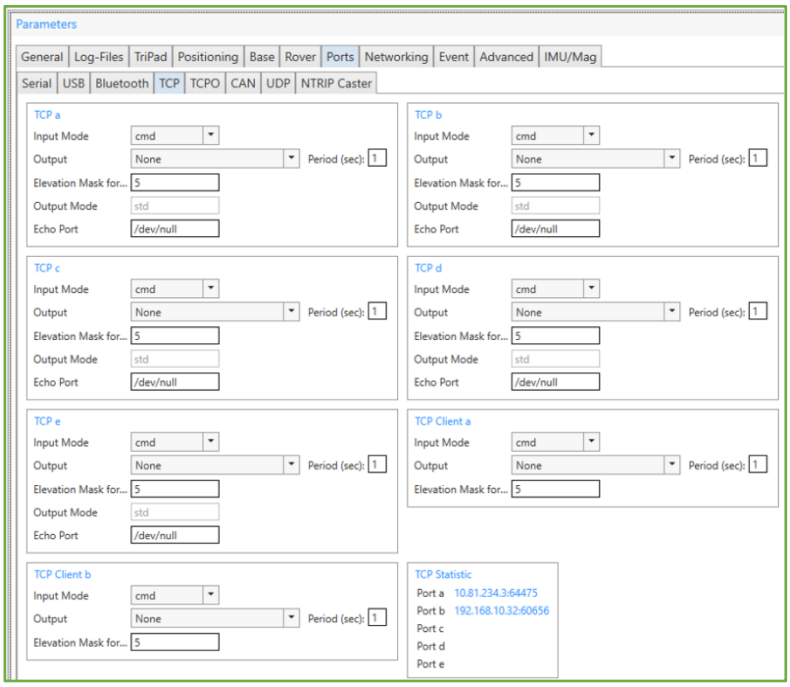


Figure 51. TCP ports parameters.

- *TCP a, TCP b, TCP c, TCP d, TCP e* – Input/output settings for the *TCP* streams (*dev/tcp/a,…,dev/tcp/e*)
- *TCP Client a, TCP Client b* – Input/output settings for *TCP* client connections. Depending on receiver model, up to 2 independent connections could be established at any given time *[2, TCP Client Parameters].*
- *TCP Statistics* – List of active incoming TCP connections (IP–address and port are displayed). *[2, 4.4.29 Network Parameters (Network Statistics)].*

TCPO Tab

TCPO tab – Is designed to enable output data for TCP output server ports. *[2, 4.4.29 Network Parameters (TCP Output Server Configuration)].*

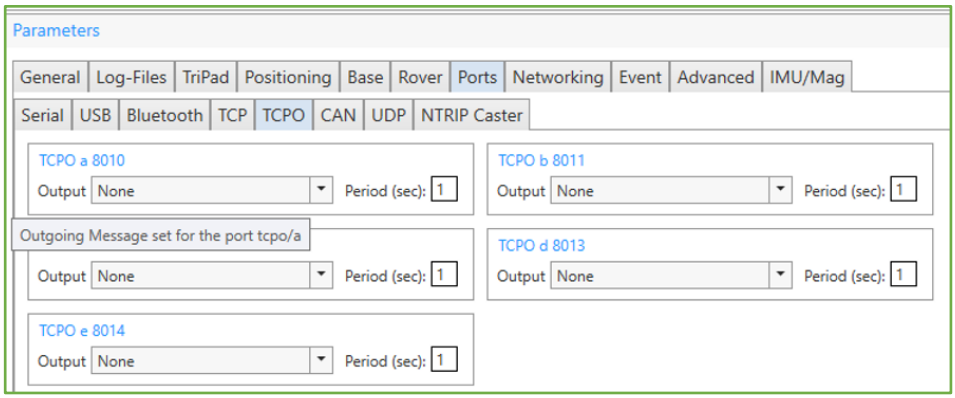


Figure 52. TCPO ports output settings.

CAN Tab

CAN tab – The parameters which allow configuring CAN ports of the receiver to establish connections via *CAN* interface. ***[2, 4.4.34 CAN Ports Parameters].***

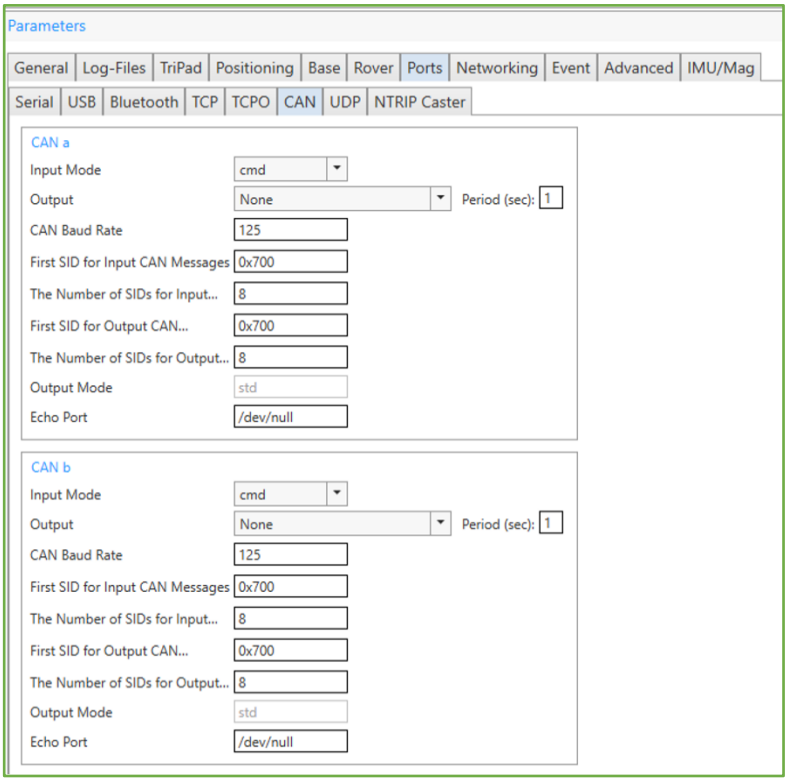


Figure 53. CAN ports settings.

UDP Tab

Receiver supports data output using UDP packets. You will use receiver port name dev/udp/X (X=[a…e]) with em or out commands to request UDP output. Parameters described in this section specify destination of UDP packets generated by the receiver as well as the rules of splitting of output data stream of bytes into stream of UDP packets. *[2, UDP Output Server Configuration].*

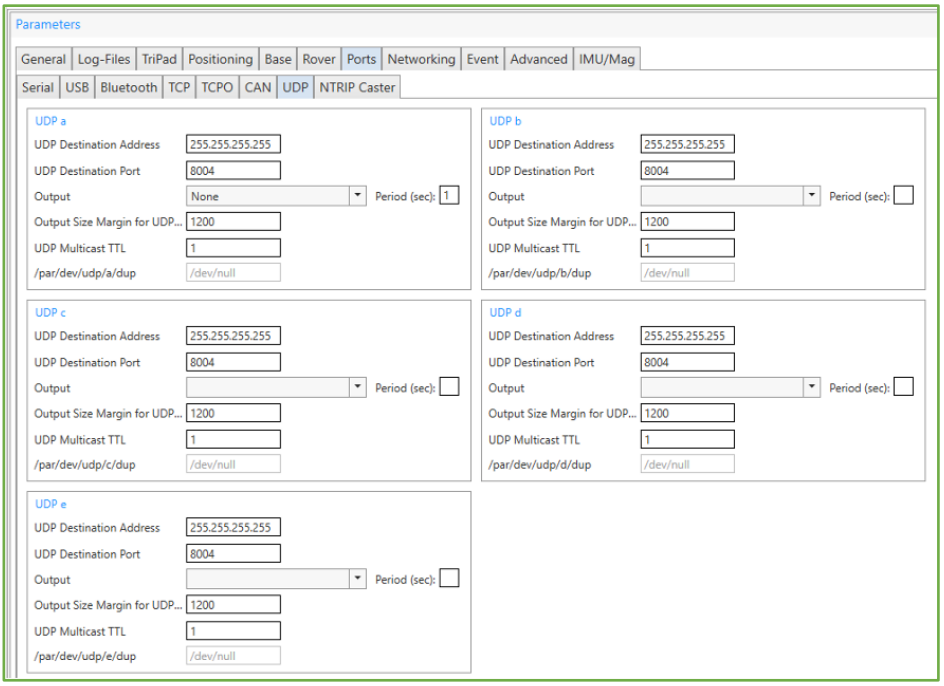


Figure 54. UDP ports settings.

MDM Tab

MDM tab – Is available only for the receivers that support modem ports.

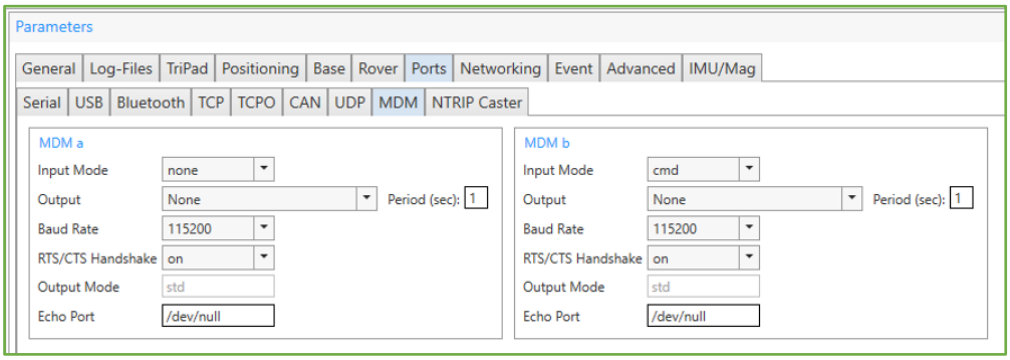


Figure 55. MDM ports settings.

NTRIP Caster Tab

NTRIP Caster output streams are called /dev/ntrip/X X=[a…e]. An NTRIP client that connects to mountpoint with the name matching /par/net/ntrip/X/mp, will receive the messages enabled to corresponding /dev/ntrip/X output stream. *[2, NTRIP Caster Configuration].*

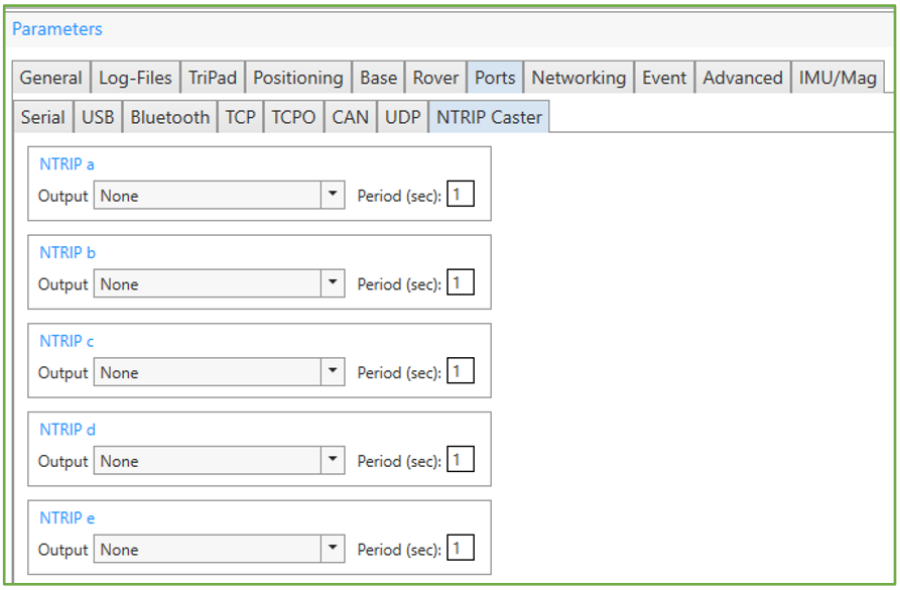


Figure 56. NTRIP Caster ports settings.

Networking Tab

Networking tab comprises in turn the set of the tabs to configure the receiver to establish connections via different network interfaces as a server, and client. In most cases, it requires a reboot to the network settings to take effect.

The following nested tabs are available:

LAN Tab

LAN tab – contains *LAN DynDNS* and *DNS* parameters described in *[2, 4.4.29 Network Parameters].*

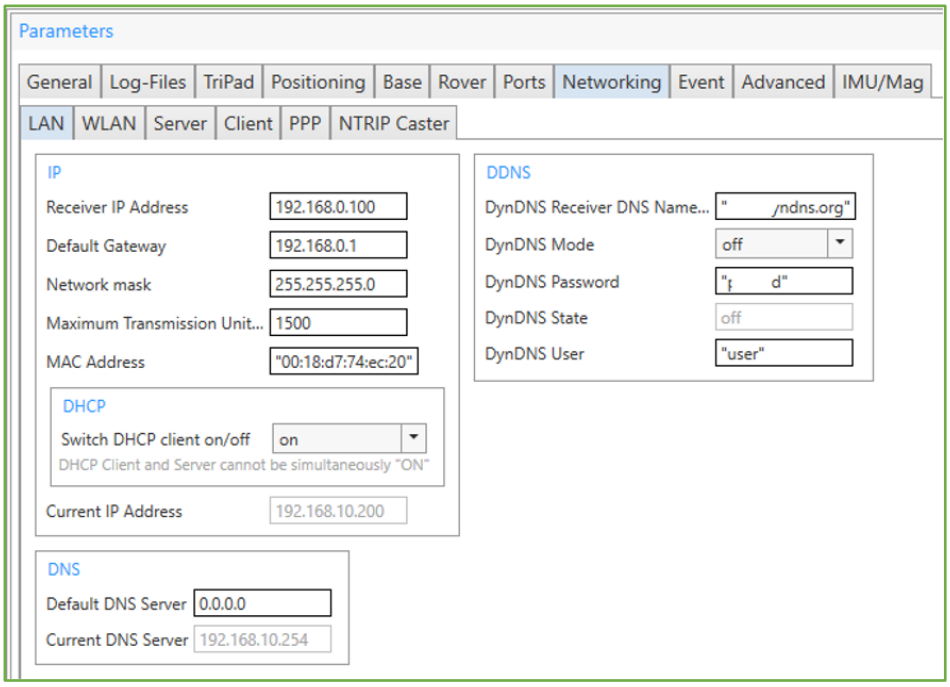


Figure 57. LAN parameters.

LAN parameters are the following:

- *IP* – Parameters which configure the receiver to be part of a *TCP/IP* local area network (*LAN*). *[2, LAN Configuration].*
- DHCP – Enable the capability to automatically assign LAN/WLAN parameters to the receiver. *[2, DHCP Client Configuration].*
- Current IP Address – IP address on the local network assigned to the receiver at the moment.
- *DDNS* – Settings for accessing and using dynamic DNS server. *[2, Dynamic DNS (DynDNS) Client Parameters].*
- *DNS* – Addresses of the DNS server to use by default and the DNS server used at the moment. *[2, DNS Parameters].*

WLAN Tab

WLAN tab – Provides parameters that configure the receiver to be part of a TCP/IP wireless local area network (WLAN). See detail description in *[2, 4.4.29 Network Parameters (WLAN (WiFi) Configuration)].*

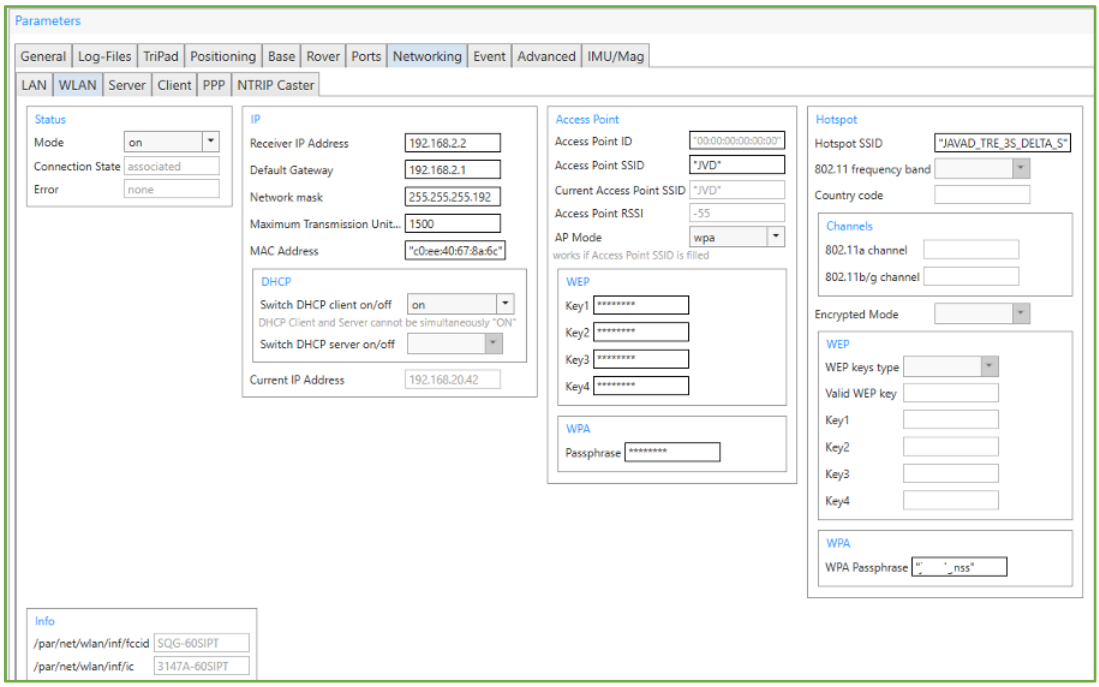


Figure 58. WLAN parameters.

The following parameters configure WLAN:

- *Status* – Mode (on, off, adhoc) and statuses.
- *IP* – Parameters of the TCP/IP network and receiver identifier in it.
    - *DHCP* –
        - *Client* – Enables the capability to automatically assign *LAN/WLAN* parameters to the receiver. *[2, DHCP Client Configuration].*
        - *Server* – Enables DHCP–server in the receiver.
    - *Current IP Address* – *IP* address on the wireless local area network assigned to the receiver at the moment.
- *Access Point ID* – Access point identifiers, received radio signal power and the type of the encryptions (WEP, WPA–PSK/WPA2–PSK).
    - *WEP – Key strings for the access point (*write–only*).*
    - *WPA* – Passphrase for the access point (write–only).
- *Hotspot* – Hotspot identifiers, received radio signal power and the type of the encryptions (WEP, WPA–PSK/WPA2–PSK).
    - *WEP* – Key strings for the hotspot *(*write–only*).*
    - *WPA* – Passphrase for the hotspot (write–only).
- *Info* – Certification parameters of the *WLAN*–module.

Note: Light gray tips appear under the parameters, if necessary.

Server Tab

Server tab – Contains parameters to enable and configure TCP, FTP, HTTP NTP and PTP servers implemented in the receiver. See *[2, 4.4.29 Network Parameters].*

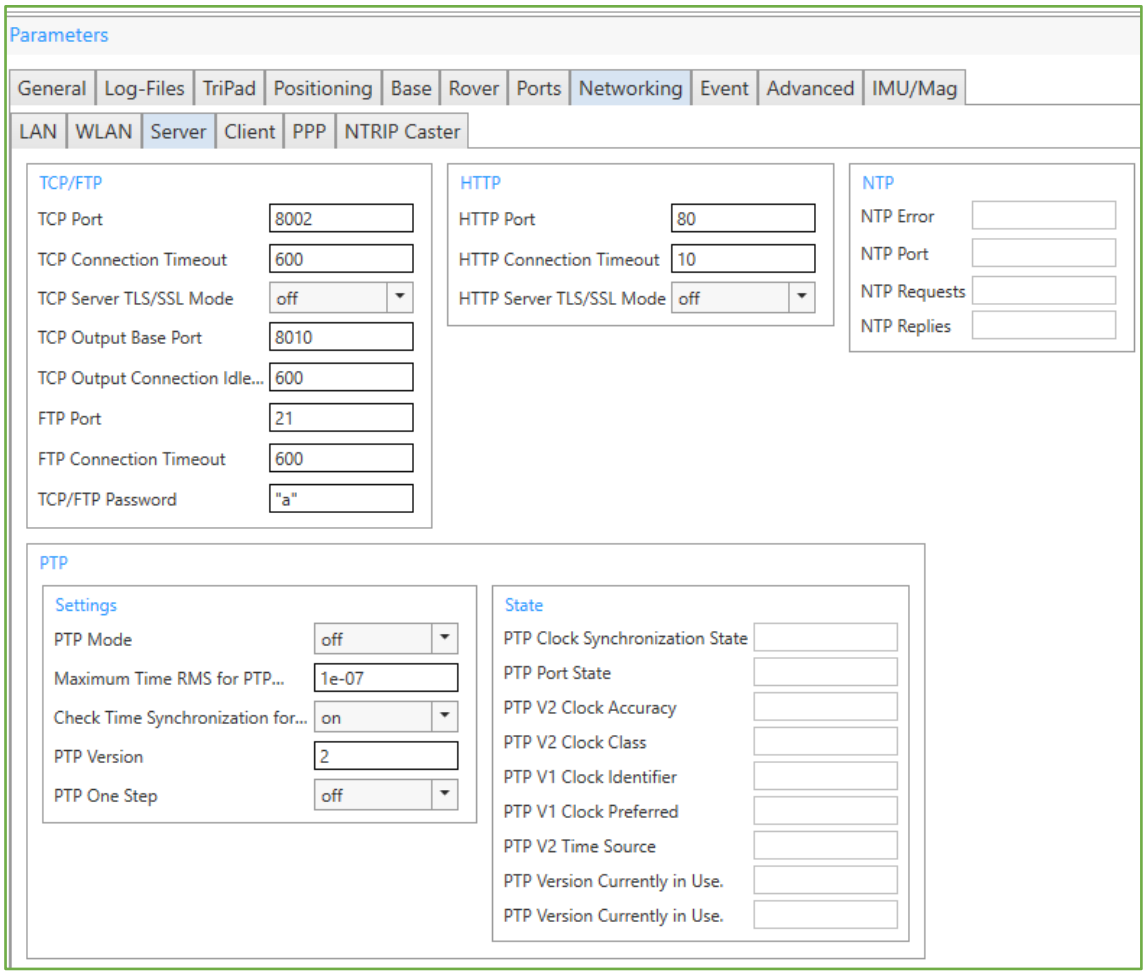


Figure 59. Server parameters.

The following servers can be configured:

- *TCP/FTP* – Parameters allow
  - *TCP clients* – To establish bidirectional connections to receiver. *[2, TCP Server Configuration].*
  - *FTP–standard clients* – To download files (for example). *[2, FTP Server Configuration].*
- *HTTP* – Parameters allows external program running in a *WWW browser* (*see [4]*) to establish bidirectional connections to receiver on top of *HTTP* protocol. *[2, TCP Server Configuration].*

- *NTP* – Parameters of the *Network Time Protocol* (*NTP*) for receivers that support it. *[2, NTP Server Configuration].*
- *PTP* – Parameters and state of the *Precision Time Protocol* (*PTP*) for receivers that support it (IEEE Std 1588, versions 1 and 2) *[2, PTP Server Configuration].*

Note: Receiver behaves as PTP grand–master clock only.

Client Tab

Client tab – Allows configuring the receiver to operate as TCP client for different kinds of TCP servers *[2, 4.4.29 Network Parameters (TCP Client Parameters)].*

The parameters for *Client A* and *Client B* are identically. *Client B* is available depending on receiver model.

To access *Client B* parameters, it will need to be selected.

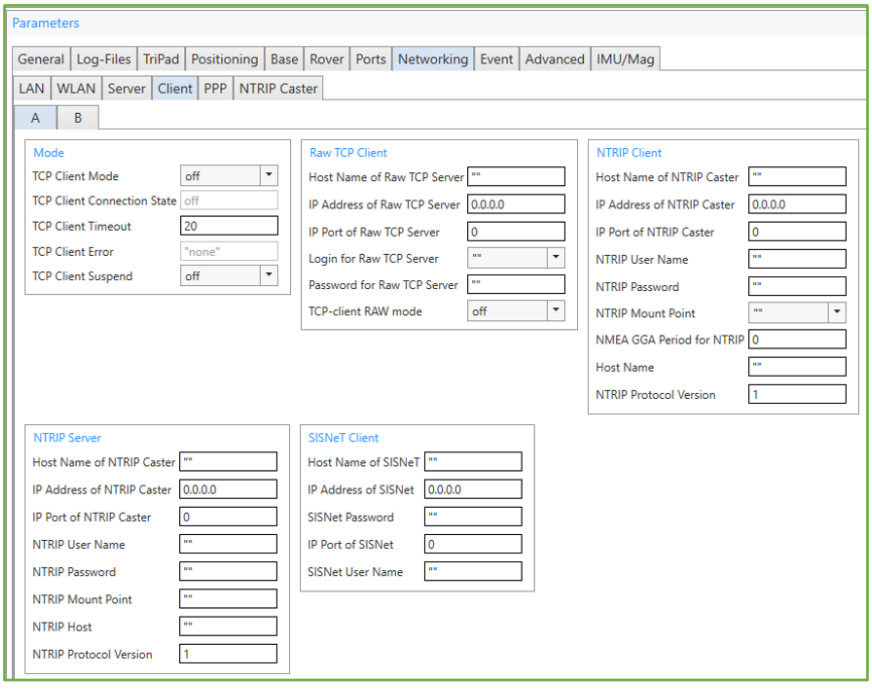


Figure 60. Client parameters.

The following parameters for both *Client A* and *Client B* can be set:

- *Mode* **–** Causes the receiver to operate as a client of a certain type and displays statuses.
- *Raw TCP Client* **–** Parameters to establish *TCP* connection to another (remote) *JAVAD GNSS* receiver. *[2, RCV Mode Parameters].*
- *NTRIP Client* **–** Parameters to establish connection to an NTRIP caster as a client and request data from particular mount point. *[2, NTRIP Client Parameters].*
- *NTRIP Server* **–** Parameters to establish connection to an *NTRIP* caster as a server and add itself as mount point. *[2, NTRIP Server Parameters].*
- *SisNeT Client* **–** Parameters to establish connection to a *SISNeT* server.

PPP Tab

PPP tab – Displays *PPP* server settings and statuses. *PPP* server starts when receiver connects to *Internet* via *GPRS* and does not require configuring. Only authentication and compression parameters could be set in peculiar cases.

The parameters are described in *[2, 4.4.29 Network Parameters (GPRS/DIALUP (PPP) Configuration)].*

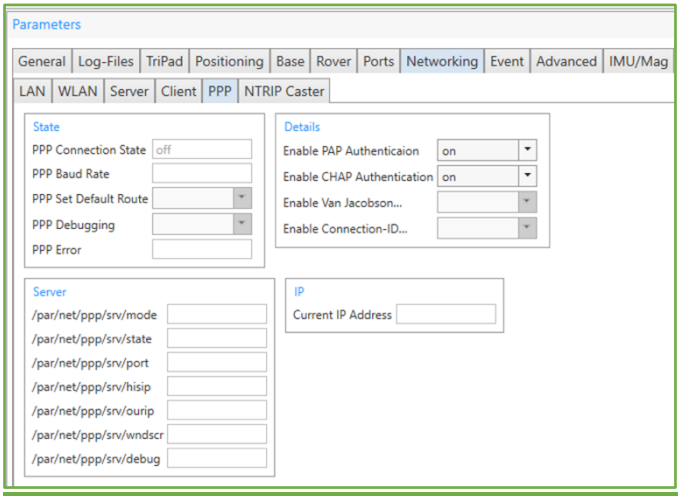


Figure 61. PPP parameters.

PPP parameters:

- *State* – Connection statuses of *PPP* server *[2, PPP Configuration Parameters].*
- *Details* – Additional authentication and compression settings *[2, PPP Configuration Parameters].*
- *Server* – Internal PPP–server settings.
- *IP* **–** Current IP address assigned by the cell operator.

NTRIP Caster tab

NTRIP Caster tab – displays *NTRIP caster* output streams parameters are called /dev/ntrip/X X=[a…e]. An NTRIP client that connects to mountpoint with the name matching /par/net/ntrip/X/mp, will receive the messages enabled to corresponding /dev/ntrip/X output stream.

The parameters are described in *[2, 4.4.29 Network Parameters (NTRIP Caster Configuration)].*

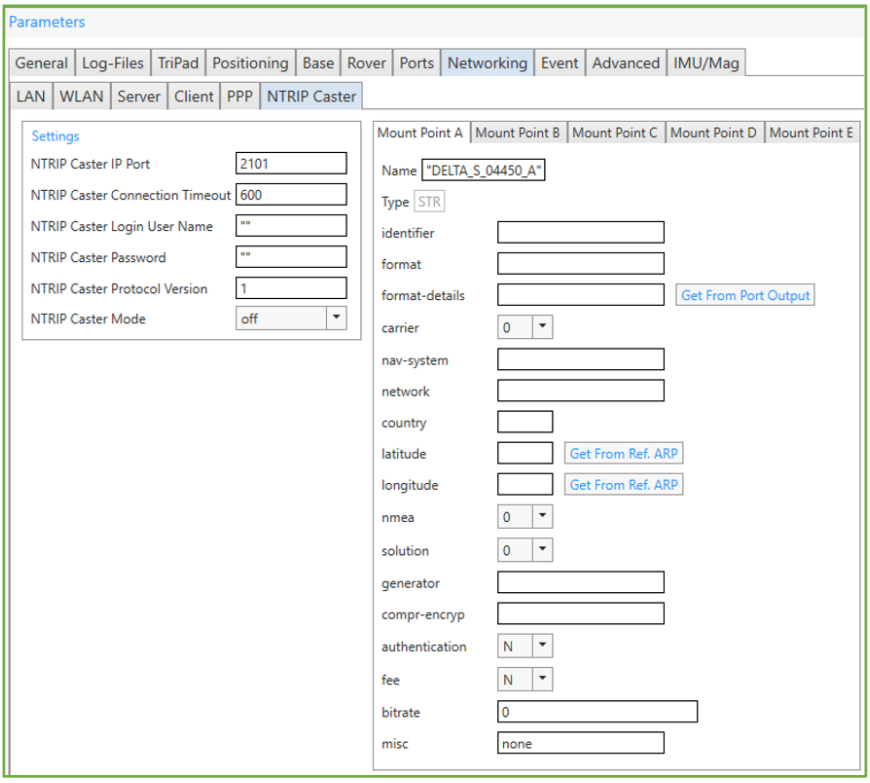


Figure 62. NTRIP Caster parameters.

NTRIP Caster parameters:

- *Settings* – Network settings for connecting to the receiver's NTRIP output stream.
- *Mountpoints* – 5 mountpoints can be configured by filling all standard fields. Format–details field can be got from the corresponding port, latitude and longitude – from Reference ARP. Mountpoint source entry sent in the NTRIP source table is concatenation of mountpoint name and then all the N strings for particular mountpoint X.

Event Tab

Tab *Event* is designed to configure *Pulse per Second* (PPS) signals and *External Events.*

Pulse per Second (PPS) signals *[2, 4.4.8 Positioning Parameters. Pulse per Second (PPS) Parameters]* have programmable reference time system, period and offset. There could be up to two *PPS* outputs in *JAVAD GNSS* receivers, *"a"* (PPSA) and *"b"* (PPSB). It is possible to use both PPS outputs concurrently. *PPSA* or both *PPSA* and *PPSB* can be available depends on *PPS* option value.

External Event functionality *[2, 4.4.8 Positioning Parameters. External Event Parameters]* allows the user to measure/record input event times. Up to two external event pins, *Event A* and *Event B* may be accommodated depending on receiver model. *EVNT* option value determines availability of *EventA* or both *EventA* and *EventB*.

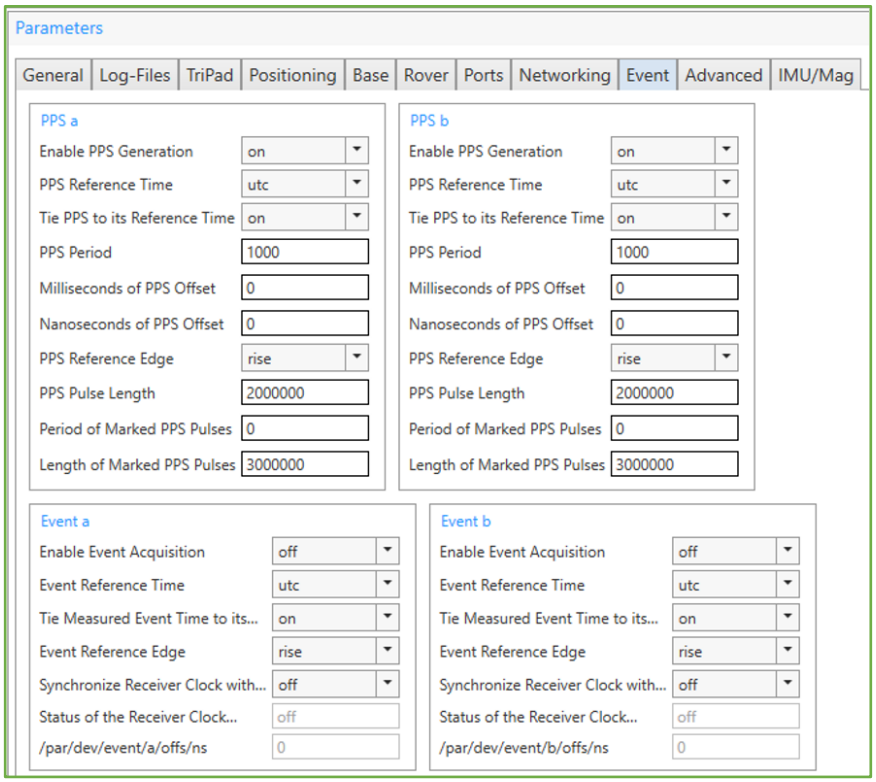


Figure 63. Event parameters.

The following parameters are available:

- *PPS a (PPS b)* – Settings for the *Pulse per Second* signals either *PPSA* or *PPSB*.
- *Event a (Event b)* – Settings for external events input either *EventA* or *EventB.*

Advanced Tab

Tab *Advanced* contains the set of tabs for the fine settings that are rarely used.

Anti–Interference tab

Anti–Interference tab allows enabling anti–jamming mode for the *GPS, GLONASS, GALILEO* and *BEIDOU* bands ***[2, 4.4.5 Measurements Parameters. Anti–jamming Parameters].***

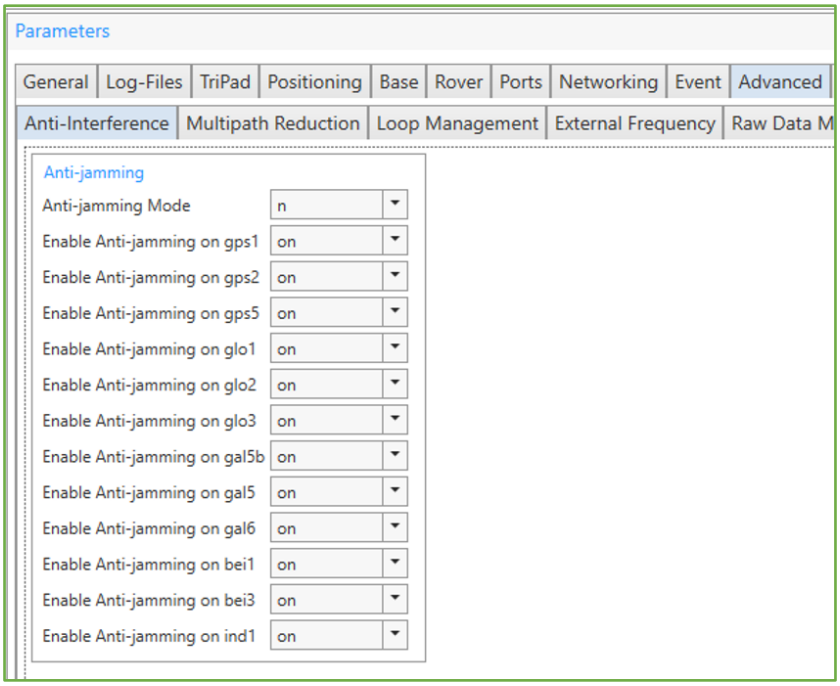


Figure 64. Anti–Interference parameters.

Multipath Reduction tab

Multipath Reduction tab contains parameters for enabling code and carrier multipath reduction for CA/LI. *[2, 4.4.5 Measurements Parameters. Correlator Parameters].*

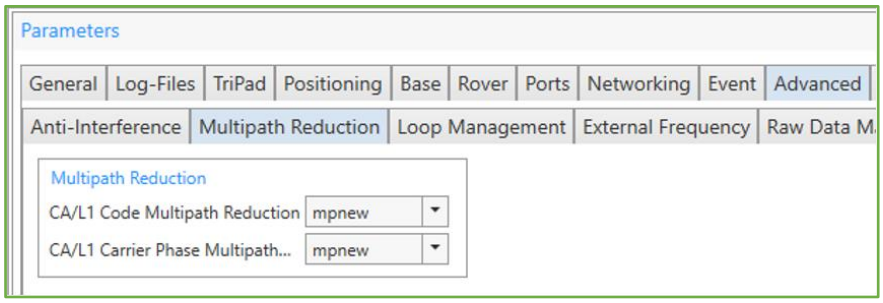


Figure 65. Multipath Reduction parameters.

Loop Management Tab

Loop Management tab contains tracking loop parameters which is not recommended to change from their default values *[2, 4.4.5 Measurements Parameters. Tracking Loop Parameters].*

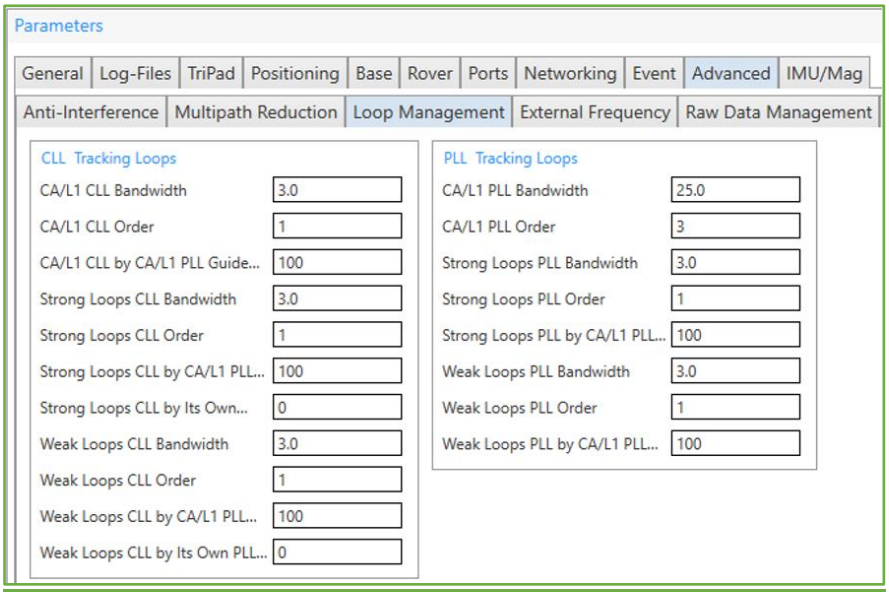


Figure 66. Loop Management parameters.

The following parameters are available:

- *CLL Tracking Loops* – Parameters for Code Lock Loop.
- *PLL Tracking Loops* – Parameters for Phase Lock Loop.

External Frequency tab

External Frequency tab is designed to select and configure oscillator and hardware calibrator *[2, 4.4.5 Measurements Parameters].*

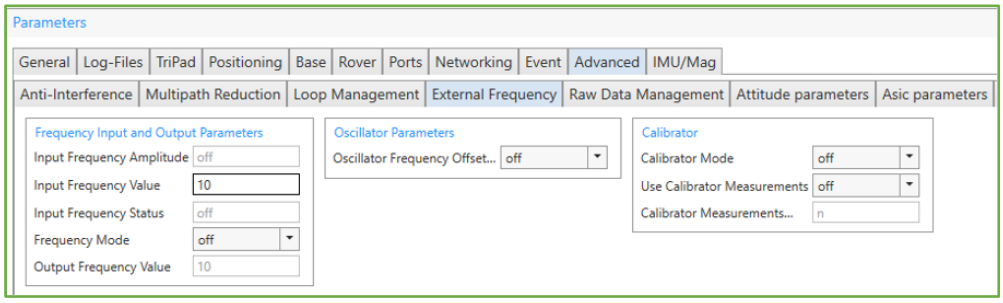


Figure 67. External Frequency parameters.

The available parameters are the following:

- *Frequency Input and Output Parameters* **–** Frequency parameters. **– *[2, Frequency Input and Output Parameters].***
- *Oscillator Parameters* – Oscillator mode – ***[2, Frequency Input and Output Parameters].***
- *Calibrator* – Parameters govern the behavior of the hardware calibrator. – ***[2, Hardware Calibrator].***

Raw Data Management Tab

Raw Data Management tab contains the settings of the internal receiver time grid and smoothing for different the indicators.

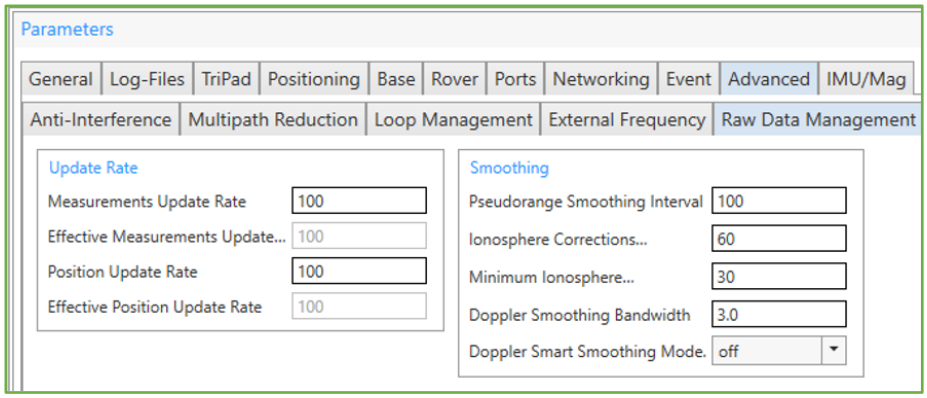


Figure 68. Raw Data Management parameters.

The following parameters are presented:

- *Update rate* – Parameters specify the required period of the internal receiver time grid and position updates**.** – *[2, 4.4.5. Measurements Parameters. Generic Measurements Parameters, 4.4.8. Positioning Parameters. Generic Positioning Parameters].* ***Effective read–only values are depending of the available options.***
- *Smoothing* **–** Smoothing settings for the different indicators**.** *[2, 4.4.5. Measurements Parameters. Generic Measurements Parameters].*

Attitude parameters tab

Attitude parameters tab allows configure and calibrate multi antenna receiver (see documentation on Duo and Quattro and *[2, 4.4.10 Phase Differential (RTK) Parameters. Attitude Parameter].*

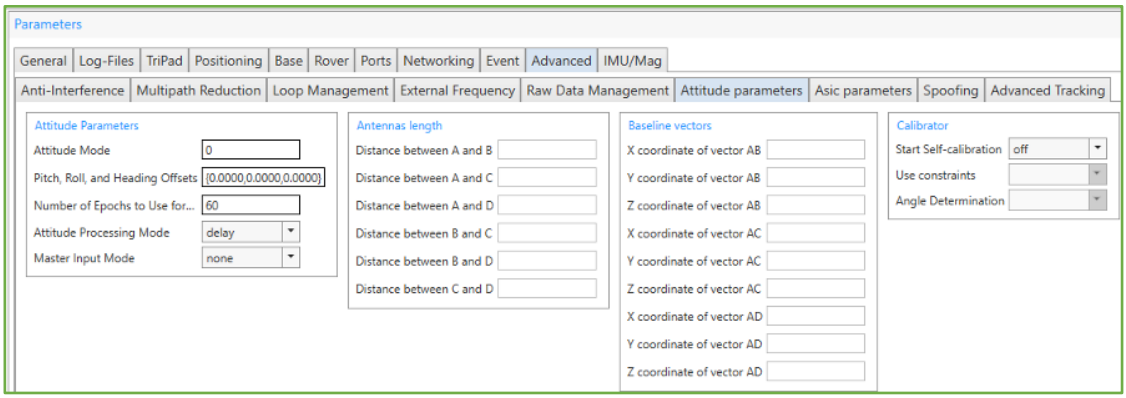


Figure 69. Attitude parameters.

The following parameters are available for the multi antenna receiver:

- *Attitude Parameters* – *[2, Attitude Parameters].*
- *Antennas length* – Distance between antennas.
- *Baseline vectors* – Coordinates of the baseline vectors.
- *Calibrator* – Staring self–calibration *[2, Attitude Parameters],* calibrator settings.

Asic parameters tab

Asic parameters tab allows setting processor clock frequency and displays current DSP (digital signal processor) sampling frequency *[2, 4.4.44 Miscellaneous parameters].*

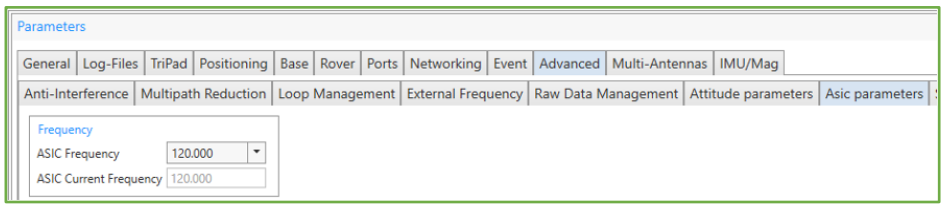


Figure 70. Asic parameters.

Spoofing Tab

Spoofing parameters tab allows setting processor clock frequency and displays current DSP (digital signal processor) sampling frequency *[2, 4.4.5 Measurements parameters. Spoofing Detection Parameters).*

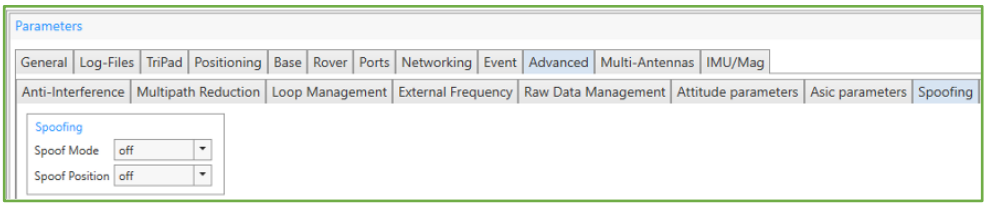


Figure 71. Spoofing parameters.

Advanced Tracking Tab

Advanced Tracking parameters tab allows to configure guided vs independent tracking *[2, 4.4.4 Locking on Satellite Signals. Advanced Tracking Parameters).*

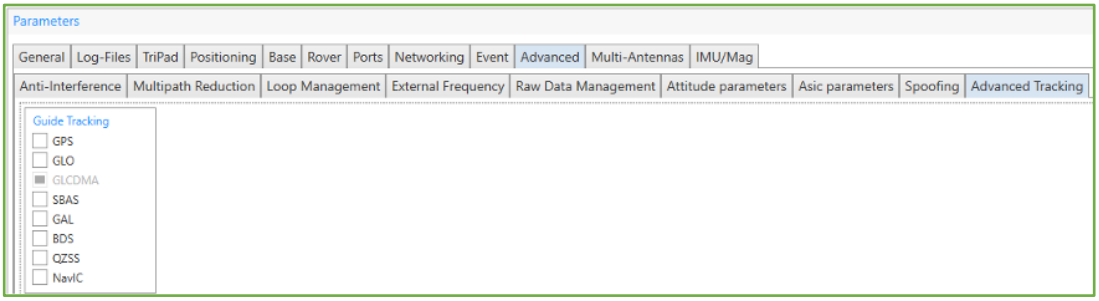


Figure 72. Advanced Tracking parameters.

Multi–Antennas Tab

Tab *Multi–Antennas* allows to configure output to each port for each antenna. Tab is available for multi–antennas receivers only *[2, 4.4.20 Parameters of Generic GREIS Messages. Masks and Counters].*

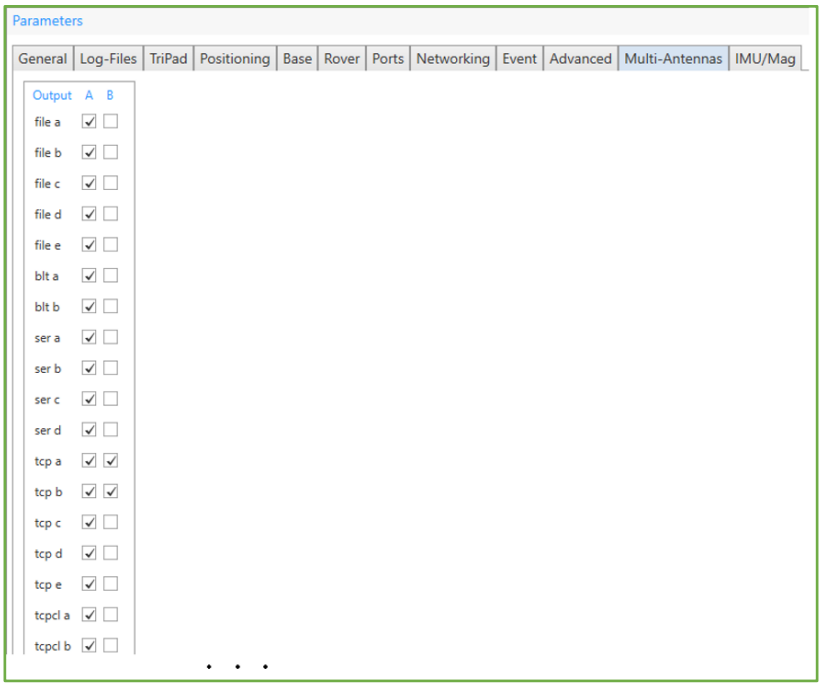


Figure 73. Multi–antennas output parameters.

IMU/Mag Tab

Tab *IMU/Mag* allows to configure IMU–module and magnetometer *[2, 4.4.40 IMU Parameters].*

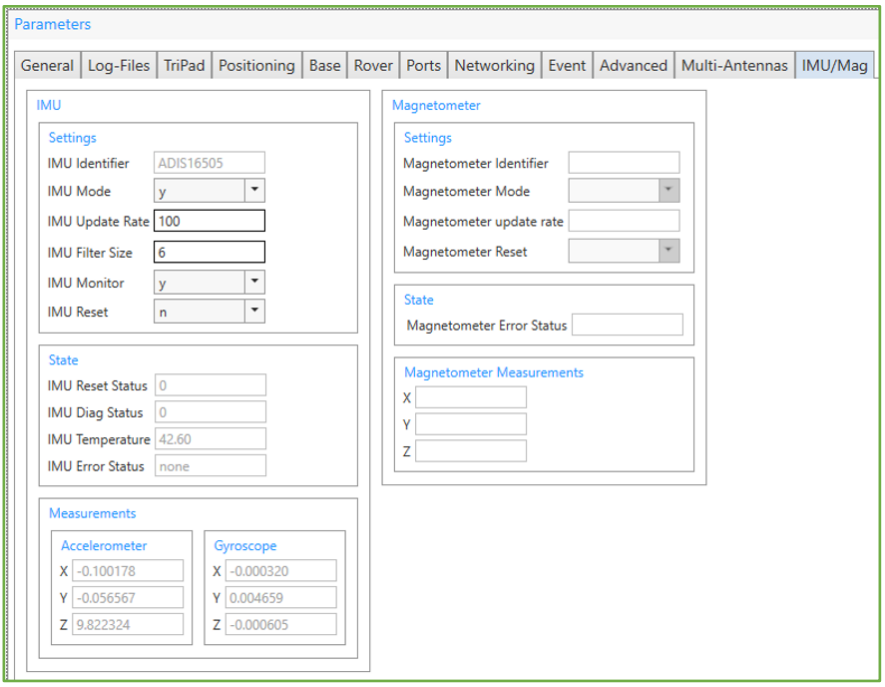


Figure 74. IMU/Mag parameters.

3.3.2 Set WiFi Ad Hoc Mode for iPhone/iPad

Button for setting up receiver as WiFi Ad Hoc for iPhone/iPad (duplicate 3.1.2 Actions).

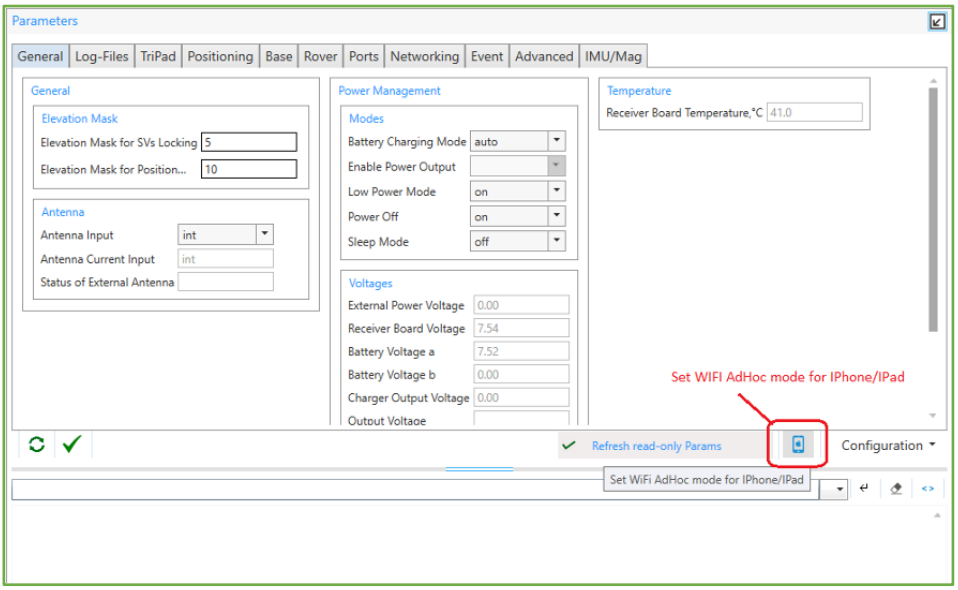


Figure 75. Set WiFi Ad Hoc mode for iPhone/iPad.

3.3.3 Save / Load Configuration

All the parameters from all the tabs can be saved to the *tcl*–script (see *Appendix 2. TCL–script example*). The saved parameters can be loaded to this or another receiver. To save configuration click button *Configuration* > *Save* and select file for saving.

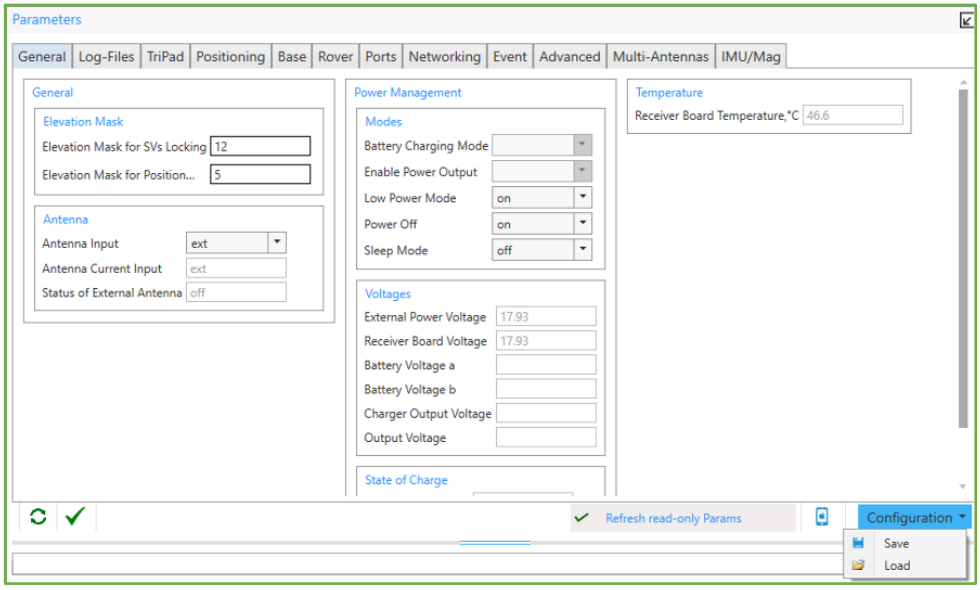


Figure 76. Save / Load Configuration menu.

If any edited parameters were not applied the appropriate warning will be shown.

All the parameters from all tabs except *LAN* and *WLAN* will be saved to the file of the *tcl* format (Tool Command Language). The *tcl*–script cannot be loaded to the receiver using ordinary terminals *ONLY* using tab *Parameters* of *NetView*

While saving user interface is disabled and the corresponding information is displayed near the button.

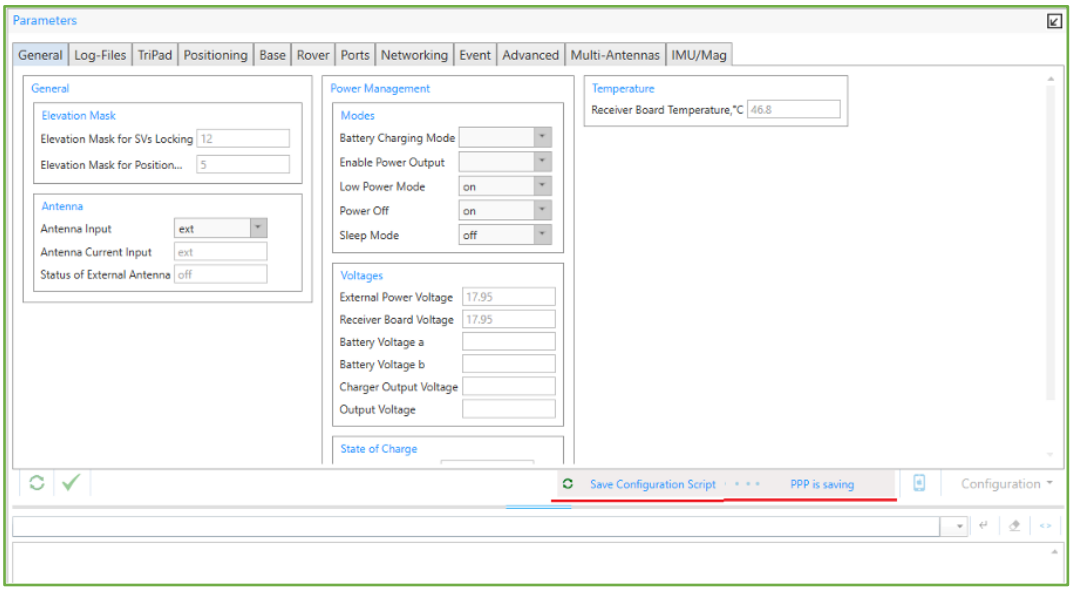


Figure 77. **Saving the configuration.**

To load configuration, click button *Configuration* > *Load* and select *tcl*–file.

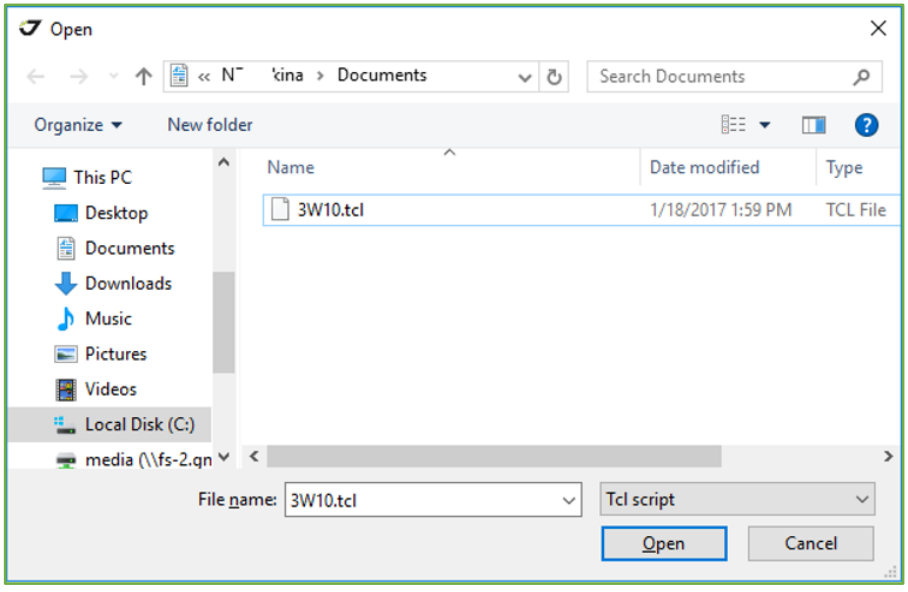


Figure 78. Load configuration from script.

MuAfter checking the board compatibility, the script will be loaded to the receiver and the result will be output in the *Manual Mode* pane.

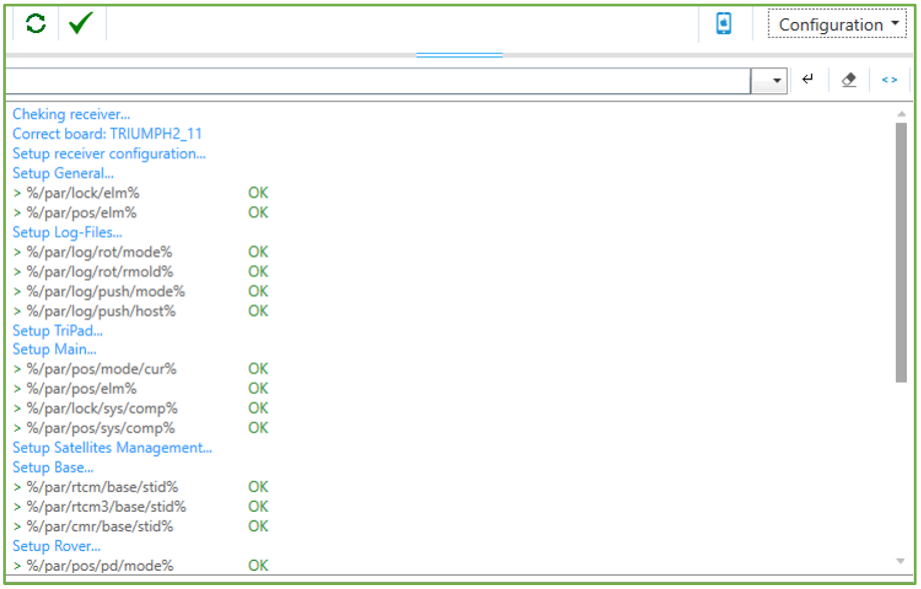


Figure 79. Configuration *tcl*–script loaded.

3.3.4 Limited Manual Mode Pane

The *Manual* pane is located under the parameter tabs and allows directly controlling the receiver by using of GREIS commands. The *Manual* pane works like a limited terminal communicating with the receiver, (i.e., it allows the user to send various receiver commands and get responses to these commands). For a complete list of commands supported by JAVAD GNSS receivers, refer to the *Greis Manual [2].*

The *Limited Manual* pane does not support outputting of the messages. Only the responses to the commands are displayed and can be logged.

The full–function terminal is provided on the *GREIS Commands* tile (see Manual Mode chapter).

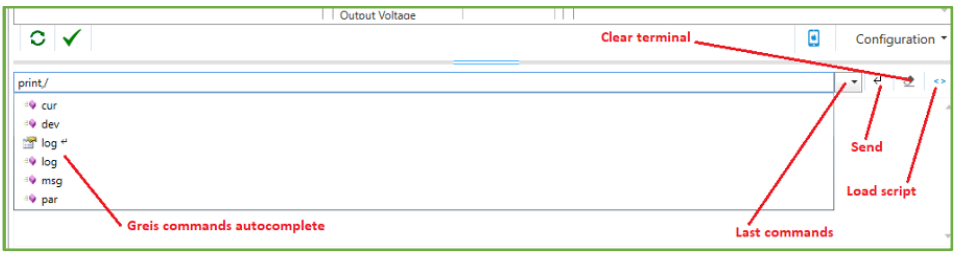


Figure 80. Manual Mode pane. Command input.

The Manual pane consists of the following elements:

- The *Input* line for the Greis commands. As you type a hint is shown with a list of available commands.
- The *Output* window displays receiver responses. “>” means that the receiver responded and is followed by the text of the response.
- The *Last Commands* button allows select one of the previously used commands. Up to 50 commands are stored.
- The *Send* button sends command to the receiver (equivalent to Enter in Input Line)
- The *Clear* button clears the Output Window.
- *Load Scrip*t button sends a set of the commands from the selected script to the receiver.

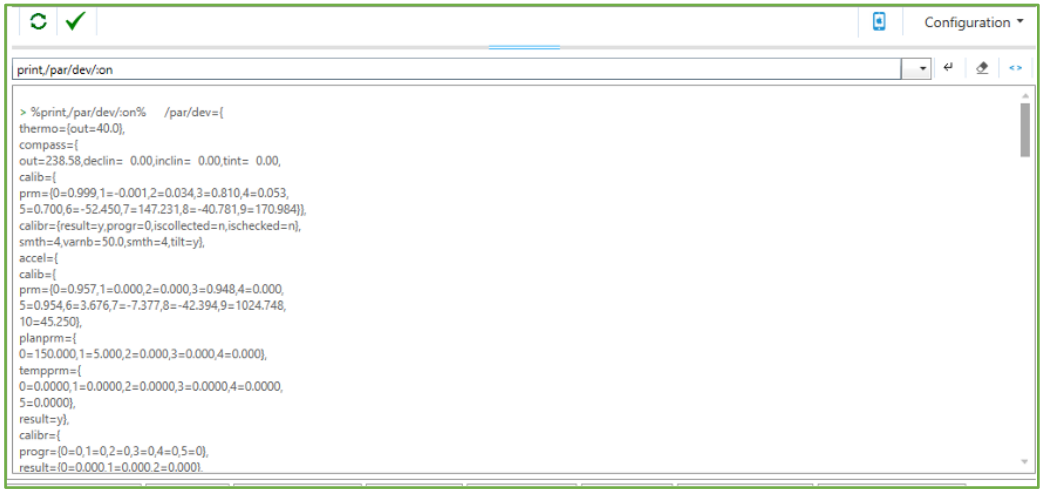


Figure 81. Manual mode output. The reply of the receiver.

The size of the pane can be changed by stretching out the slider, which separates the parameters and the field for manual input. The slider has a typical light blue handle in the middle.

3.4 File Operations

The *NetView* provides the friendly interface for monitoring and managing the memory of the receiver. You can start up 5 *jps*–files recording, send *free–events* to file, *stop* recording, *download* file from the receiver or delete it.

Expand *Files* tile to select the *File* window.

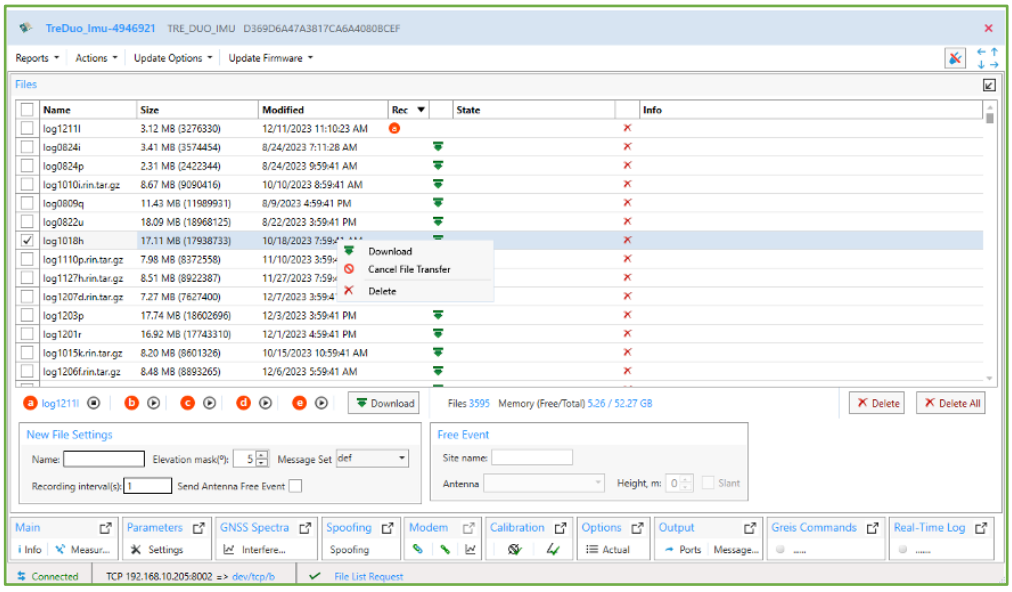


Figure 82. File window.

In the upper part of the window is a list of files. If the list is large, it might take some time to get it. The following information is provided for each file:

- *Name*
- *Size*
- *Modified* – Time of the last modifying
- *Rec* – If the file is recording at the moment A or (B, C, D, E) is displayed depending *log–file A* (*B, C, D, E)* is recording
- *State* – Status of downloading
- *Delete button* – Removes file from the receiver.
- *Info* – Displays path and speed of downloading.

Each file line in the list provides *Download* button and *Delete* button to download or delete concrete file.

To perform group operation, select file list items and right–click to open the context menu.

The information about *Total Files*, *Total Memory*, *Free Memory* available in the receiver is displayed under the file list.

3.4.1 Start/Stop File Recording

Under file list the pane for file recording is located.

The red circles with the letters A (B, C, D, E) inside are displayed if the corresponding file is recording. For the recording file the *Stop* button is available. Otherwise, there is the *Start* button. If no name is set a new file will be started with default name.

To configure a new file:

- Type file *Name* or leave the field empty to get default name.
- Specify the *Elevation Mask*, the parameter for excluding the satellites whose elevation angles are less than the specified value.
- Specify the *Recording interval* of output.
- Select *Message Set* from drop–down list, the parameter specifies the name of particular message set that will be enabled for corresponding log–file.
- Check the *Antenna Free Event* if desire to send the following free events when file is starting:
    - “_DYM=STATIC”
    - “_SIT=” – name of the site
    - “_ANT=” – type of the antenna
    - “_ANH=” – height of the antenna (with slant if checked)
- The values for _SIT, _ANT, _ANH and slant can be specified on the Free Event pane.

Note: See information about the free events *[2, 2.3.9 event].*

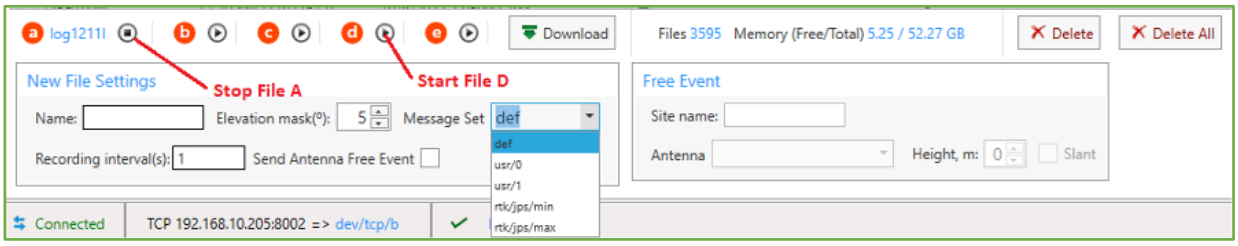


Figure 83. File recording.

Click *Start* button next to the red circle A (B, C, D, E) to start corresponding *log–file*

If you try to start file that is already exists you will be suggested to append or overwrite it.

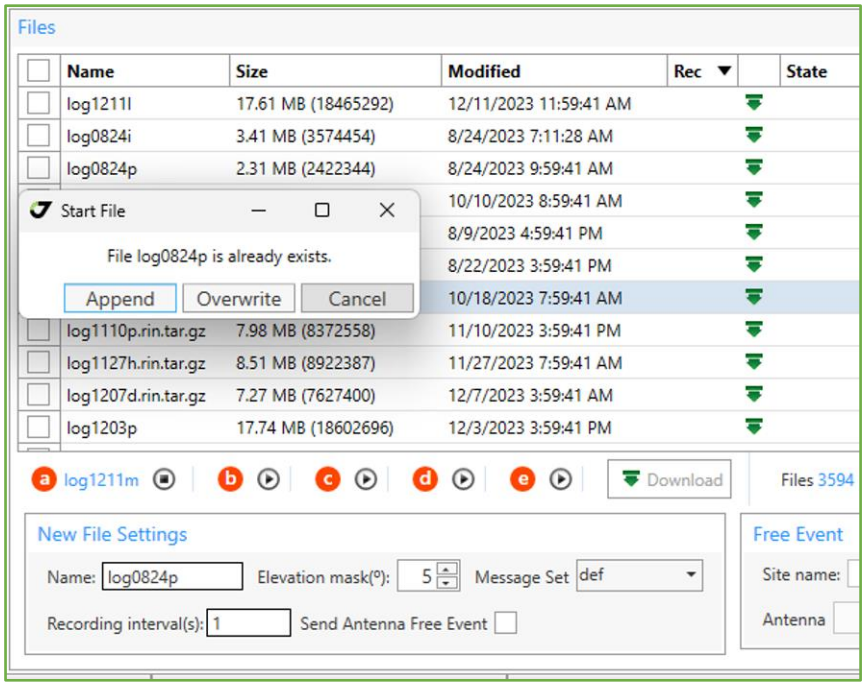


Figure 84. Existing file is started.

3.4.2 Download Files

Select one or several files from the file list and click *Download* button or in the context menu. Specify the file path in case of single file or folder if several files are selected.

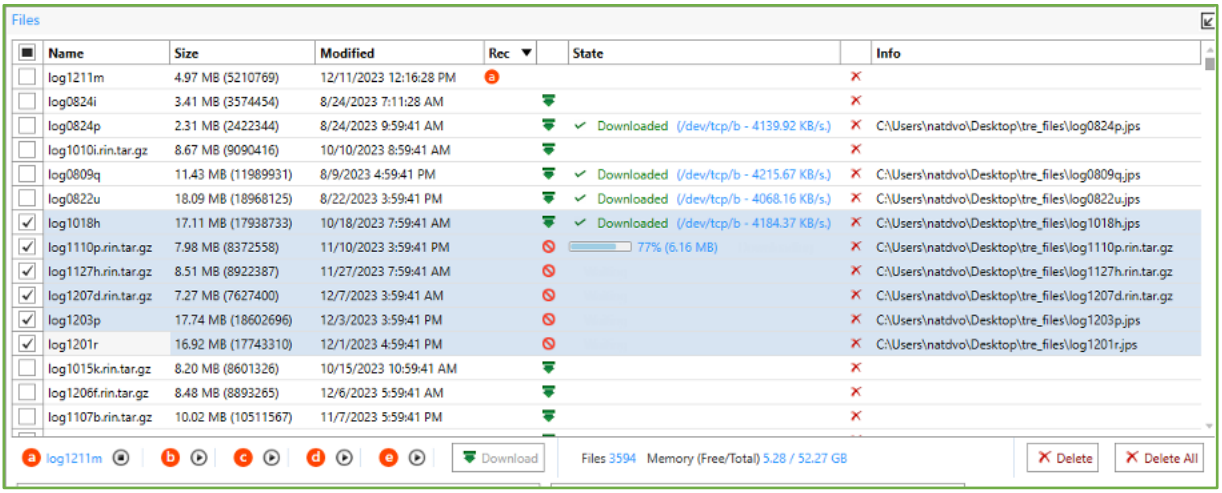


Figure 85. Download files.

Downloading states are displayed in the file list. The *Cancel* button for interrupting of the file transfer is available instead of *Download* button.

3.4.3 Delete Files

Select the files you want to delete and click *Delete* button in the line, or in the context menu, or under the file list. A confirmation message will appear. Click *Yes*. Deleting of the file will start.

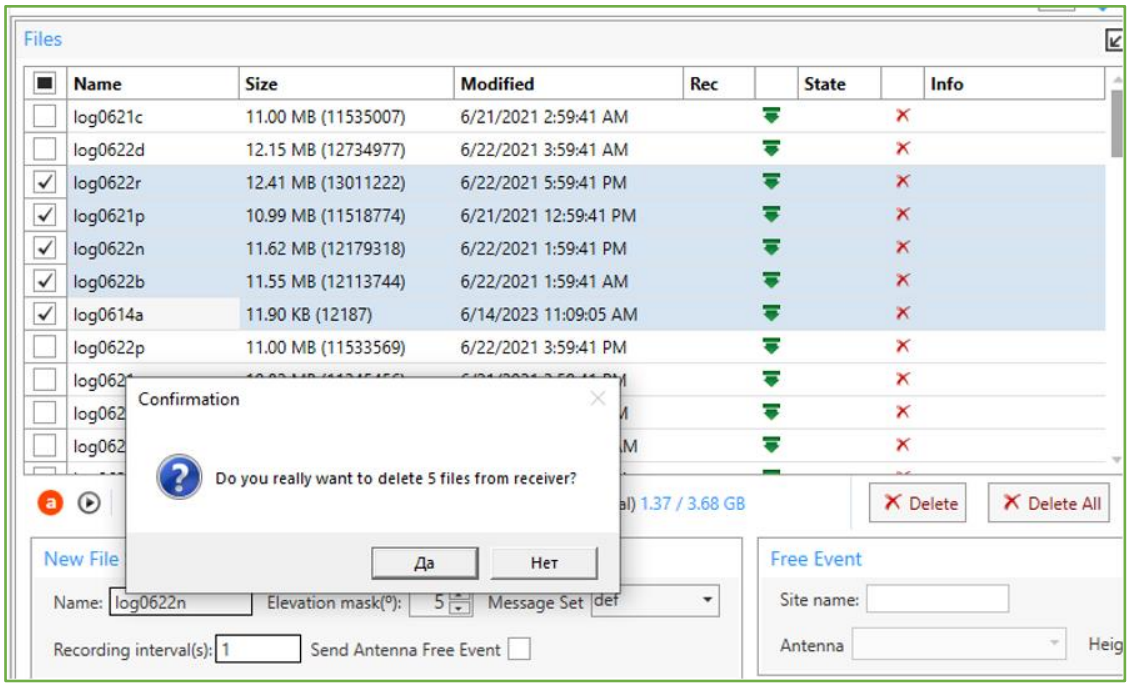


Figure 86. Delete files.

While deleting files window is disabled. Removal of a large number of files can take several minutes. To delete all the files just click the button *Delete All* without selecting the files.

3.5 GNSS Spectra

The *Spectra* tile allows collecting, display and store measurements of GNSS interference.

Number of spectra depends on receiver type and is equal to the number of RF bands implemented in the receiver.

The interference data for all the GNSS bands is collected separately. Filter, AJM (need to be *On*) and Channel modes are available.

Note: The option SPEC must be activated for spectra obtaining.

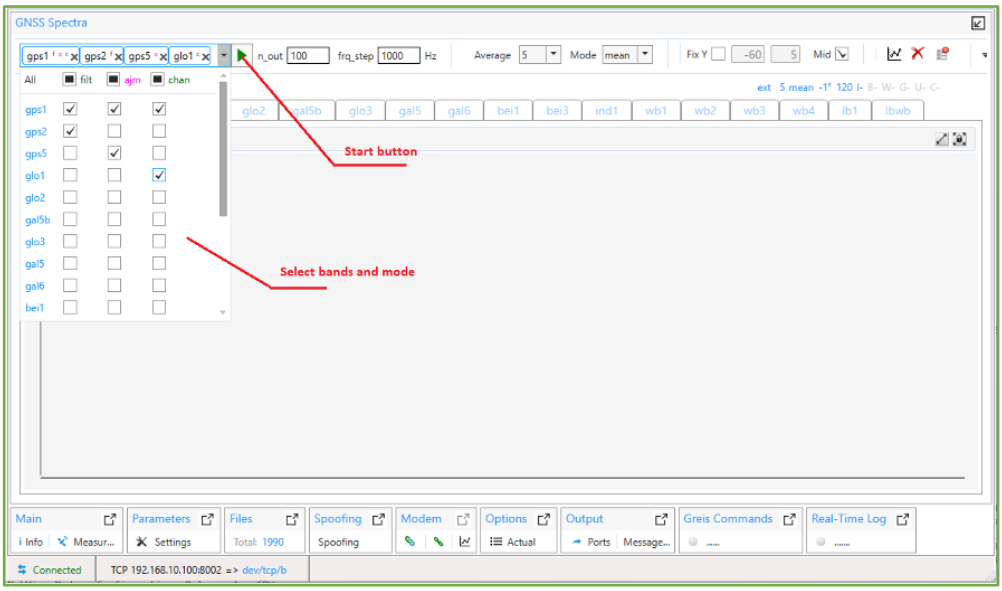


Figure 87. GNSS–spectra bands and mode.

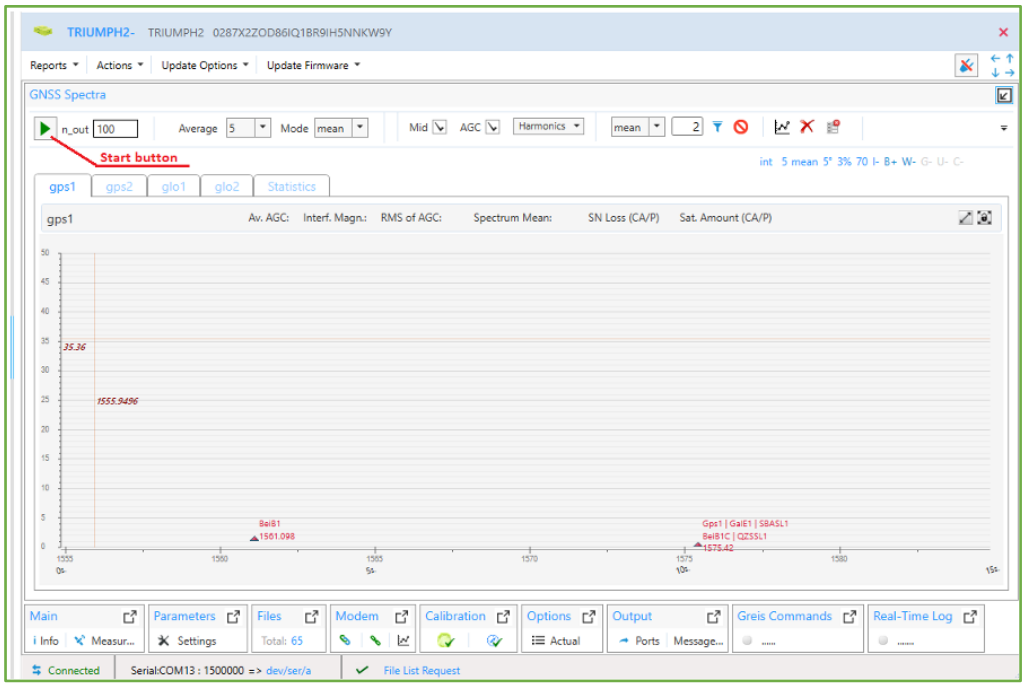


Figure 88. GNSS–spectra tile for old models.

For old models spectra for all the bands are collected simultaneously and only in a single mode (max 13):

- *Gps L1*, *Gps L2*, *Gps L5*
- *Glo L1*, *Glo L2*
- *Glo L3/Gal E5B*
- *Gal E5*, *Gal E6*
- *Bei B1*, *Bei B2*, *Bei B3*
- *W1*, *W5*, *W6*

Use the buttons to switch between the bands.

3.5.1 Collecting Spectra

To start the current measurements of the interference:

- Select bands and modes from the dropdown list.
- Specify the n_out – Number of Points in Each Spectrum Message.
- Specify the freq_step – Spectrum Frequency Step. Internally, spectrum data are computed with /par/spectr/frq_step interval.
- Specify the Samples to Average – Time Interval of Incoherent Spectrum Data Accumulation.
- Specify the Mode (mean, min, max) – Spectrum Averaging Mode.
- Click *Start* button.

Note: Please do not change /par/spectr/frq_step parameters from their default values if you are not an expert in the spectrum stuff as some combinations of these parameters may give unexpected results.

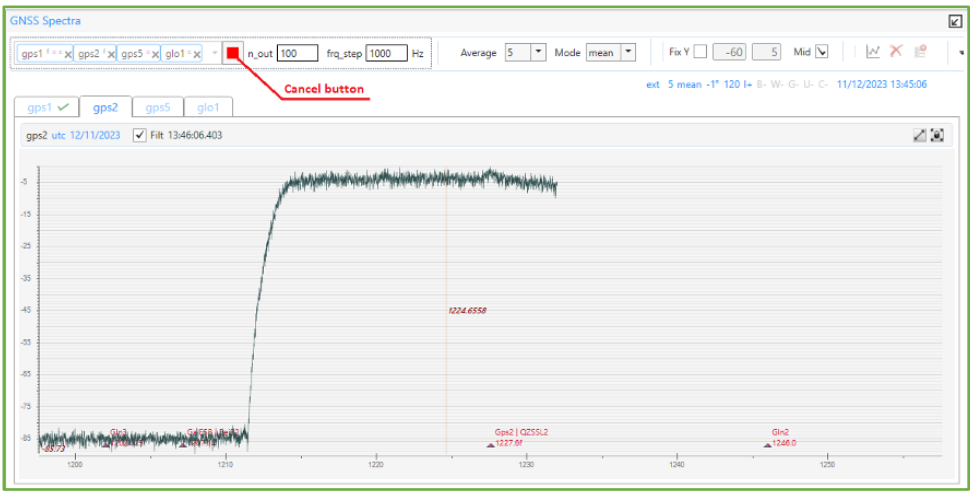


Figure 89. Collecting GNSS–spectra for selected bands.

The construction of graph begins. The status of the process will be shown in the status bar. Collecting can be interrupted by clicking button Stop.

Figure 90. GNSS–spectra for selected bands and modes are collected.

The following data are displayed on the charts:

- Black, green and magenta lines – Show the spectrum output *filter, ajm* and *channel* modes, respectively.
- X axis – The carrier frequency in MHz. For each GNSS band the values are different.
- X axis – Time in seconds (blue numbers)
- Y axis – Amplitude, dB.
- Red triangle – Mid frequency.

In the upper right corner is shown the receiver status during the spectrum measuring.

It lists the following:

- Name of the test
- Position the antenna
- The number of measurements for averaging
- Elevation mask
- ASIC frequency
- AGC
- I – Anti–Jamming mode (+ enabled; – off)
- Status of communication module (gray if the module is not)
    - + enabled; – off:
    - *B* – Bluetooth
    - *W* – Wi–Fi
    - *G* – GSM
    - *U* – UHF / FH
    - *C* – Communication Board (for TVS)
- Time

All previously made measurements are available. To see them use the *Navigation buttons* in bottom.

For older models, the following data are output:

- Black – show the spectrum output.
- Blue line – Only shows the value of the system voltage (AGC).
- Green triangle – harmonics.

Figure 91. GNSS–spectra for old models.

Also, Statistic tab is shown for older models.

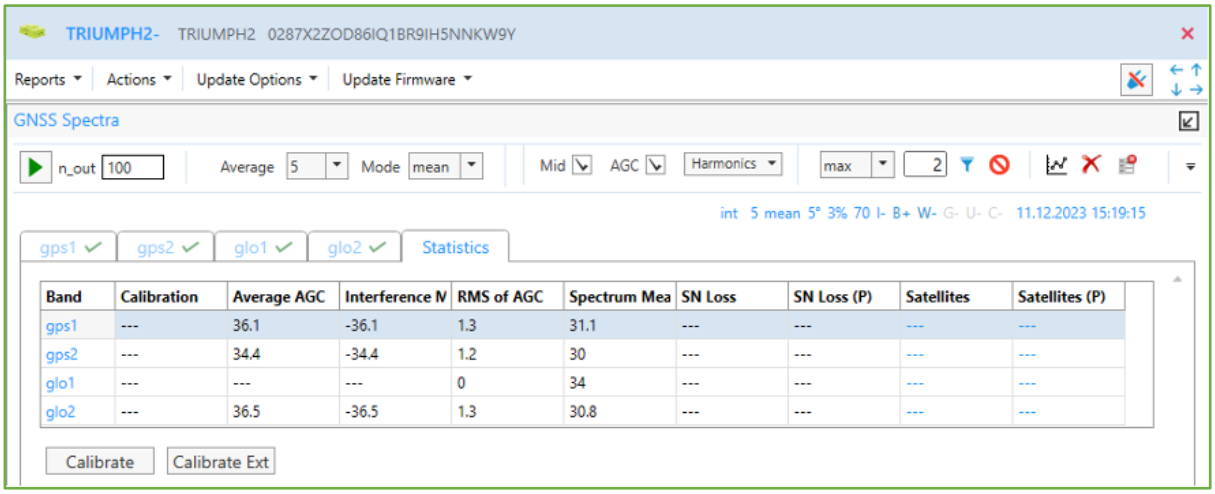


Figure 92. GNSS–spectra Statistics for old models.

There are following data are in the table:

- *Calibration* – AGC calibration
- *Av Agc* – Mean value of AGC divided by 2 for each of RF bands for the time interval the spectrum has been measured over.
- *Inter Magnitude* – Interference magnitude, calculated from the average values and calibration of AGC.
- *RMS of Magnitude* – RMS value of AGC for each of RF bands for the time interval the spectrum has been measured over.
- *Spectrum mean* – Mean spectrum value for each of RF bands for the time interval the spectrum has been measured over.
- *SN Loss* – Average loss in signal/noise ratio.
- *Sat Amount* – The average number of satellites for CA and P codes.

Buttons *Calibrate* and *Calibrate Ext* set Spectrum/AGC Calibration and Spectrum/AGC Calibration for External Antenna Parameters.

3.5.2 Operation with Plots

The following chart manipulations are available:

- *Show/Hide* modes – Flags to show/hide graphs for the particular mode.
- *Fix Y–axis* – Set min and max values for Y–axis and fix it
- *Show/Hide* Mid – Flag to show/hide middle frequency red triangle.
- *Zoom* – Select region by mouse right button or turn the mouse wheel to zoom plot.
- *Pan* – Left mouse button move the graph.
- *Fit to view* – Return the graph to full view.
- *Show* band intersection – Flags for show/hide bind intersections (for wide bands).

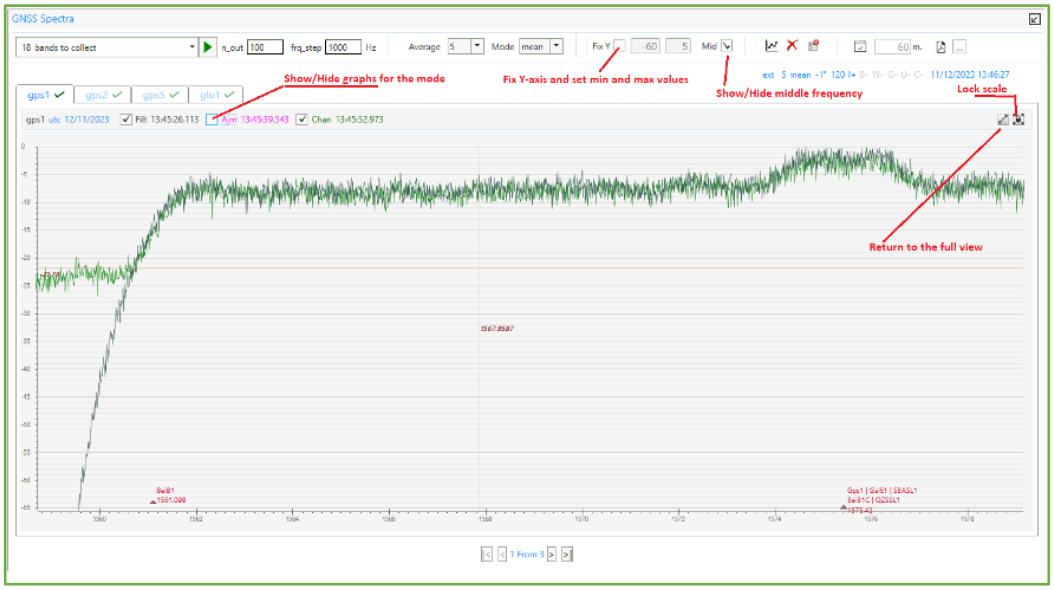


Figure 93. GNSS–spectra plot zooming and panning.

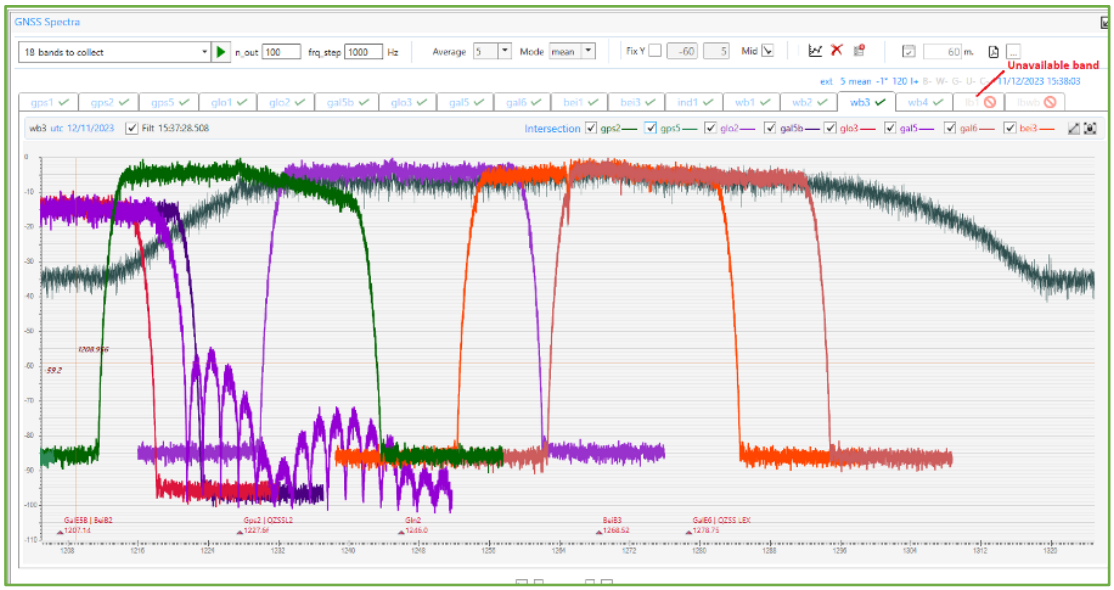


Figure 94. GNSS–spectra band intersections.

Available for older models only:

- *Show/Hide* AGC – Shows/hides AGC line.
- *Harmonics* – Shows/hides AGC additional harmonics.
- *Filter* – Allows roughening plot using different mode.
- *Lock Scale* – Completely, Y–axis 0–50.

3.5.3 Saving and Deleting

You can save and delete the spectra plots. Moreover, it is possible to configure schedule for collecting spectra periodically and saving reports.

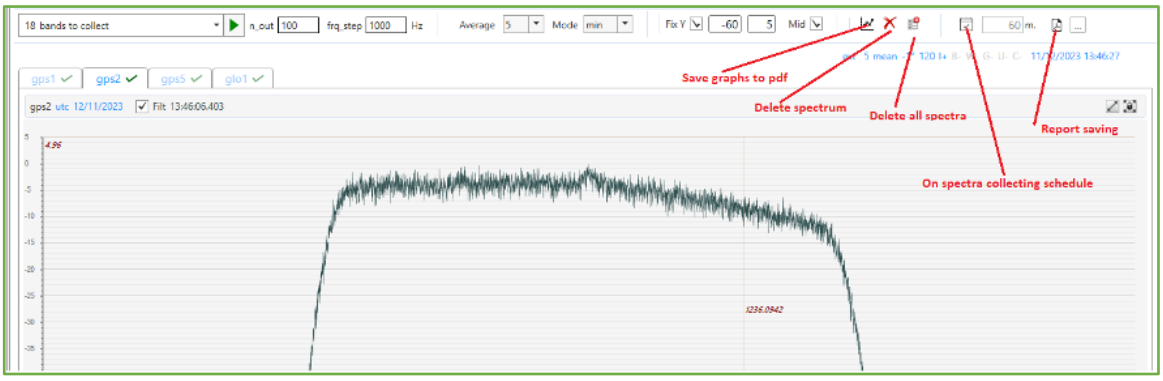


Figure 95. GNSS–spectra saving and deleting.

- *Delete* – Deletes the current spectrum plots (all bands).
- *Delete All* – Deletes all existing plots for the receiver.
- *Save to File* – Saves the spectra for all bands pdf file.
- *Enable Schedule* – Starts collecting spectra with a specified period.
    - *Save Reports* – Enabling saving spectra to the specified folder.

3.6 Spoofing Detection

Spoofing detection is available for firmware beginning with 4.1.0.0 and requires the Spoofing Detection (_SPF) option. User interface is provided in NetView & Modem 2.2.7.0 or higher.

Short Description of Spoofing / Jamming Detection Algorithm

Receiver detects possible spoofing by analyzing number of correlation peaks. In normal conditions only one peak is present. In case of spoofing, there should be 2 peaks – original and from spoofer. If receiver detects 2 peaks – it marks signal as "spoofed". If number of spoofed satellites appeared to be more than one, that signal for all satellites is flagged as "spoofed".

Jamming detection based on analysis of incoming noise characteristics. In case of jamming "noise floor" increases. Also deviation of noise may increase. Receiver measures these parameters and in case at least one is more than threshold that signal for all satellites is flagged as "jammed".

3.6.1 Spoofing Option

Spoofing detection is available if Spoofing Detection (_SPF) option is loaded.

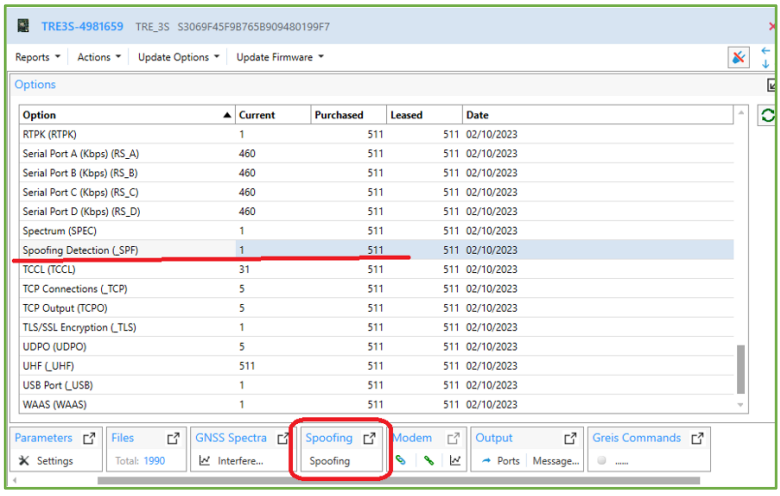


Figure 96. Spoofing Option.

Detail spoofing detection information can be obtained on Spoofing Tile.

Also spoofed and jammed satellites are flagged in the main satellite table if spoofing mode is on.

Information about spoofing mode is presented on the main tile.

3.6.2 Spoofing Tile

Select tile “Spoofing”. Toolbar and satellite system/signal table are on the tile.

The following settings configure spoof detecting:

- Mode – On/off spoofing detection mode.
- Position – On/off using of signal in positioning.
- Dependent Lock – Switch tracking to dependent mode.

Note: For spoofing/jamming detection, signal should be tracked in independent (not guided) mode, so for checking of all possible signals.

Button “Enable Spoofing Details” starts collecting detail slots information (message [sj]).

Also, toolbar contains time of the last received message and button Expand All, which expand/collapse all systems in the table at once.

The table contains available signals for each satellite system.

Obtained data fills the table.

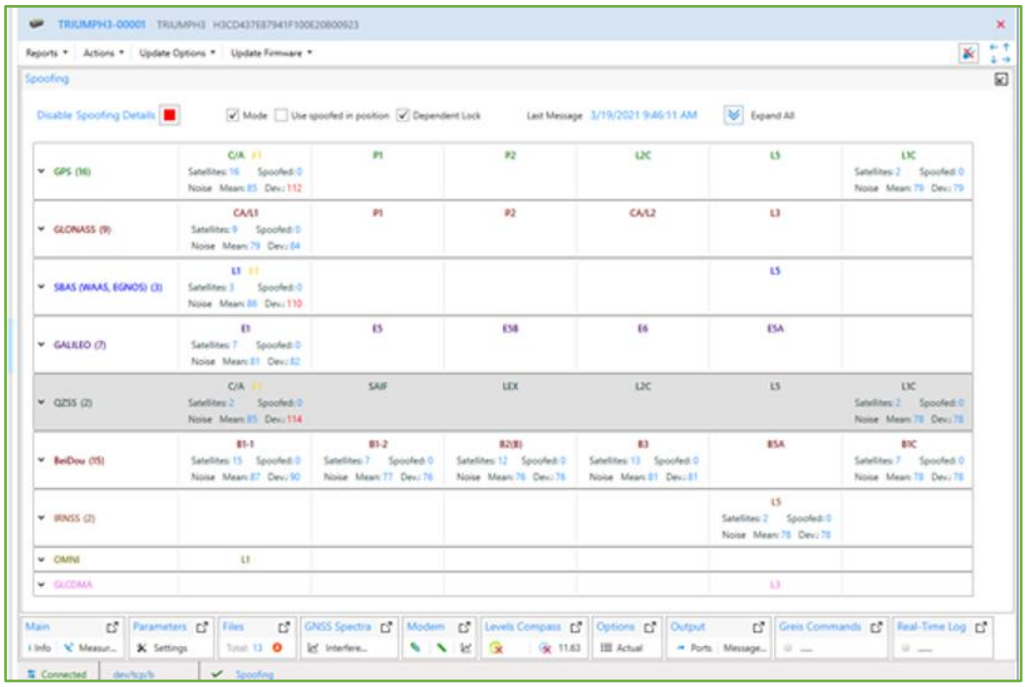


Figure 97. Filled Spoofing Table. GPS/CA, SBAS/L1, QZSS/CA – jammed.

Receiver provides the following information for each available signal in every satellite system:

- Satellites – Count of the locked satellites in the signal.
- Spoofed – Count of spoofed satellites. If spoofed more than 1, the entire signal is considered to be spoofed. It is red and “S!” appears near the signal header.
- Noise Mean – It is red if greater than 100. It means that signal is jammed and dark yellow “J!” appears near the signal header.
- Noise Deviation – It is red if greater than 100. It means that signal is jammed and dark yellow “J!” appears near the signal header.

Expand System to See Satellites Information

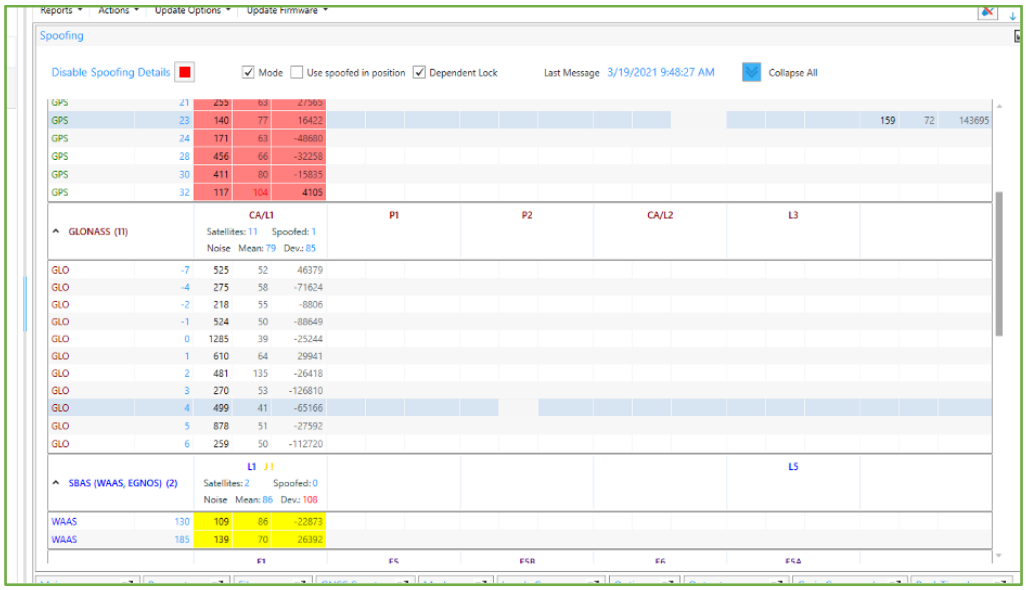


Figure 98. Detail satellites info. GPS and SBAS are expanded.

GPS/CA – spoofed and jammed, SBAS/L1 – jammed.

Spoofing details contain the following columns:

- Satellites system.
- Satellite number.
- Signals. Each signals contains 3 sub columns.
    - Main Peak
    - Second Peak – Gray if less than 100
    - Delta Range – Gray if Second Peak less than 100

The entire signal is orange if spoofed, dark yellow if jammed and red if both.

3.6.3 Main Tile

Spoofing detection mode adds dark yellow, orange or red flag to the SNR – value of satellite in the main table if it is jammed, spoofed or both accordingly.

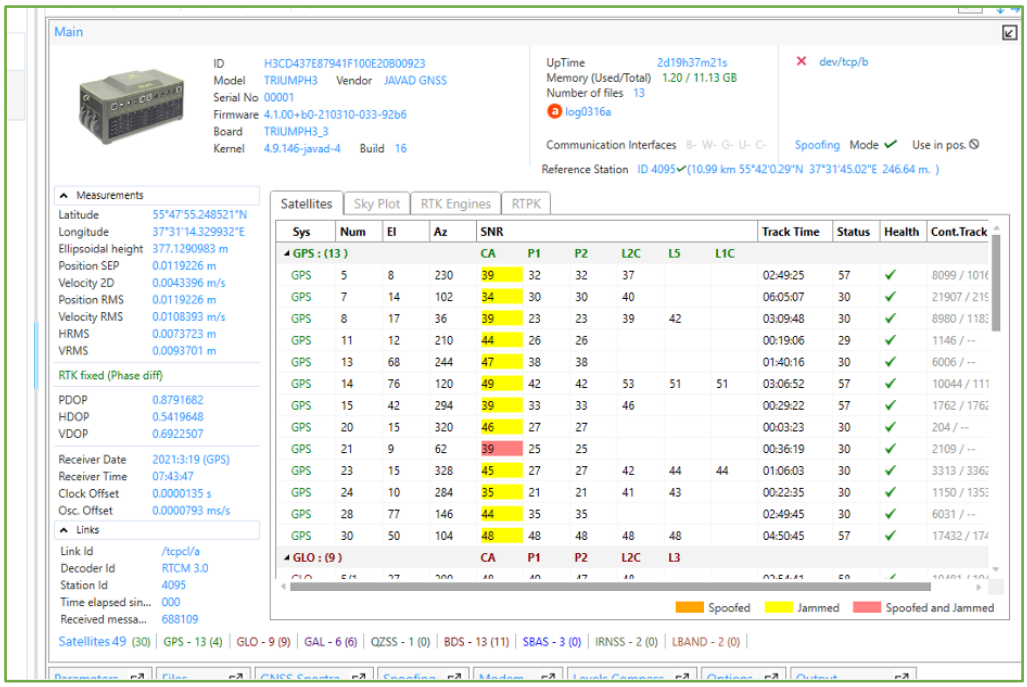


Figure 99. Spoofed and Jammed flags in the main satellite table.

GPS/CA jammed, 21–st satellite also – spoofed.

3.7 Modem Configuration

Expand *Modem* tile to configure an inner modem or pair an outer one.

Modem tile provides the toolbar with Update Firmware and Daisy Chain buttons and 3 tabs: Parameters, Pair via BT and Spectra.

Currently receivers support up to four GSM, UHF, or FH modems, called A, B, C and D.

Note: In JAVAD GNSS receivers, the internal GSM, UHF, or FH modem is usually hardware–wise connected to Port C. As for external GSM radio modems, it is common practice to connect such modems to the receiver's Port B or Port D, if available.

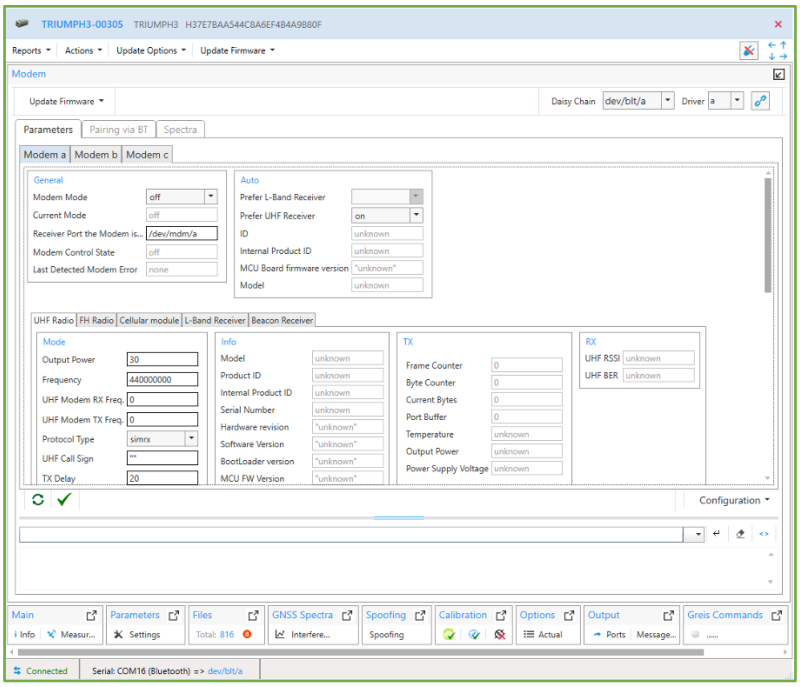


Figure 100. Modem Tile.

Toolbar contains:

- *Update Firmware* menu – Allows updating modem firmware from file or website.
- *Daisy Chain* group – *A*llows selecting the channel and driver and start daisy chaining.

3.7.1 Updating Modem Firmware

Inner modem firmware can be updated from file or via Internet. Depending of the modem model *Radio*, *MCU* and *Internal MCU* firmware can be updating.

Updating from File

Click *From File* button and choose firmware file using *Open File Dialog*.

Updating from Internet

Click *From Website* button. Select modem type: *Radio* or *GSM* and provider for GSM. Firmware file will be downloaded from the site and checked.

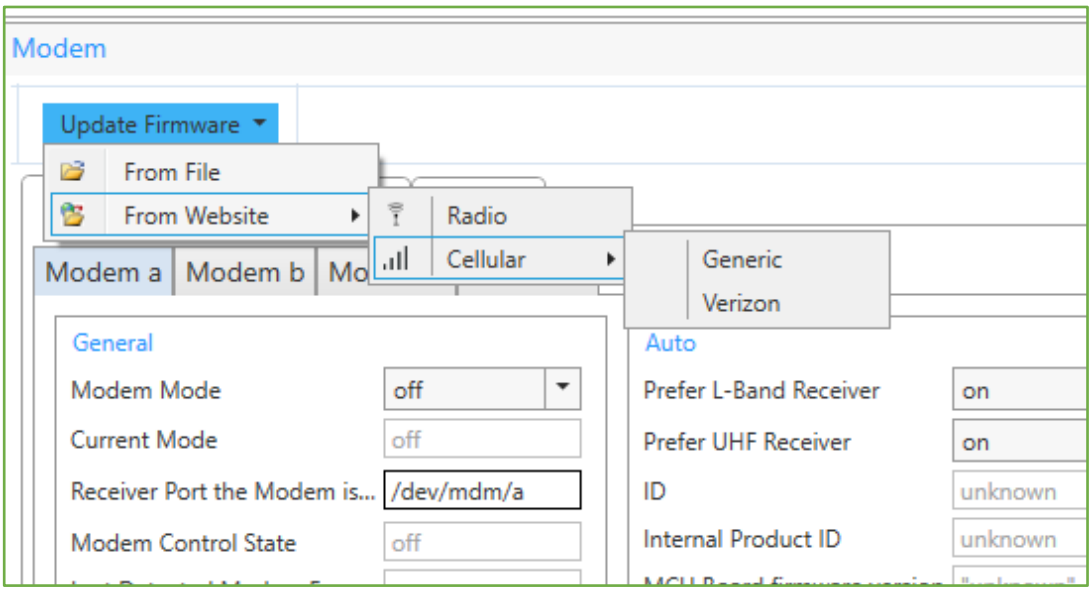


Figure 101. Update Firmware menu.

Before updating the modem, need be to turn on and has the status *"Ready".* Otherwise, a warning will appear.

After new firmware is download Confirmation *message* appears.

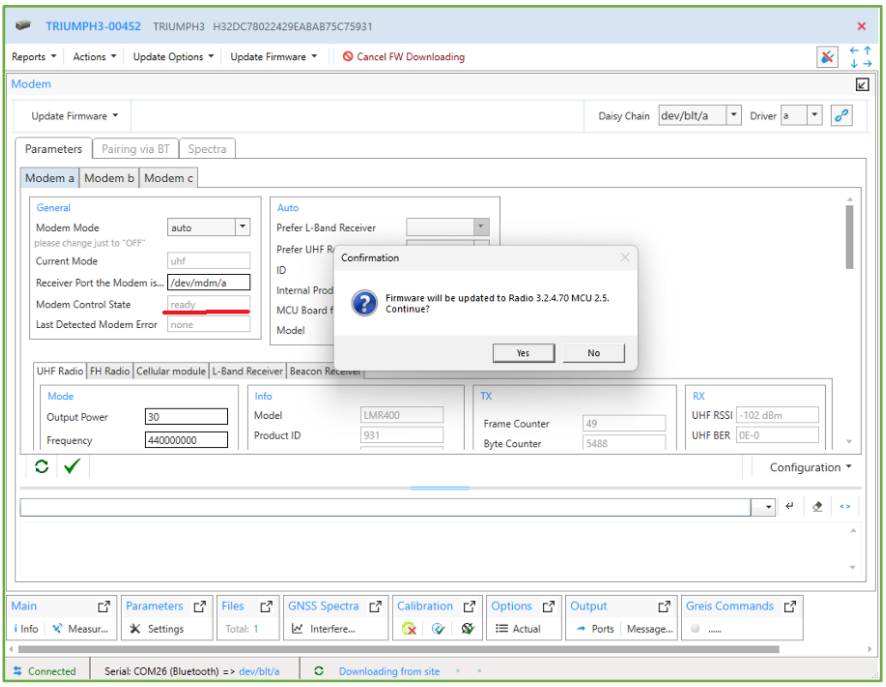


Figure 102. Updating modem confirmation.

Then new modem firmware will be uploaded to the receiver.

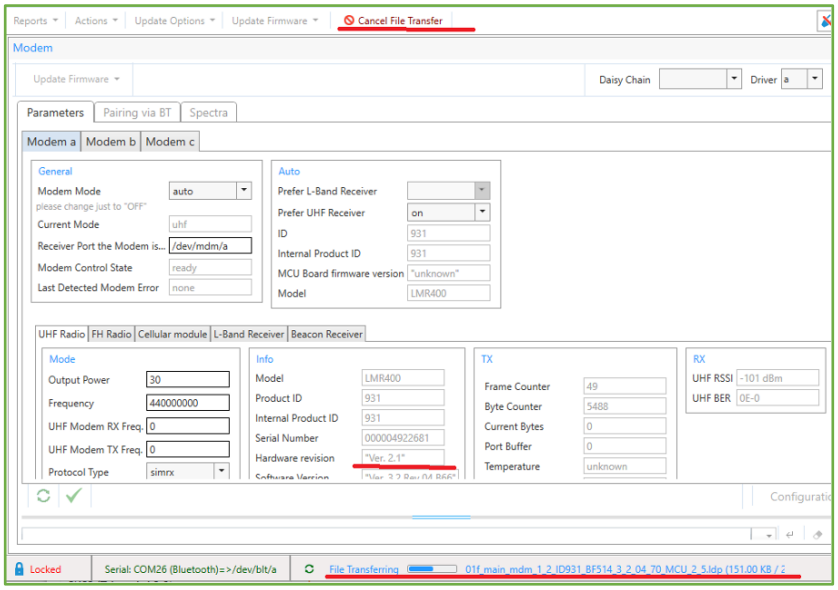


Figure 103. Uploading new modem firmware.

Status bar at the bottom of the window shows process progress.

Both the firmware downloading from the site and uploading to the receiver can be canceled.

After new firmware is uploaded to the receiver, it reboots and reconnects. Rebooting can take several minutes. Info about new firmware appears in the *Parameter Info* panel.

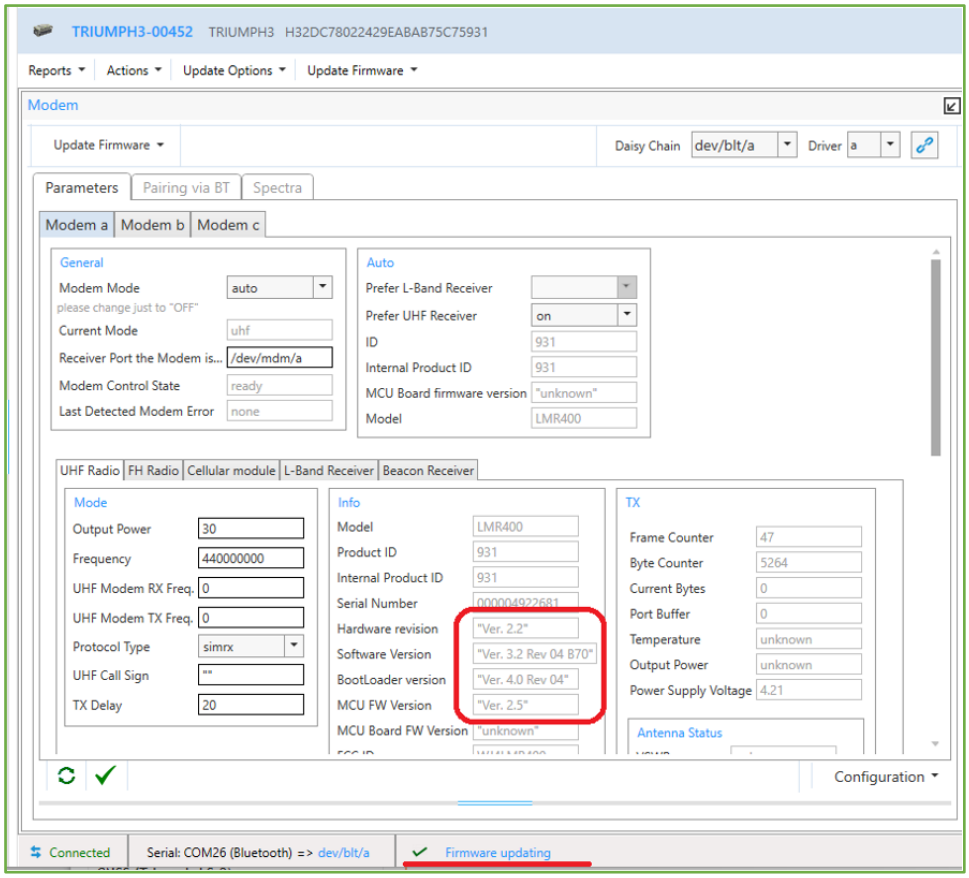


Figure 104. Internal modem is updated.

3.7.2 Daisy Chaining

An inner modem can be accessed by daisy chaining. To start daisy chaining select the channel from *Daisy Chain* drop–down, modem driver and click *Daisy Chain* button.

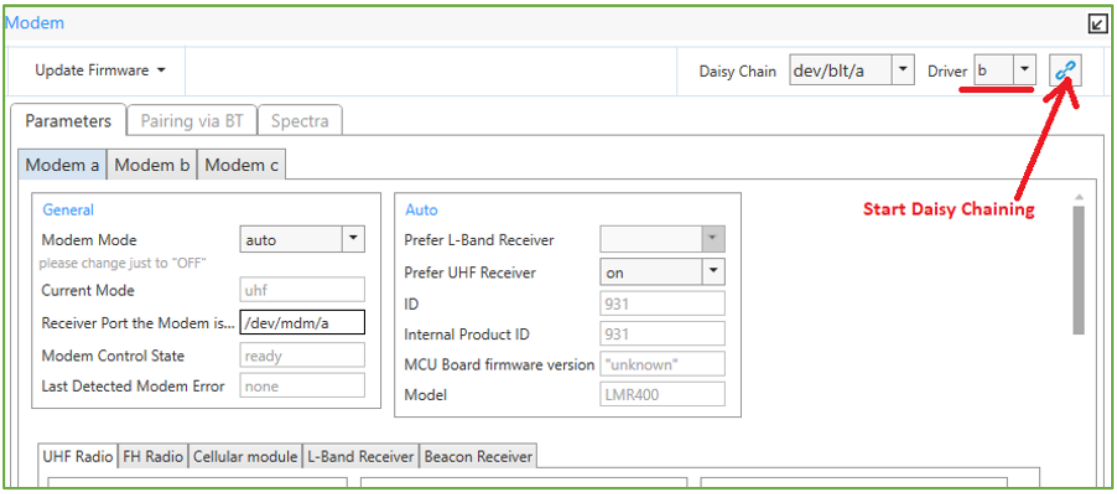


Figure 105. Daisy Chaining menu.

After connecting full info about the modem panel is displayed. There is full info is presented and firmware updating menu is available. *Log* panel displays all the commands which were send to the modem and responses. Content of the *Log* panel is also stored to the log file.

Firmware updating process is the same as for outer modems, described in the Modem chapter.

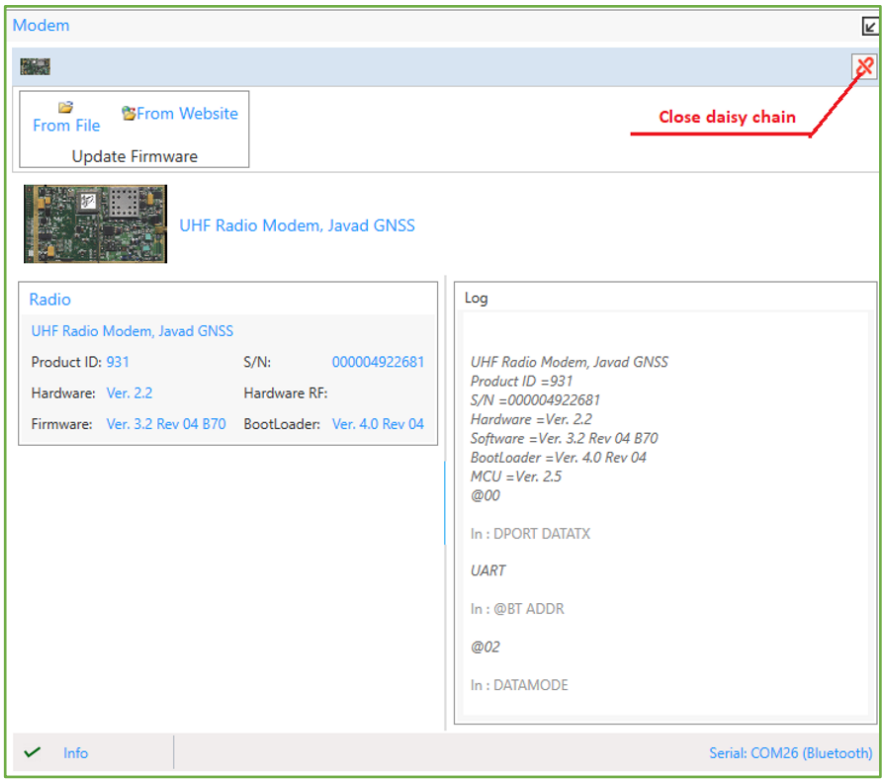


Figure 106. Internal modem connected by Daisy Chaining via Bluetooth channel.

To disconnect from the internal modem, click *Close* button. Daisy chaining will stop and the channel will be released.

3.7.3 Radio Parameters

Parameters tab – Contains up to four sub–tabs called *Modem c, Modem a, Modem b, and Modem d*. All the section provides the identically set of the settings for each modem. Receivers support GSM, UHF and FH modems which can be as internal so paired.

The parameters are described in *[2, 4.4.30 GSM, UHF, and FH Modem Parameters].*

Depending on the type of modem you may need to configure various settings. They are located at the respective nested tabs.

Parameters tab is arranged like *Parameter* tile (see *3.3 Configuring the Receiver*).

Configuration buttons save/load work also like *Parameter* tile (see *3.3 Configuring the Receiver*). But only radio configuration will save/load using *tcl*–script.

Limited Manual Mode pane is also provided and works like described in *3.3.4 Limited Manual Mode Pane.*

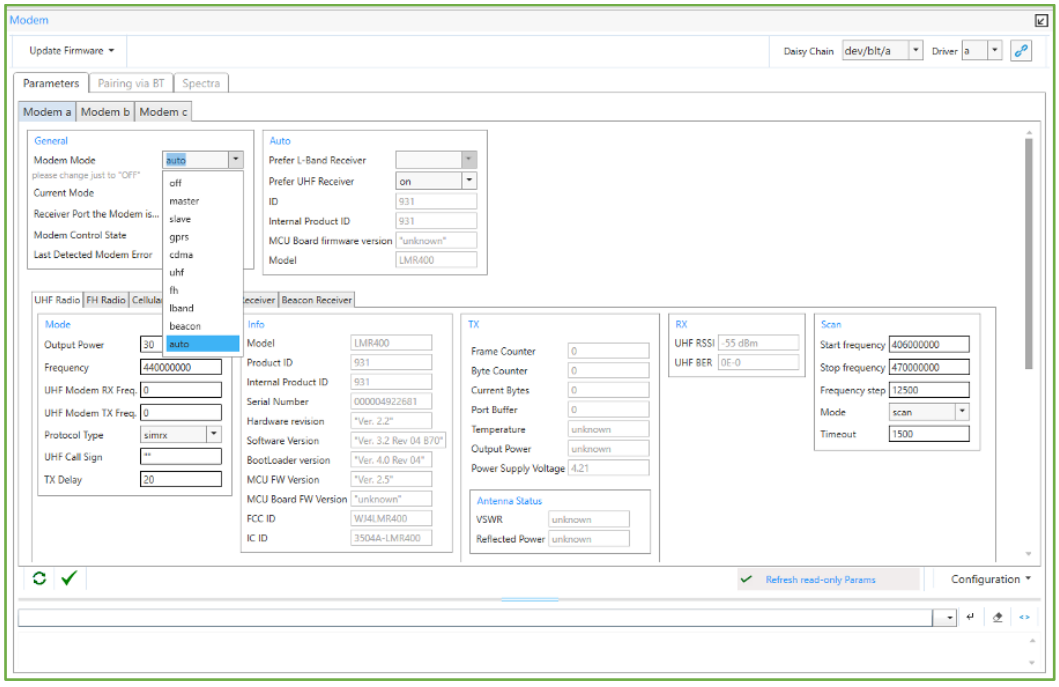


Figure 107. Modem parameters.

The following parameters can be set for each modem:

- *General* – Allows to specify the mode the modem connected to corresponding receiver port will use to communicate with the remote modem at the other end of the radio link. Connection statuses are displayed here too.
- *Auto* – Auto modem parameters.
- *Tabs for the different types of modems*:
  - *Uhf Radio* – *[2, Uhf Modem Parameters].*
    - *Mode* – Settings configuring the uhf modem.
    - *Info* – Internal settings of the modem (read–only.)
    - *TX* – Counters of the transmitted data (read–only.)
    - *RX* – Characteristics of the received signal (read–only.)
    - *Scan* – Settings for scanning radio interferences.
    - *Controls* – Settings for controlling antenna voltage and so an.
    - *Protocols* – Configuring protocols to transmit and receive data via modem depending on selected UHF Protocol Type.

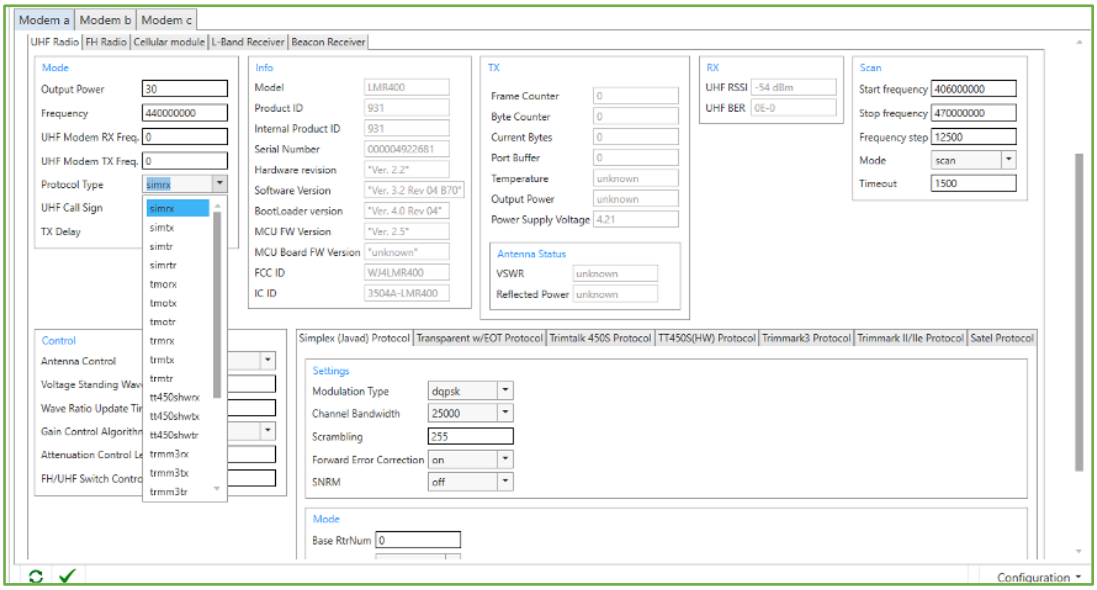


Figure 108. UHF Radio parameters.

The following protocols can be configured to transmit and receive data via modem depending on selected UHF Protocol Type.

- Simplex (Javad)
- Transparent w/EOT
- Trimtalk 450S
- TT450S(HW)
- Trimtalk3
- Trimmark ll/lle
- Satel

Settings for each protocol are available on the separate tab.

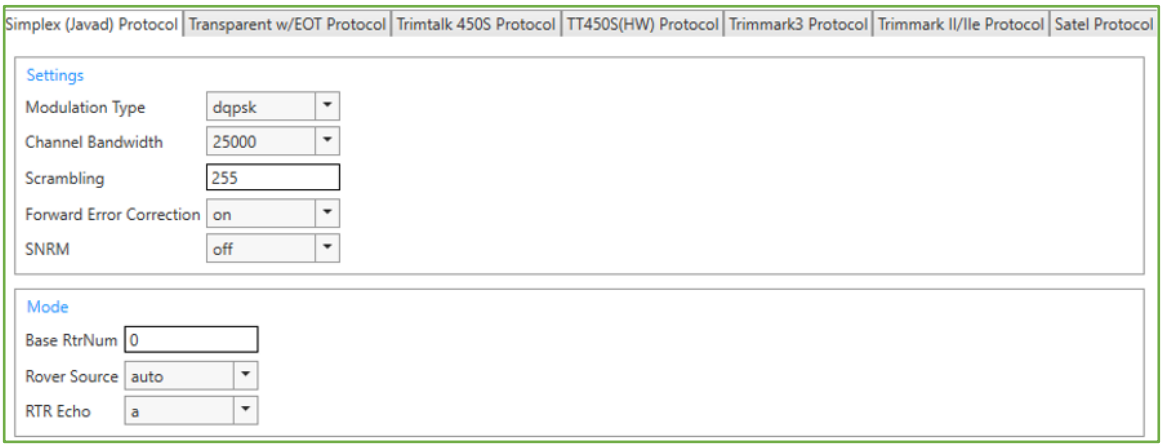


Figure 109. Simplex (JAVAD) protocol parameters.

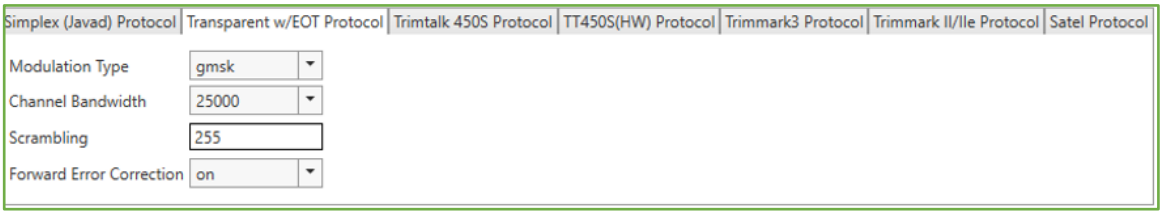


Figure 110. Transparent w/EOT protocol parameters.

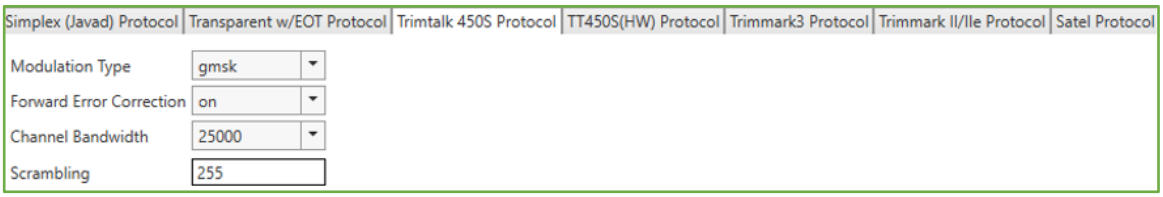


Figure 111. Trimtalk 450S protocol parameters.

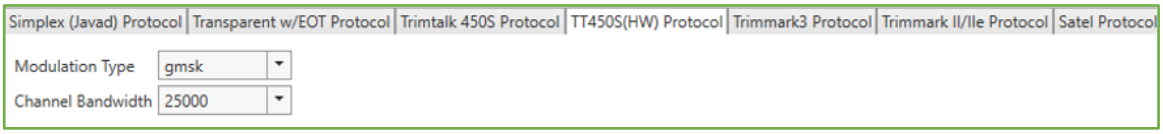


Figure 112. TT450(HW) protocol parameters.

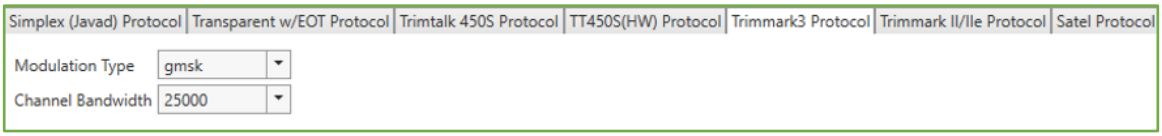


Figure 113. Trimtalk3 protocol parameters.

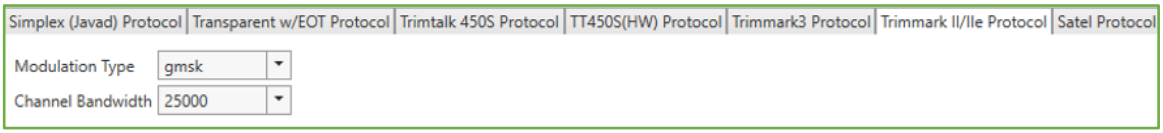


Figure 114. Trimtalk II/IIe protocol parameters.

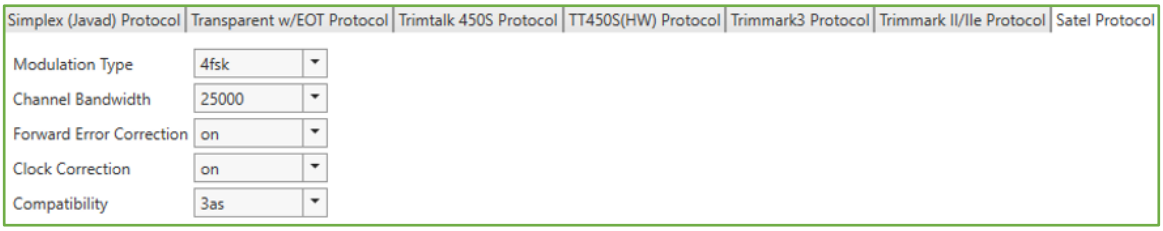


Figure 115. Satel protocol parameters.

- *FH Radio* – *[2, FH Modem Parameters]*
  - *Zone* – The zone of FH radio operation.
  - *Info* – Internal settings of the modem (read–only).
  - *TX* – Counter of the transmitted bytes (read–only).

- *RX* – Characteristics of the received signal (read–only).
- *Scan* – Settings for scanning radio interferences.
    - *Go To Spectra* – Button for navigating to the receiver main window tab *Radio Spectra.*
- *Zones* – The following zones can be configured to transmit and receive data via modem depending on selected *Zone.*
    - *USA*, *AUS* – USA and Australia
    - *EU* – Europe
- *Repeater* – Repeater mode.
- *Port Buffer Status* – Read–only numbers of bytes in RX and TX buffers.

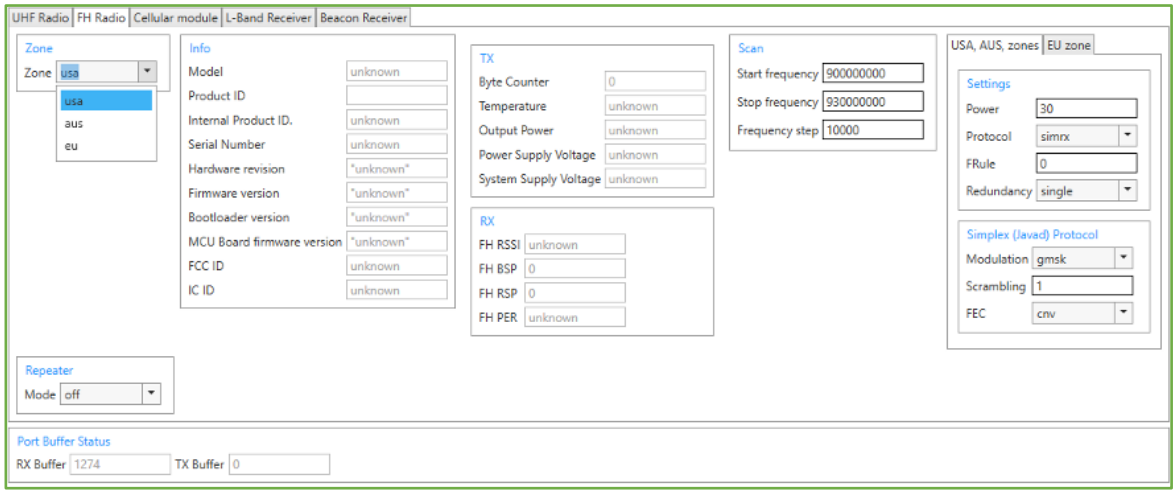


Figure 116. FH Radio parameters, *USA*, *AUS* zone.

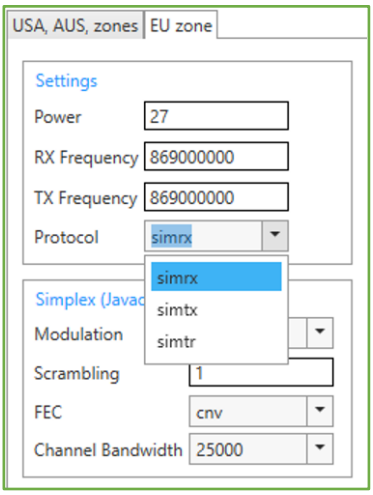


Figure 117. FH Radio parameters, EU zone.

- *Cellular module* – ***[2, GSM Modem Parameters].***
  - *Settings* – Settings which configure the receiver to control the cellular module.
  - *Info*– (read–only):
    - *Device* – Internal settings of the modem.
    - *Network* – The parameters of the cellular network
  - *Mode* – The settings configuring two different modes of cellular module depending of selected modem mode:
    - *CSD* – Master, slave
      - *Dial* – Dial settings
      - *AT+CBST* – Select bearer service type.
    - *3G/2G* – GPRS
      - *PPP* – Connection statuses of the PPP server (duplicated on the *Networking.PPP* tab *PPP Configuration Parameters*).
      - *GPRS* – *GPRS* connection parameters [***2, GPRS Configuration***].
      - *PDP* – *Packet Data Protocol* (PDP) settings. ***[2, GPRS Configuration].***

Settings for each mode are available on the separate tab.

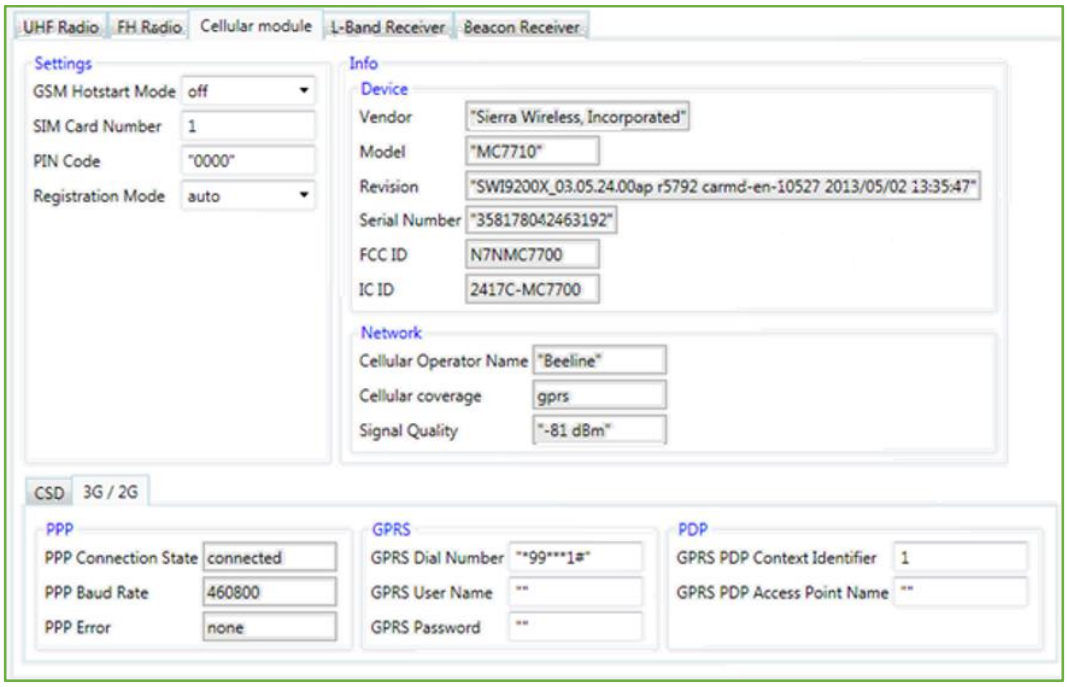


Figure 118. Cellular module parameters, 3G/2G mode.

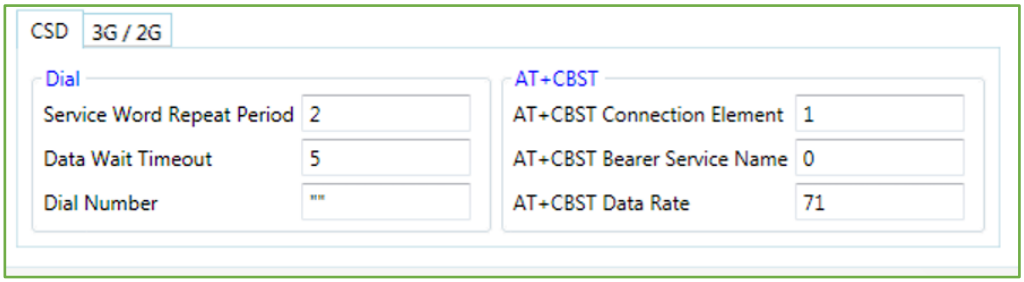


Figure 119. Cellular module parameters, CSD mode.

- *L – Band Receiver* – ***[2, LBAND Receiver Parameters]***
  - *Mode* – The settings configuring *lband receiver* mode. Channel frequencies can be added, edited and deleted using *Channel map*. Selected frequency is set.
  - *Info* – Internal settings of the *lband receiver* (read–only).
  - *Rx* – Characteristics of the received signal (read–only).

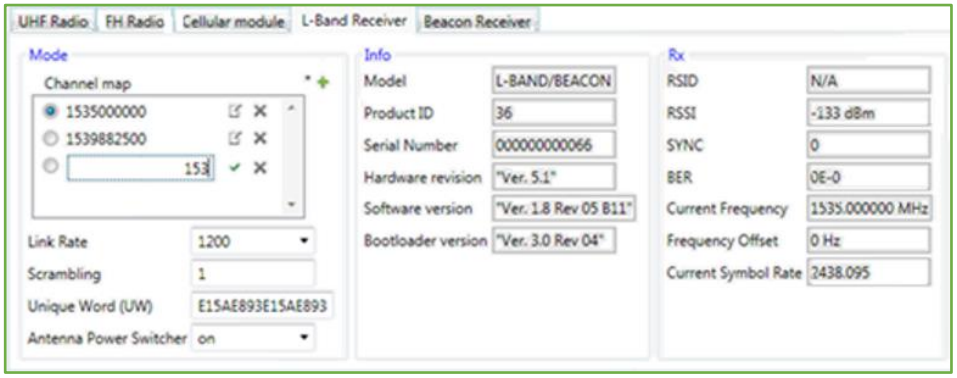


Figure 120. L–Band Receiver parameters.

- *Beacon Receiver* – [***2, BEACON Receiver Parameters].***
  - Mode – The settings configuring beacon receiver mode. Channel frequencies can be added, edited and deleted using *Channel map*. Selected frequency is set.
  - *Info* – Internal settings of the beacon receiver (read–only).
  - *Rx* – Characteristics of the received signal (read–only).

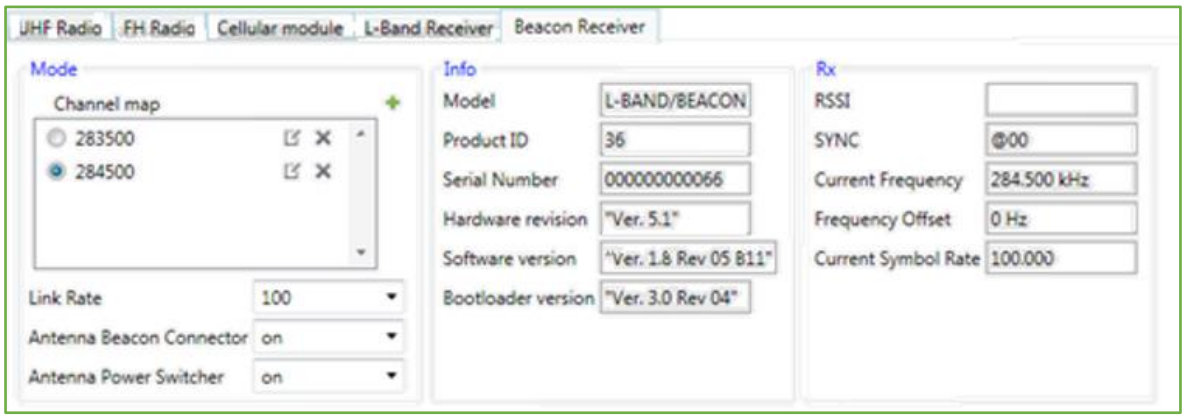


Figure 121. Beacon Receiver parameters.

- *Port Buffer Status* – Read–only numbers of bytes in RX and TX buffers.

3.7.4 Outer Modem via Bluetooth

NetView provides the possibility of interfacing between modems and receiversBoth the receiver and modem need to be connected to *NetView*. Then outer modem and receiver can be paired via Bluetooth.

Select tab *Pairing via BT*.

Connected modem is available in the *Pair with Modem* drop–down if it is not paired yet.

Follow the next steps to pair modem to the receiver:

1. Select *Driver*
2. Set *Port* to *dev/ser/blt/a (b)*
3. Set *Mode* to *off (*Otherwise, an error window will appear and pairing process will not start)
4. Select modem from *Pair* drop–down.
5. Click *Pair button* to start

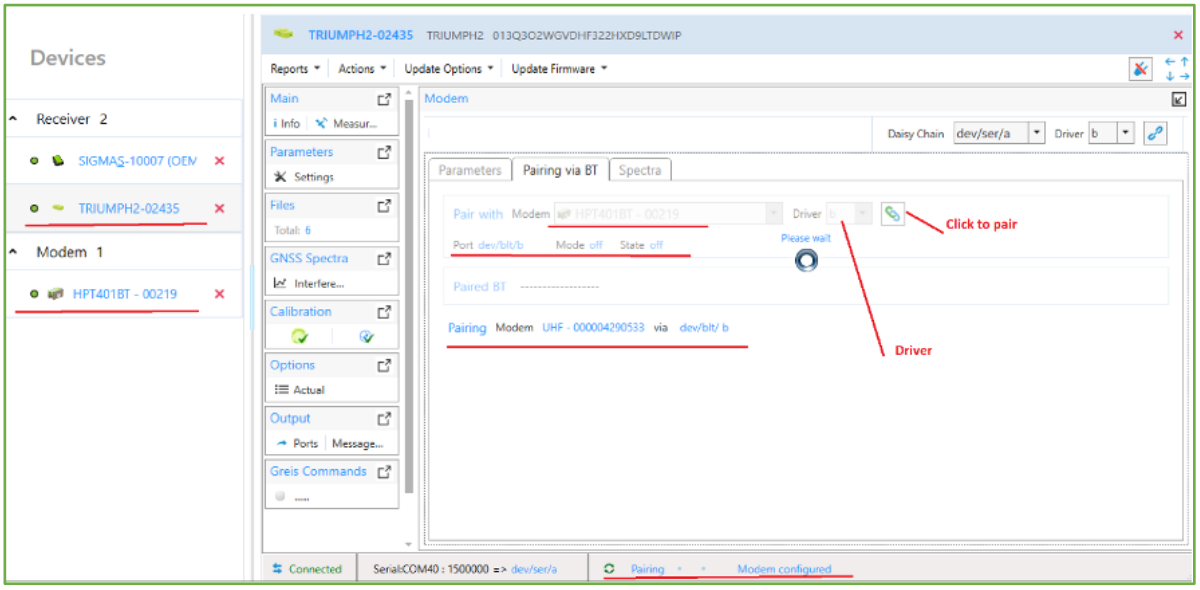


Figure 122. Pairing process.

While pairing is going, the panel is disabled. Progress and statuses are displayed.

The paired modem appears in the Paired panel. Next to it is the *Unpair* button.

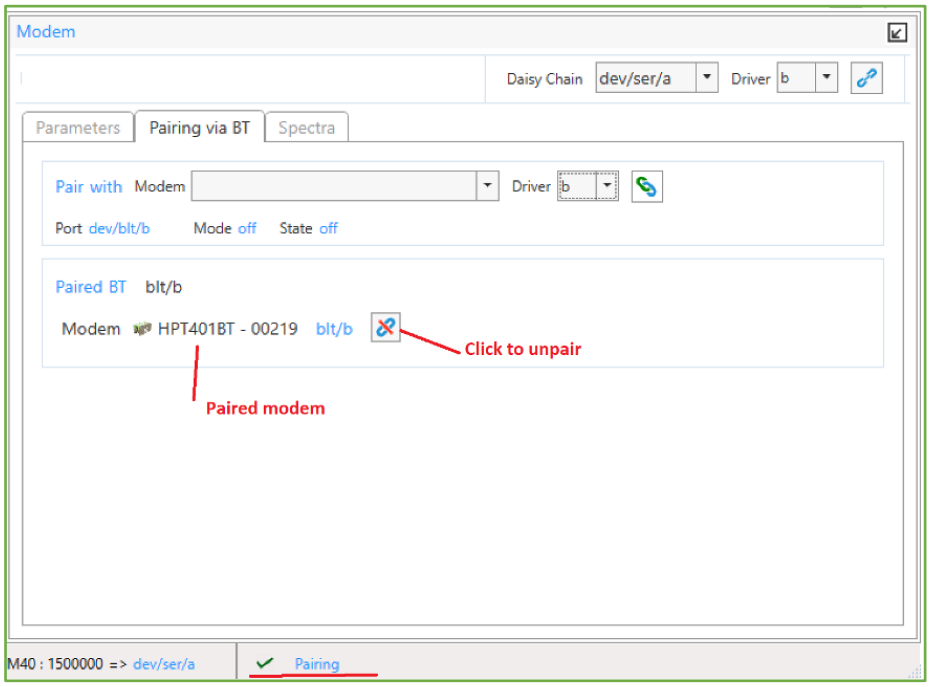


Figure 123. Outer Modem via Bluetooth paired.

Clicking *Unpair* button starts unpairing procedure.

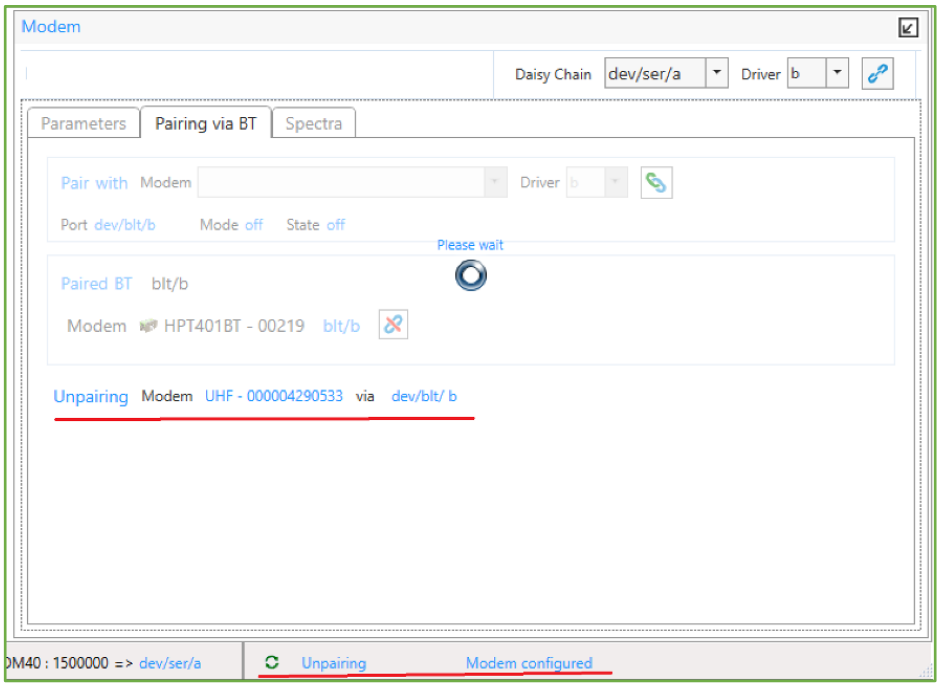


Figure 124. Unpairing the modem.

After modem is unpaired, it reappears in the *Pair* with drop–down and is available for paring again.

3.7.5 Radio Spectra

The *Spectra* tab allows collecting, display and store measurements of radio interference.

To start spectrum values collecting select *Modem Driver* and click the *Start* button.

Receiver automatically detects modem (*UHF* or *FH*) and gets spectrum from modem cyclically until *Stop* button press.

Figure 125. Radio–spectrum (Uhf) collecting.

All previously made measurements are available. To see them use the navigation buttons in bottom.

Spectra collecting parameters can be set in the *Parameter*s tab panel *Scan*. Mode *scan* needn't be set manually.

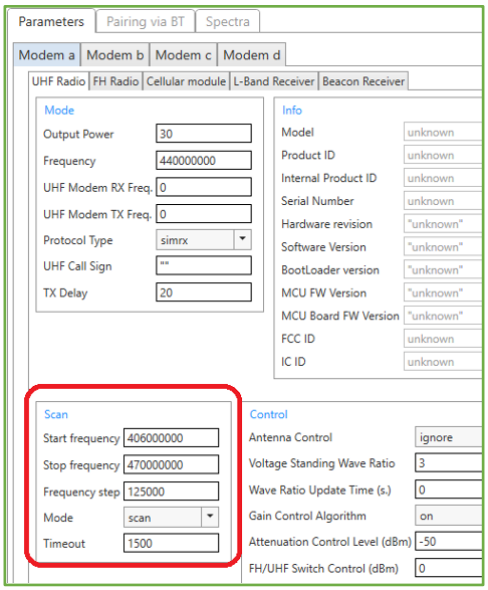


Figure 126. Radio Spectra scanning parameters.

Figure 127. Radio–spectrum (Uhf) collecting.

The status of the process is shown in the status bar.

The following data can be displayed on the plots:

- *Blue line* – Shows the current spectrum output.
- *Green line* – Shows mean values of all previous passes.
- *Red line* – Shows max values of all previous passes.
- *X axis* – The frequency in MHz.
- *Y axis* – RSSI (Received Signal Strength Indication), dBm.

Mean and max previous values can be shown simultaneously.

Above the graph the following parameters of the scanning are shown:

- *Modem Type* – Uhf, Fh
- *Modem Driver* – A, B, C, D
- *Start Frequency*
- *Stop Frequency*
- *Frequency Step*

Operation with Plots

- Zoom – Select region by mouse right button or turn the mouse wheel.
- Pan – Left mouse button move the graph.
- Fit to Whole View – Top right button.

Saving and Deleting

You can save and delete plots.

Figure 128. Radio–spectrum (zoomed). Save and Delete buttons.

To save or delete the spectra, use the buttons in the right bottom:

- *Save Plots* – Saves all the plots as png–files to the selected folder. (A subfolder will be created with a name consisting of the receiver model and the date of the spectra.)
- *Delete* – Deletes the current spectrum plots.
- *Delete All* – Deletes all plots for the receiver.

3.8 Calibration

JAVAD receivers can be equipped with internal *compass* and *levels* or *IMU* module which also provides *gyroscope* that allows to control device orientation parameters.

Compass and *gyroscope* should be calibrated for proper operation. You can check calibration and calibrate those using *NetView*.

If receiver is equipped with internal levels, compass ore IMU module the *Calibration* tile will appear.

Select *Calibration* tile to check current calibration or to calibrate devices.

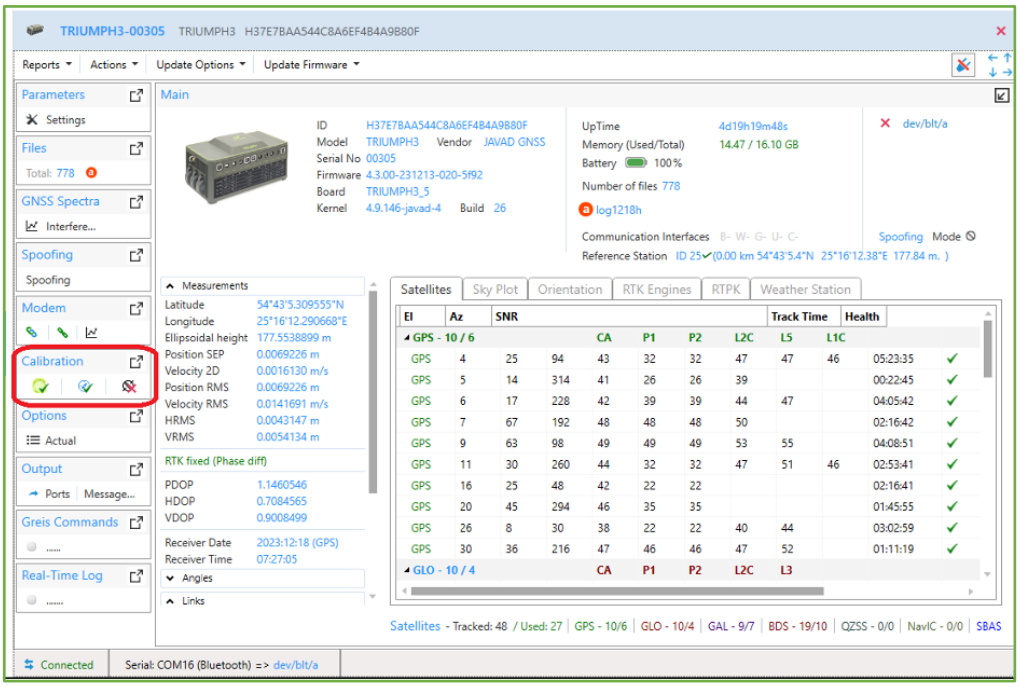


Figure 129. Calibration. Levels, Compass, IMU.

Green check marks on the device icons means that it is calibrated. Otherwise, red x–sign is displayed.

To check calibration or calibrate *Compass*, *IMU*–module and *Levels*, maximize the tile.

Depending on the hardware of the model, there will be different panels on the *Calibration* tile.

The Levels are calibrated at the factory and it is not recommended to recalibrate them. The Levels panel appears only under Development mode.

If *Compass*, *IMU*–module and *Levels* are already calibrated make sure that calibration is still good.

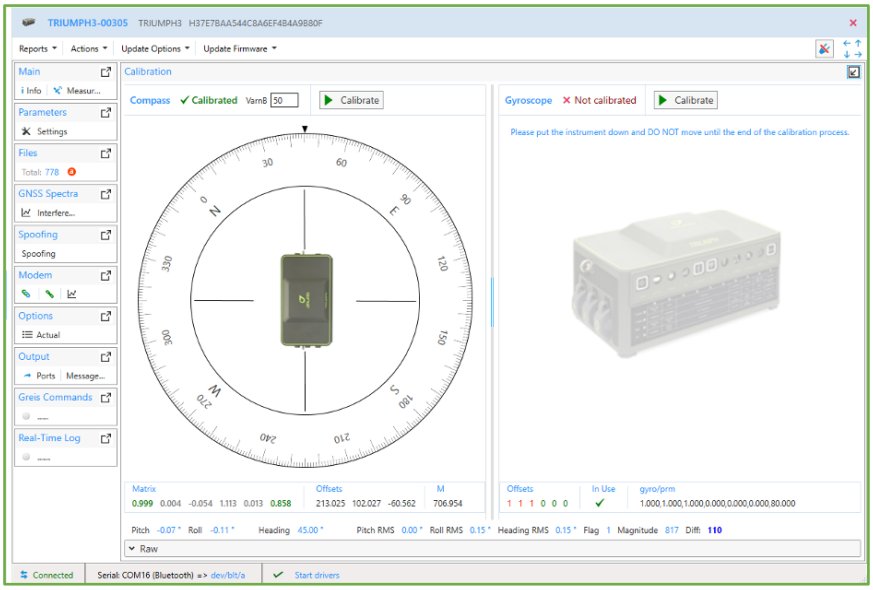


Figure 130. Calibration. Compass is calibrated, Gyroscope is not.

Calibration tile contains several panels depends of receiver equipment and *NetView* mode. Each panel provide the following controls:

- Toolbar – Contains *Calibrate*, button and calibration settings.
- The picture depends of calibrated state.
- Table of the calibration parameters.

Below the calibration panels there is line with the data from the *[MR]* and *[MA]* messages updated 10 times per second: *Pitch, Roll, Heading, Pitch RMS, Roll RMS, Heading RMS, Magnitude, Flag, Difference* – magnitude difference between current magnitude and magnitude from the compass parameters.

Expand *Raw* panel to see messages data and calibration parameters in raw form.

3.8.1 Compass

Heading value is a correct direction. You can use another compass to check this.

Ideally compass should be calibrated before every usage due to a change in the magnetic environment.

Figure 131. Compass is calibrated.

Calibration

If *Compass* is not calibrated you will see pictures prompting to calibrate. Heading values are not available.

Levels should be calibrated first.

Click *Calibrate* button to start calibration if it is not calibrated yet or you are not satisfied with current one.

Figure 132. Compass is not calibrated.

To start Compass calibration click the *Calibrate* button. Then rotate the receiver along each axis, following the pictures, until calibration is finished. Rotation directions should be changed six times.

Figure 133. Compass calibrating. Rotate the receiver along the three axes.

After calibration is completed wait for a moment until calibration matrix is calculated. Then Heading plot and calculated values will be displayed.

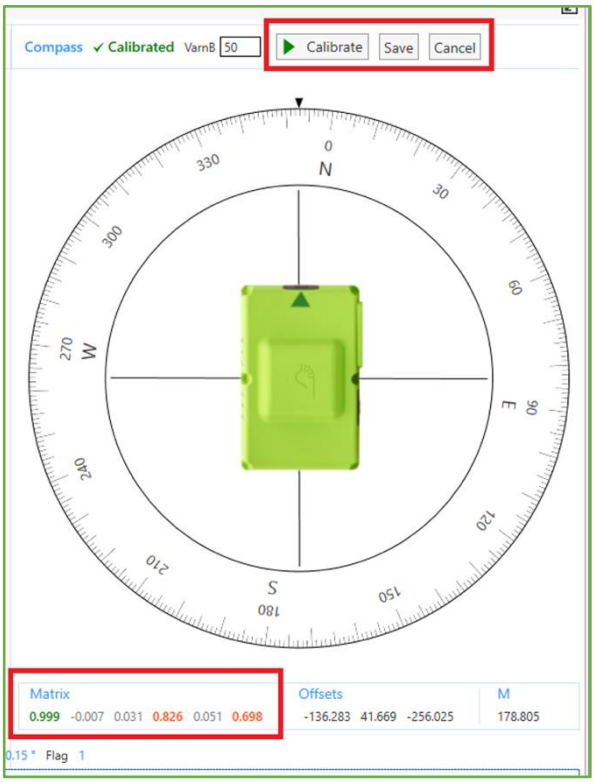


Figure 134. Compass calibration is completed.

Compass calibration *Matrix* shows calibration results. If first, forth and sixth values are more than 0.8 and less than 1 calibration is good. You can save results to non–erasable memory by clicking the *Save* button or use those only in the current session by clicking the *Cancel* button.

Offsets are offsets from real values; **M** is magnitude.

VarnB **–** scatter of acceptable values. It takes value from 30 to 50. You can play with *VarnB* to improve the calibration results.

3.8.2 Gyroscope

Calibration using a *NetView* is available for receivers equipped with IMU–module

Figure 135. Gyroscope is not calibrated.

Place the receiver on a flat surface and do not move it until the end of the process.

The msint parameter specifies the required time grid period for the internal receiver. The default is 10 (100ms). Calibration time 1000 epochs (10 sec).

Click *Calibrate* button to start the calibration process

Figure 136. Gyroscope is calibrating.

A progress bar is displayed in percentages and epochs.

The calibration can be canceled by clicking the Cancel button.

When the process is complete, the calibration flag appears and the offsets are updated.

The offsets modulus must be in the range [–0.5, 0.5]. Otherwise, they are red.

Save confirmation message appears.

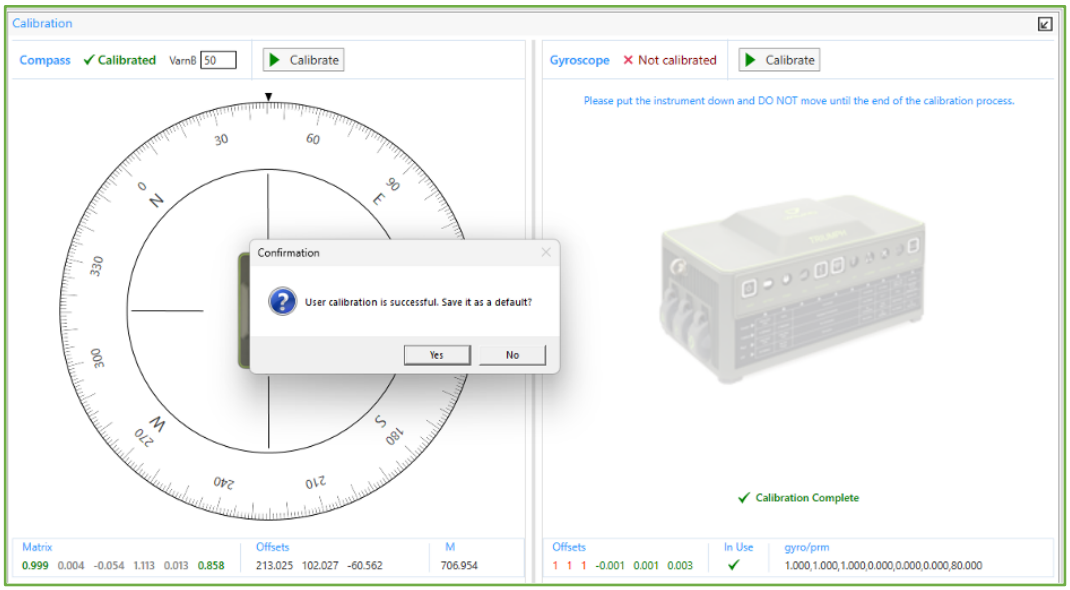


Figure 137. Gyroscope calibration save confirmation.

The new offsets will be saved in the receiver by clicking the Yes button.

ATTENTION! Saving offsets clears the factory calibration settings.

3.8.3 Base Line Calibration

For DUO receivers *Baseline* calibrating is available.

The following parameters can be set on the panel *[2, RTK Heading Parameters]:*

- *Fixed* length – Base line length. Can be set manually.
- *Use Fixed Line* – *F*lag, that RTK engine will use in the heading mode the apriori baseline from *fixed* length, unless its value is equal to zero.
- *Apply* button – Applies manually set fixed length and flag.
- *Calibrated (tune)* length – Calculated by calibrating.

- *Refresh* button – Request heading parameters from the receiver.
- *Update Fixed Length* – Sets *calibrated* length to *fixed* one.

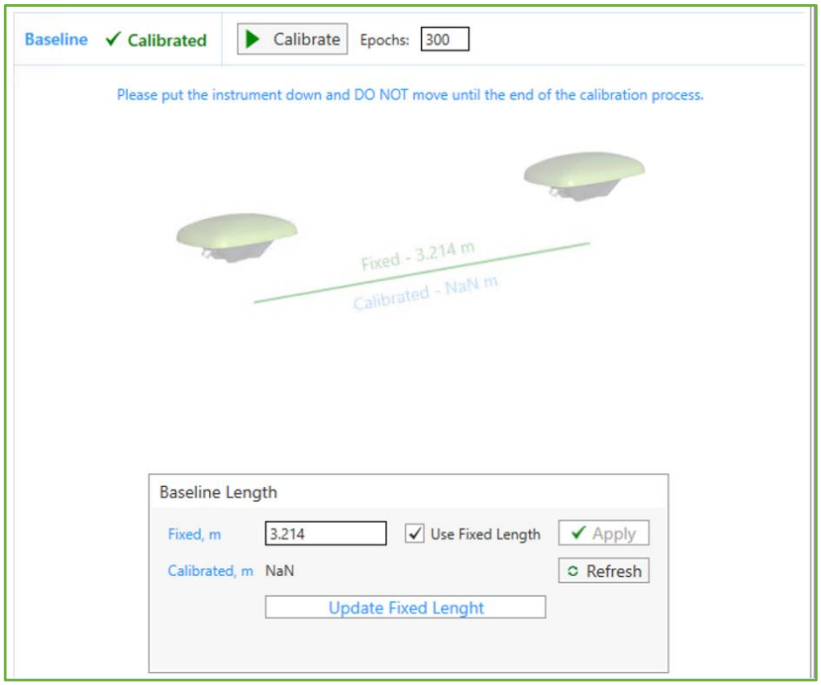


Figure 138. Baseline calibration panel.

To start calibrating set epochs count and click *Calibrate* button. Calibrating will continue during set epochs. Default epoch count value is 300. Calibration can be stopped by clicking *Cancel* button.

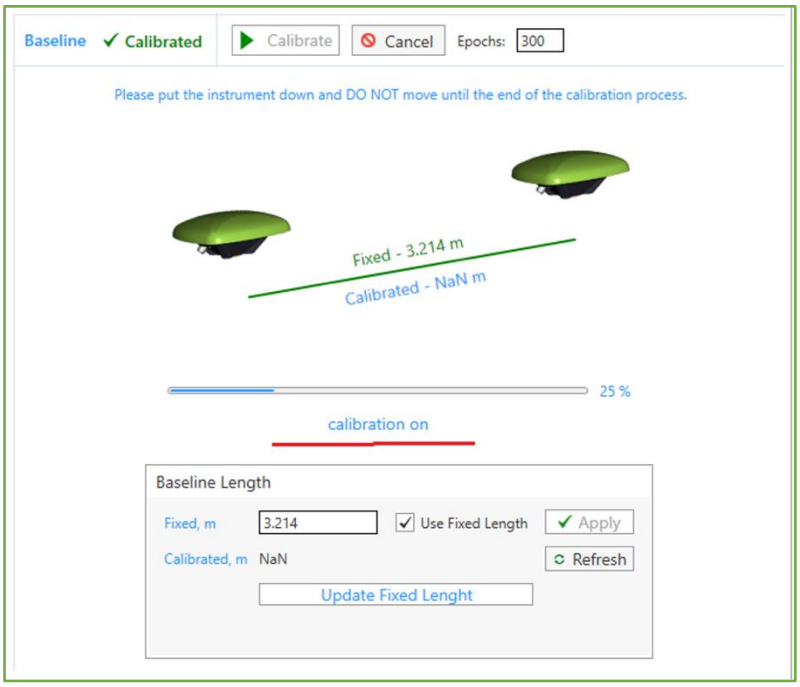


Figure 139. Baseline calibrating progress.

After calibrating is finish successfully green check appears and *Calibrated* field is filled.

To apply this calibrated value, click *Update Fixed Length* button.

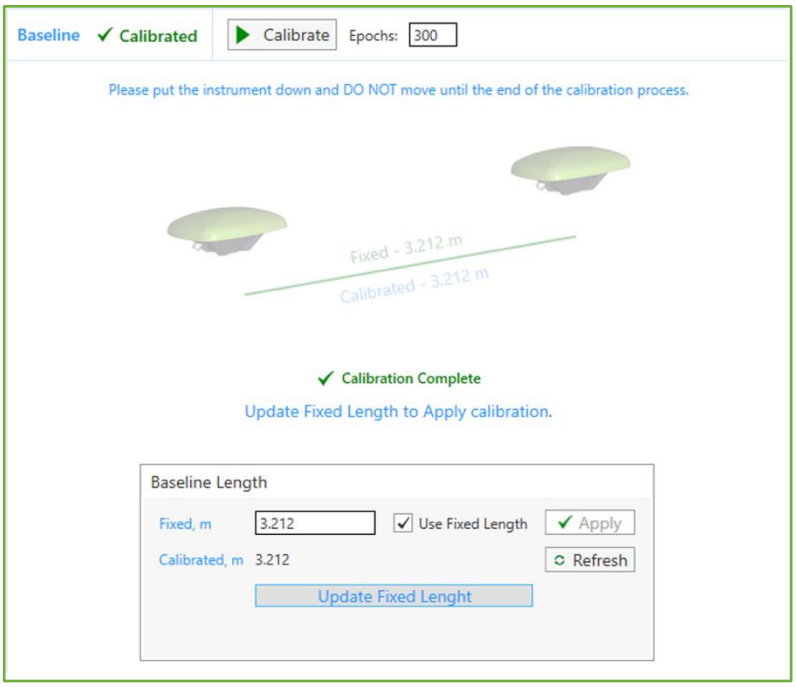


Figure 140. Baseline calibrated and applied.

Calibration Reports

The calibration reports is generated after calibration is saved.

Report path is C:\Users\% USER% \AppData\Roaming\JAVAD NET\Imu.

3.8.4 Levels (Development Mode Only)

Levels panel are visible only under *Development* mode.

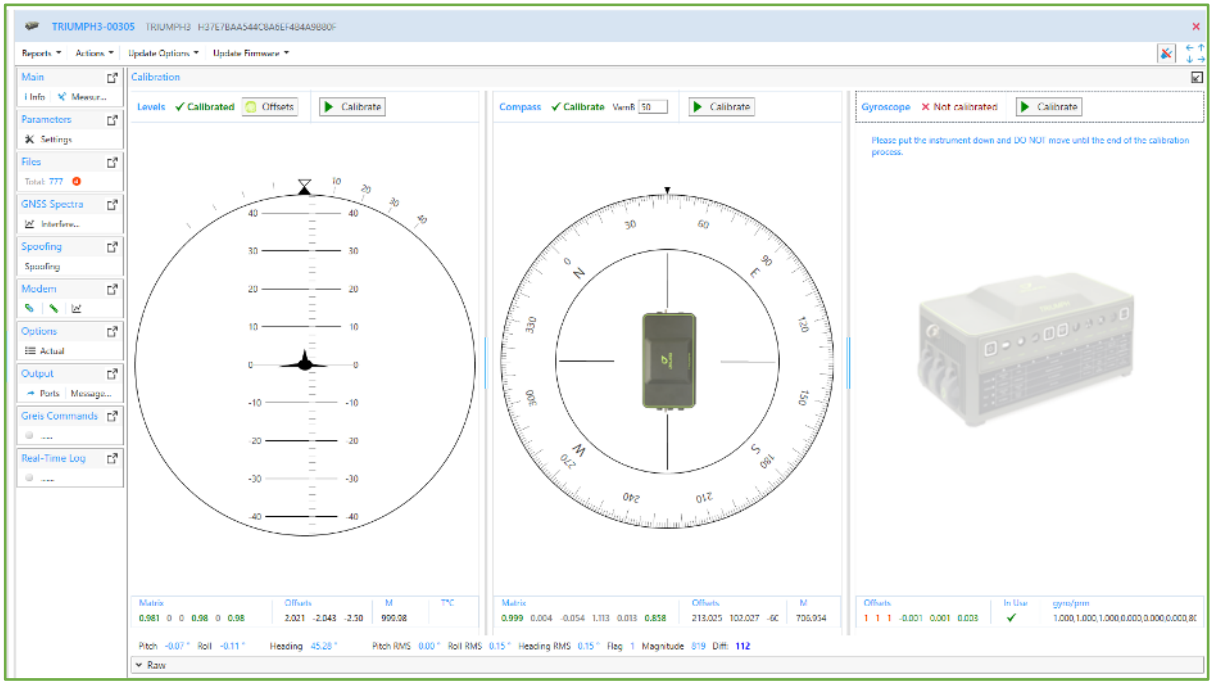


Figure 141. Calibration tile in Development mode. Levels and Compass are calibrated.

Calibration

If *Levels* are not calibrated you will see pictures inviting calibration. Pitch and roll values are not available.

Click *Calibrate* button to start calibration if it is not calibrated yet or you are not satisfied with current one.

Pitch and Roll values are within 0.5º for a receiver is placed on the absolutely flat horizontal surface.

Figure 142. First edge is ready for calibration.

After *Levels* calibrating is started six edges must be calibrated in proper order. Controls with current edges become available one by another. Place the receiver on the flat horizontal surface as shown on the picture and click *Start* button. Don't move or shake receiver until calibration is going on.

After current edge calibration is finished next edge become available. Put the receiver on every side following the pictures and calibrate all. The same way the next side will be calibrated.

Please be careful since pictures for TRIUMPH–2 show the real receiver position but in other cases it will be view from up.

If the receiver is placed wrong error message will be displayed.

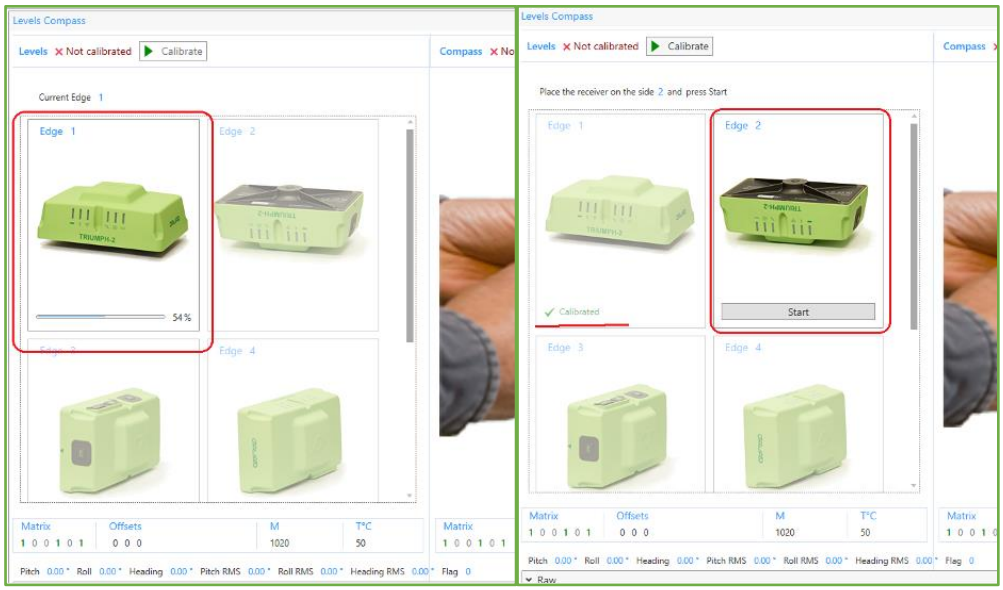


Figure 143. First edge is calibrated. Second one is ready.

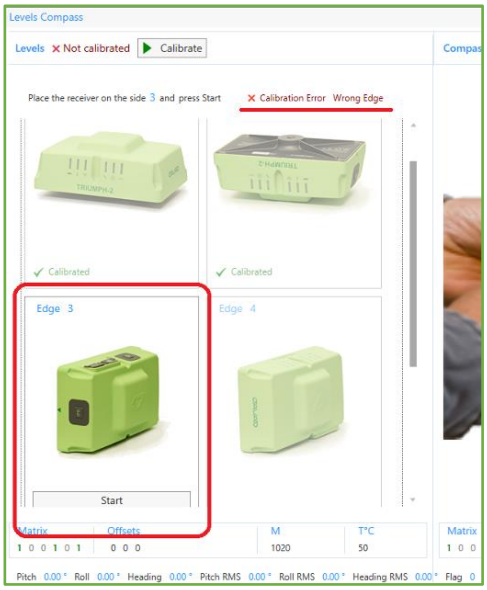


Figure 144. Error. The receiver is not placed as shown in the picture.

After all sides are calibrated, the levels calibration is completed. Wait for a moment until calibration matrix is calculated. Then Pitch/Roll plot and calculated values will be displayed.

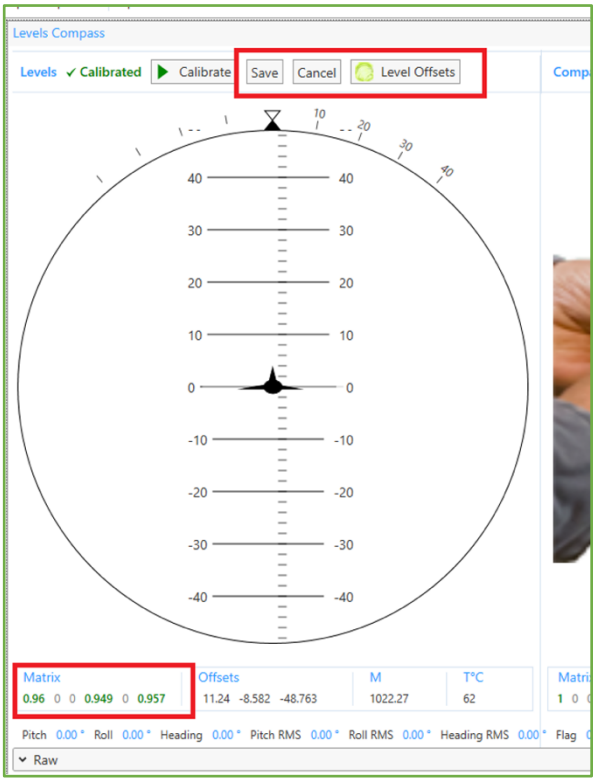


Figure 145. Levels calibration is finished successfully.

Levels calibration *Matrix* shows calibration results. If first, forth and sixth values are more than 0.9 and less than 1 calibration is good. You can save results to non–erasable memory by clicking *Save* button or use those only in the current session by clicking *Cancel* button.

Offsets are offsets from real values; ***M*** is magnitude. ***T*** is device temperature.

If it is necessary click *Level Offsets* to reset offsets as described below.

Removing Levels Offsets

If the surface on which the receiver is placed is not ideally flat and horizontal click *Level Offsets* button to reset level offsets.

3.9 Options

To see actual options expand *Options* tile.

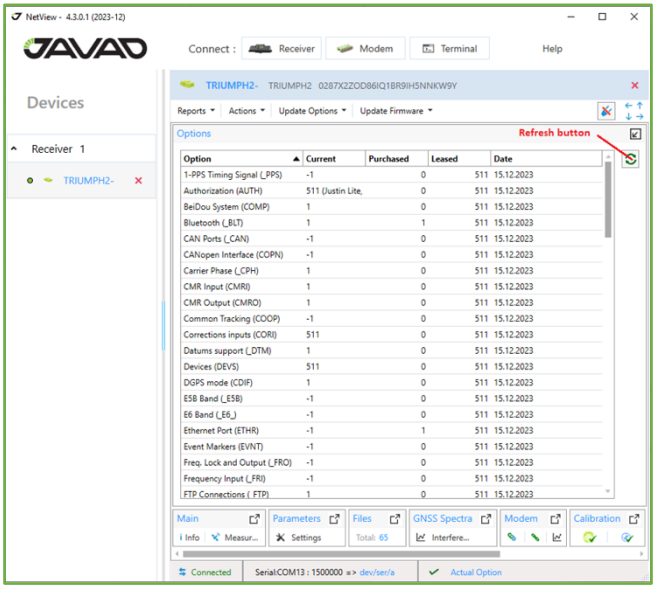


Figure 146. Options Tile.

Actual options are present in the convenient table supporting the sorting by columns.

Each option is characterized by the following columns:

- Option name
- Current value
- Purchased value
- Leased value
- Expiration date of leased value

See details in the Greis manual – *[2, 4.4.45 Receiver Options].*

Clicking *Refresh* button requests options at the receiver and fills the table.

3.10 Output

Select Output Tile.

It Contains Ports, Message Sets and Timing Tabs.

3.10.1 Ports Tab

Ports tab contains the list of the available ports and provides information about current output for each of them. It allows enabling and disabling output on the selected port or on the all ports.

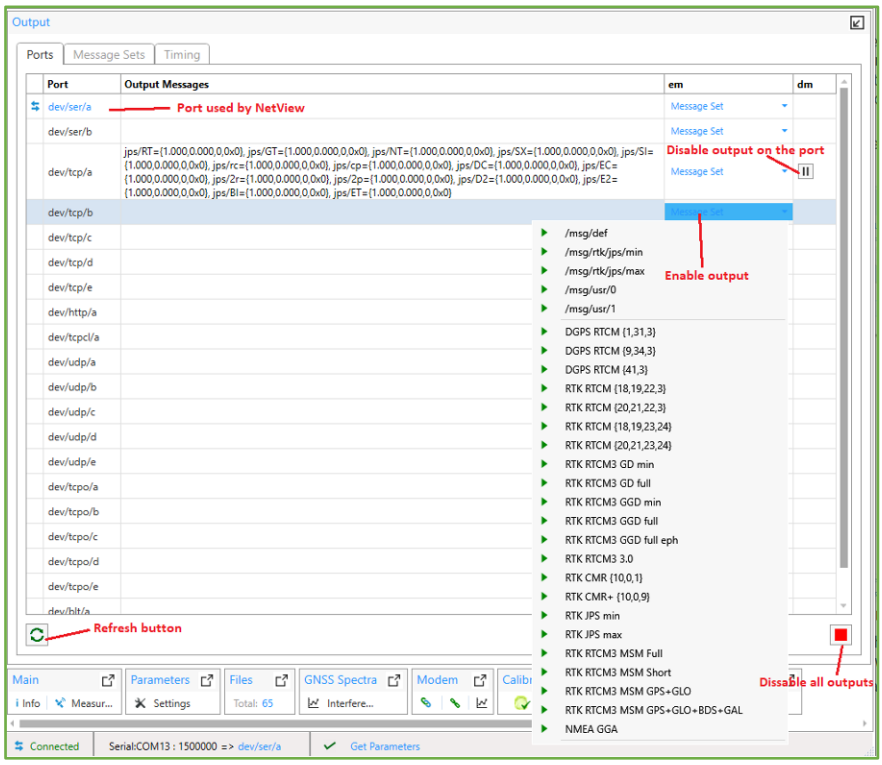


Figure 147. Output Ports tab.

The following buttons control output to the ports:

- *Refresh* – Gets actual info about output from the receiver.
- *Enable* – Opens dropdown list of message sets to enable output on the selected port. Message set list contains receiver predefined message sets, base correction predefined sets and custom sets. They can be edited on the Message Sets tab
- *Disable* button – Stops the output on the selected port. The confirmation windows will appear.
- *Disable All* stops output on all the ports. The confirmation windows will appear.

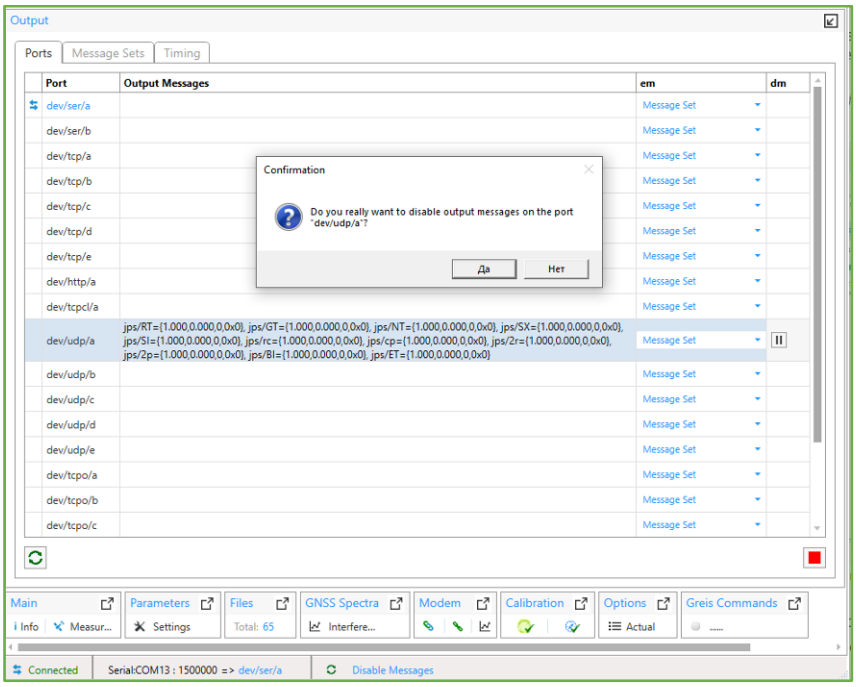


Figure 148. Confirmation of output disabling.

Deferred Output

If port is currently used by *NetView* output enabling will be deferred until disconnect. It can be canceled by clicking Cancel button.

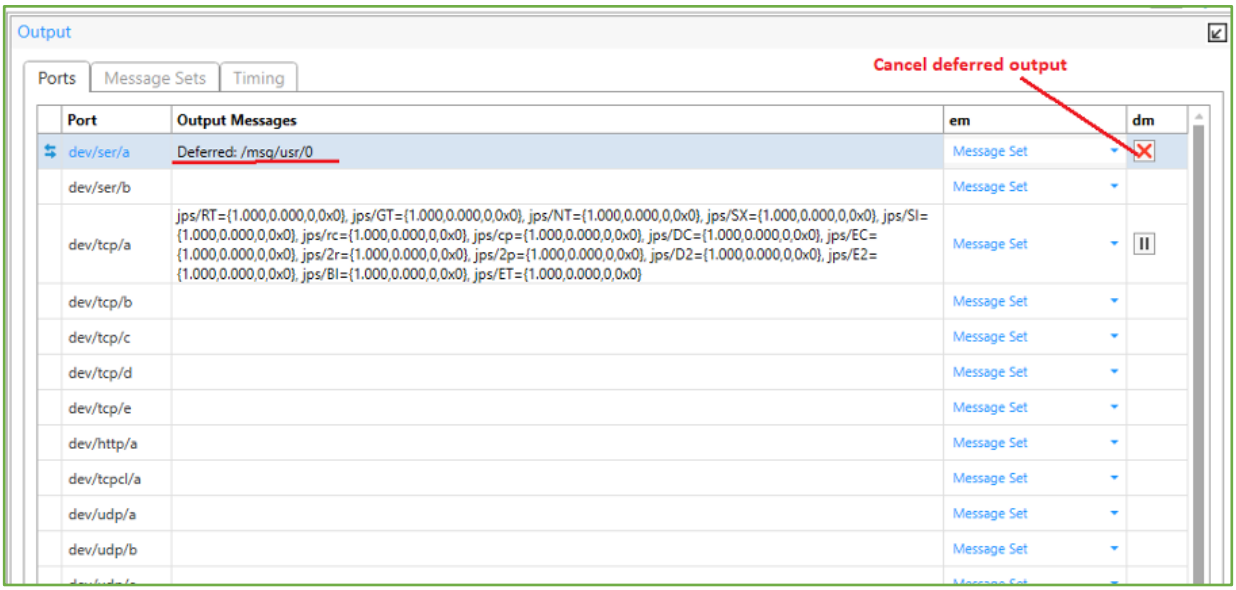


Figure 149. Deferred output on the current port.

3.10.2 Message Sets Tab

Message Sets Tab contain the following editable message sets.

Predefined Message Sets

Predefined message sets are:

- */msg/def*
- */msg/rtk/jps/min*
- *msg/rtk/jps/max*

They can be edited and stored in the receiver.

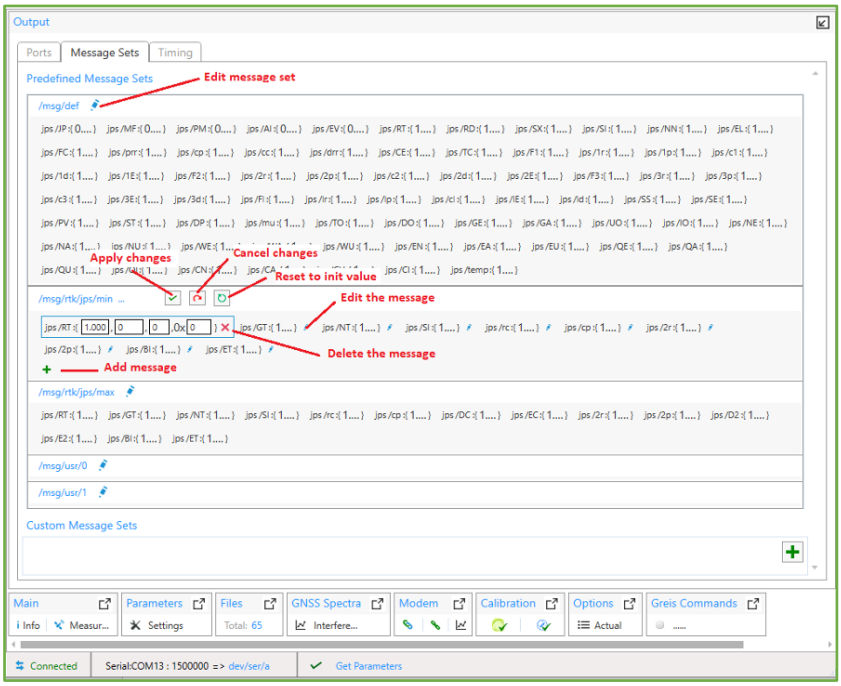


Figure 150. Predefined message sets.

Editing Predefined Message Set

Click Edit button (blue pen) in the header. Edit button will be replaced by the following buttons:

- Apply – Saves changes to the receiver.
- Cancel – Receives actual message set from the receiver. All changes are lost.
- Reset – Resets predefined message set to the initial value. All changes are lost.

Editing Message

Click Edit button near desired message. The following fields became available for the editing:

- Output Interval
- Phase
- Count
- Flag

Edited message will be signed by blue star.

Delete button deletes message from message set.

Adding Message to the Message Set

Click Add Button (green cross). Available messages tree will be opened. Expand desired messages node and click on message. It will be added to the set. Messages that are already in the set are shown semitransparent.

Figure 151. Adding of a message.

Custom Message Sets

Custom message sets can be created by the user. They are stored in the NetView and are available for the enabling in the Ports tab.

To create new custom messages set click Add button (Green cross).

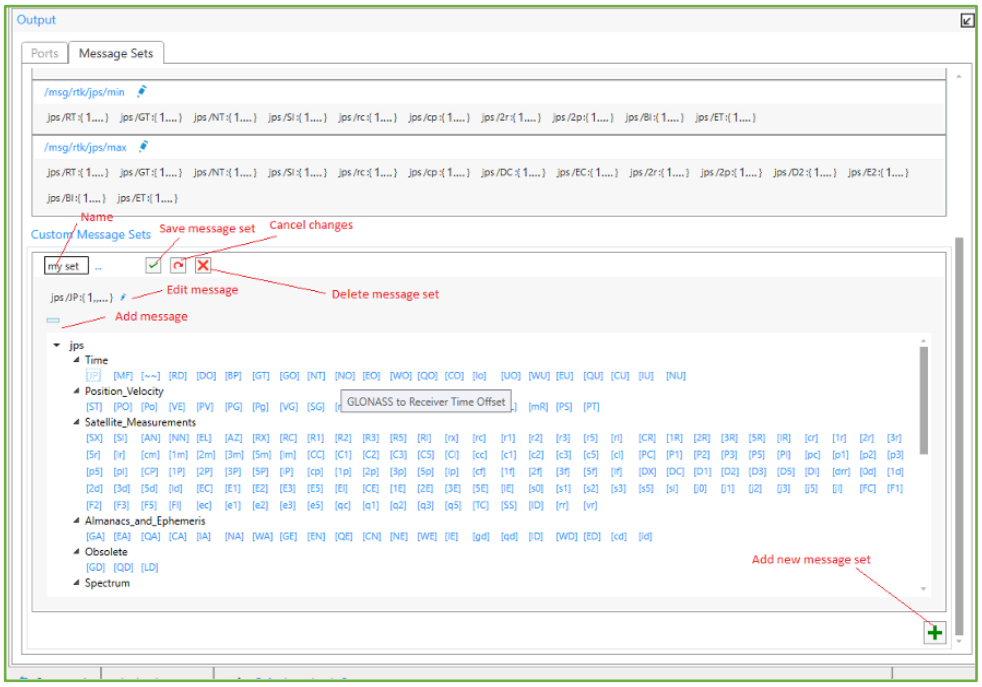


Figure 152. Custom message set.

Editing Custom Message Set

Click Edit button (blue pen) in the header. New message set is shown in the editing mode. The following buttons appear:

- *Save* – Saves changes to the *NetView*.
- *Cancel* – Receives last saved message set. All changes are lost.
- *Delete* – Delete custom message set.
- *Name* box allows to change message set name.

Adding and Editing messages are carried out in the same way as for the predefined messages set.

3.10.3 Timing

CGGTTS stands for “CGGTTS–Version 2E: an extended standard for GNSS Time Transfer”.

CGGTTS support in JAVAD GNSS receivers is achieved by combining multiple receiver features to get suitable JPS files and then converting them to CGGTTS.

To start recording CGGTTS files select tile Output and tab Timing.

- Fill in data which will be put to the CGGTTS file headers:
  - Laboratory data.
  - Antenna Phase Center coordinates.
  - Internal delays (receiver + antenna) delays for each signal.
  - Cable delay. (Delays from the antenna to the main unit including delays in the filters, electronics and cable length).
  - Reference delay (Time delay between the local clock (or realization of UTC) and the receiver internal clock).
- Select file, output format and destination for converting. Any file from A, B, C, D, E can be used without affecting another tasks. For converting receiver uses FTP Push destination, but outputs result to the receiver internal file system. 6 FTP Push destination (A, B, C, D, E, F) are available and work independently. CGGTTS file can be output in text or tar.gz formats.
- Click Start button

Required parameters will be set and selected file will be started to record.

Essentials are to use special CGGTTS time scale, 30–seconds epochs, log–file rotation being multiple of 16–minutes being shifted a bit to start every log file a little bit earlier than corresponding CGGTTS time interval.

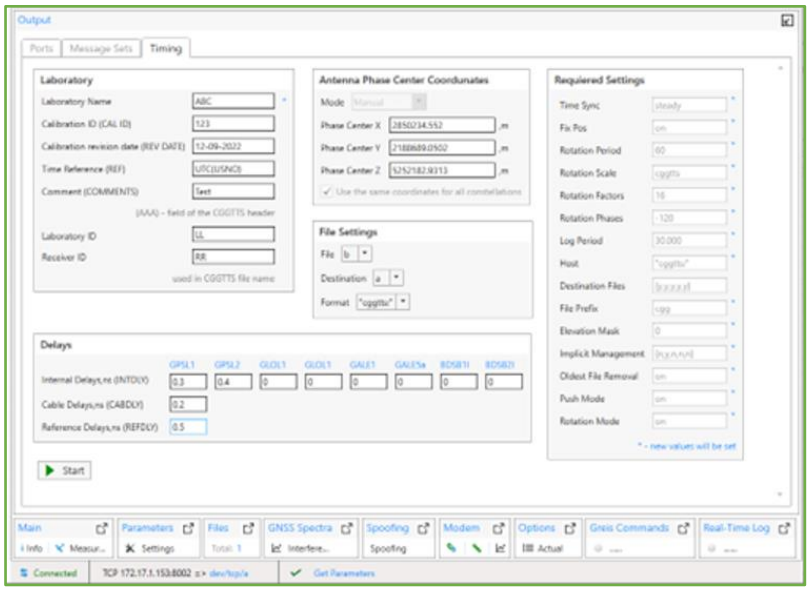


Figure 153. Timing settings. Start button is available.

If CGGTTS files are recording, Stop button is available. It stops recording current CGGTTS file, reset parameters and destination.

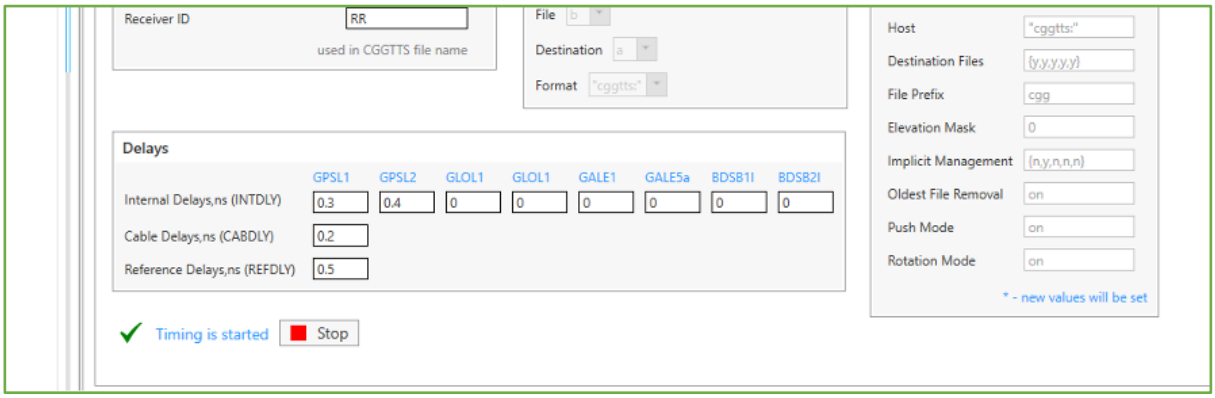


Figure 154. Stop Timing.

3.11 Manual Mode

Greis Commands window is designed to direct control of the receiver as a same way as using an ordinary terminal. It allows the user to send various receiver commands, get receiver responses and to log them into the text–file. For a complete list of commands supported by *JAVAD GNSS* receivers, refer to the ***[2].***

Click on *Greis Commands* tile of the receiver to go to *Manual mode* window.

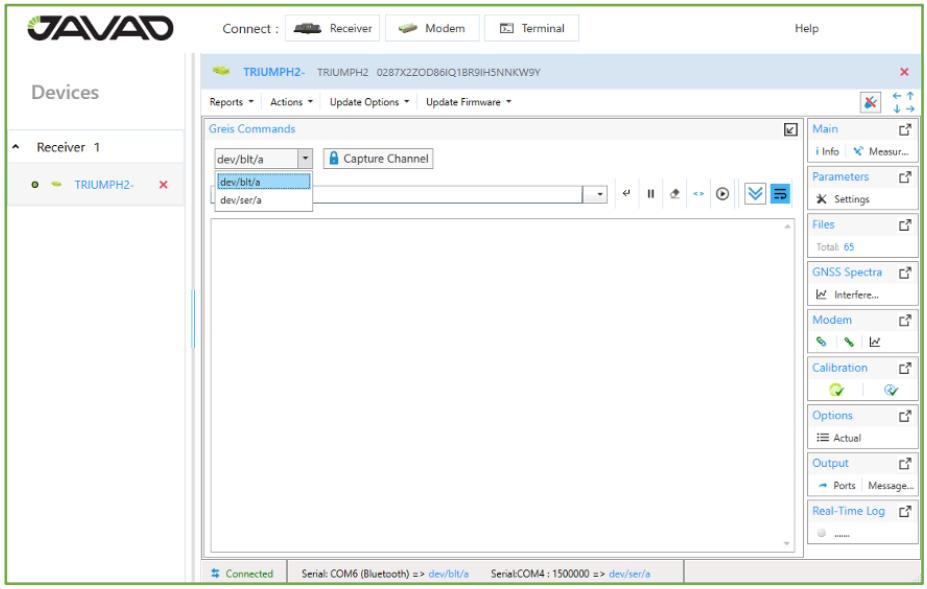


Figure 155. Manual Mode window.

The drop–down list contains the interfaces which *NetView* uses to communicate with the receiver.

Select one to capture for manual mode and press *Capture* button. This connection becomes unavailable for another functionality of *NetView* If the connection is the only communication with the receiver is carried out only manually.

After connecting all the elements of the user interface are enabled.

Use *Input Line* to type a command. The functionality of each button is described below.

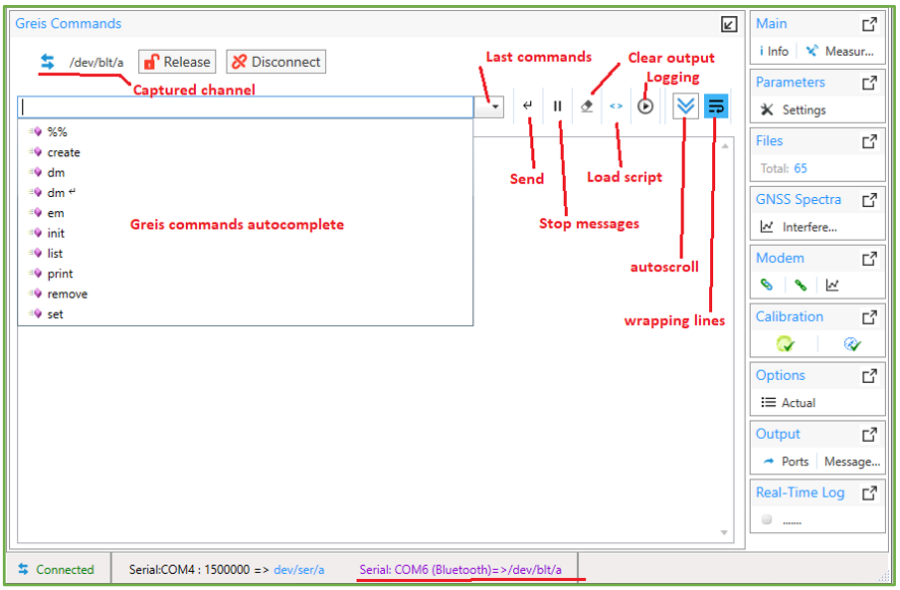


Figure 156. Manual Mode tools.

The following controls serve the manual operation:

- *Input line* for the *Greis* commands. As you type a hint is shown with a list of available commands.
- *Output window* displays receiver responses.
- *Last Commands list* – Allows select one of the previously sent commands. Up to 50 commands are stored.
- *Send button* – Sends command to the receiver (equivalent to *Enter* in Input *Line*)
- *Stop Messages button* – Disables messages.
- *Clear button* – Clears the *Output Window*
- *Load Script button* – Sends a set of the commands from the selected file to the receiver. Only ordinary scripts are supported (*tcl*–scripts can be loaded using *Parameters* window).
- *Start Logging* (*Stop Logging*) *button* – Saves receiver output to the selected file. After starting the button changes to *Stop Logging*. Log file path is displayed at the bottom.
- *Auto scroll button* – On/off auto scrolling of the output window.
- *Line wrapping button* – On/off wrapping of output lines.

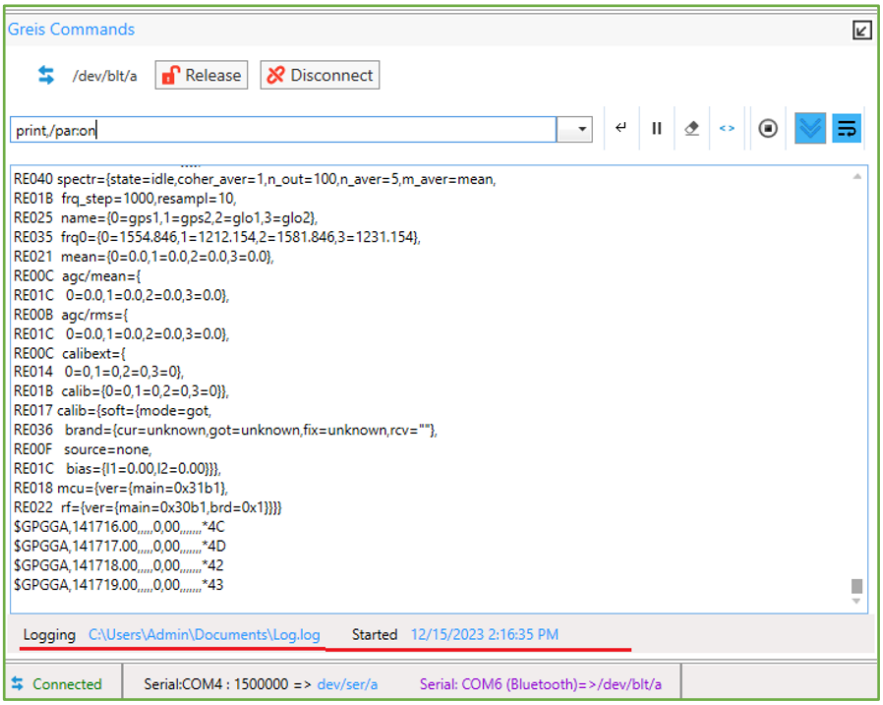


Figure 157. Output and logging the stream of messages and replies.

Finish the manually operation can be done in two ways:

- *Release button* – Returns the connection to the *NetView* Output of messages is stopped.
- *Disconnected button* – Close the connection. The ordered messages continue to be output. *Net View* doesn't use the connection. This way is useful to configure receiver outputs.

3.12 Real – Time Logging

NetView allows logging *JPS* or *RTCM* files directly to the PC storage in real time. It can be useful, for example, for the receiver for which the internal memory is unavailable. In fact, *Real–Time Logging* in *NetView* is just a wrapper on the console application *RealTimeLogger* which is available on *JAVAD GNSS* site *[5].*

Click on *Real–Time Logging* tile to open the corresponding window.

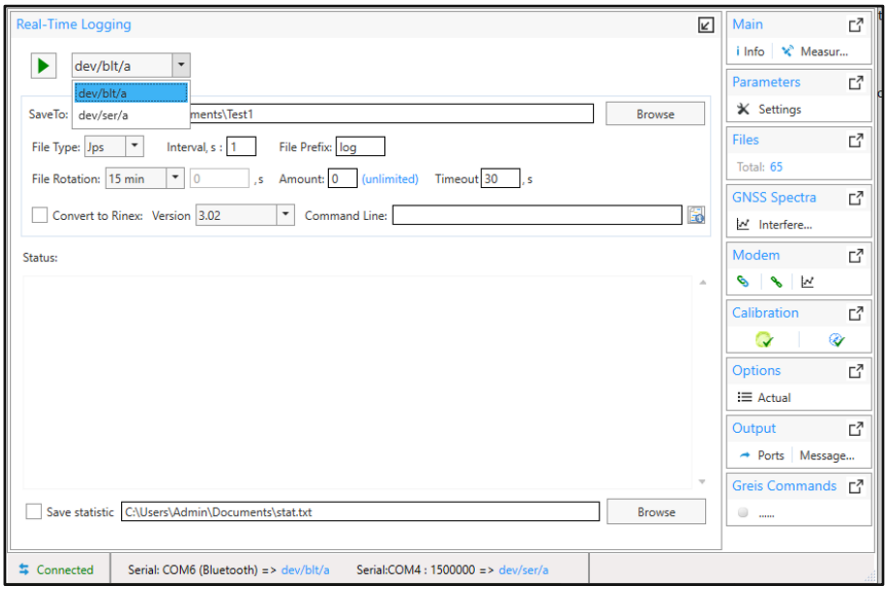


Figure 158. Real–Time Logging window.

Follow these steps to start logging:

- Select from the drop–down list one of the connections, which is used by the *NetView* for the communication with the receiver. *NetView* will use the selected connection for *Real–time logging* exclusively.
- Specify the folder for logged files saving by typing or using button *Browse*.
- Set the following parameters:
  - *File type* – *JPS* or *RTCM3*
  - *Interval* – interval of messages generation (sec).

- *File Prefix* – Prefix which will be added to the file name before the date.
- *File Rotation* – Recording period (sec). It can be selected from the drop–down list or typed manually if *Other* value is selected.
- *Amount* – File number. 0 means the files will be logged until *Real–time logging* is stopped. The value greater than 0 specifies file number to recording.

- Click *Start* button.

Real–time logging is started (in fact *RealTimeLogger.exe* executed). Status information is displayed below the setting pane and contains the command line which was used for *RealTimeLogger.exe* starting.

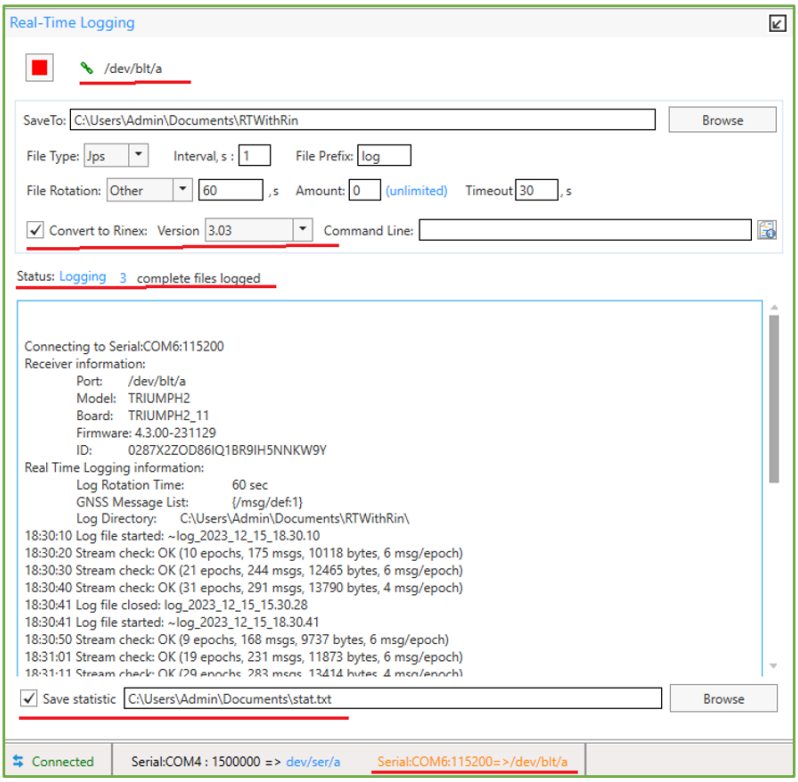


Figure 159. Real–Time Logging is going on. Convert to Rinex on. Save statistics on.

For converting files to RINEX format:

- Check *Convert to Rinex* flag.
- Select Version from drop–down list.
- Type additional command line arguments if need. Button right of command line opens tips with all available command line arguments.

Check *Save statistic* and specify file path for saving statistics if desire. File path can be typed manually or selected using the button *Browse*.

Statistics window displays the statistics received from *RealTimeLogger.exe.*

Logged files are located in the selected folder.

If Convert to Rinex checked additional folder Rin appears.

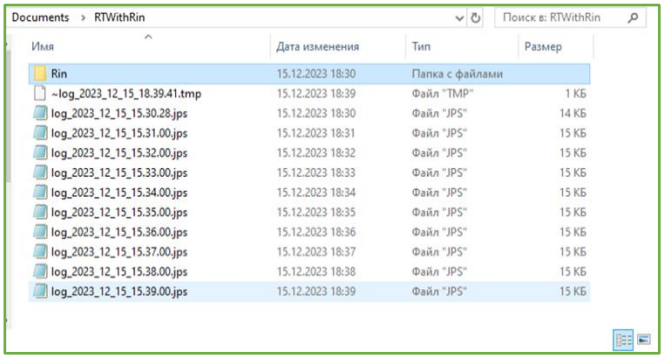


Figure 160. Logged files.

First file is usually shorter then selected *File Rotation* due to time alignment. The file which is logging at the moment has extension *“.tmp”.*

Real–time logging stops if specified file number reached or *Stop* button is clicked. *NetView* restores the connection and uses it as usually.

4. Modem

NetView provides functionality for interacting with the modems.

Switch connection mode to *Modem* and connect to the modem as described in *2.2. Connection Mode Switcher.*

Connected modem will be added to the *Modem* list on *Devices* pane and the *Modem* page will appear.

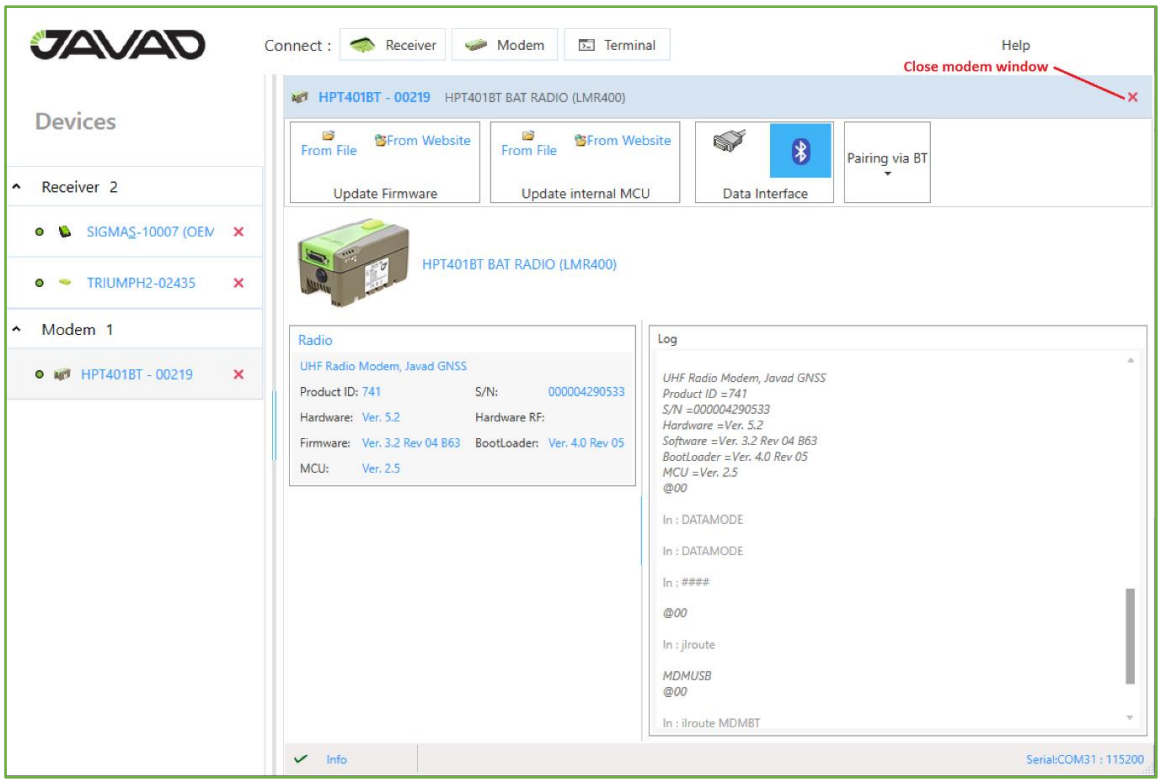


Figure 161. Modem Page.

Modem page contains:

- Toolbar – which provides:
  - Update Firmware and Update internal MCU if present groups.
  - Data Interface – Set interface for the data transferring.
  - Pairing group.

- Information about modem.
- Log panel – Outputs the commands and replies.

Status bar at the bottom of the page displays current or last operation state.

Close button in the header disconnect modem and close the page.

4.1 Update Firmware

Modem firmware can be updated from file or via Internet. Depending of the modem model *Radio*, *MCU* and *Internal MCU* firmware can be updating

4.1.1 Updating from File

Click *From File* button and choose firmware file using *Open File Dialog*.

4.1.2 Updating from Internet

Click *From Website* Button. Firmware file will be downloaded from the site and checked.

If firmware is suitable to the modem and has another version updating will be started. Otherwise, the warning will be shown.

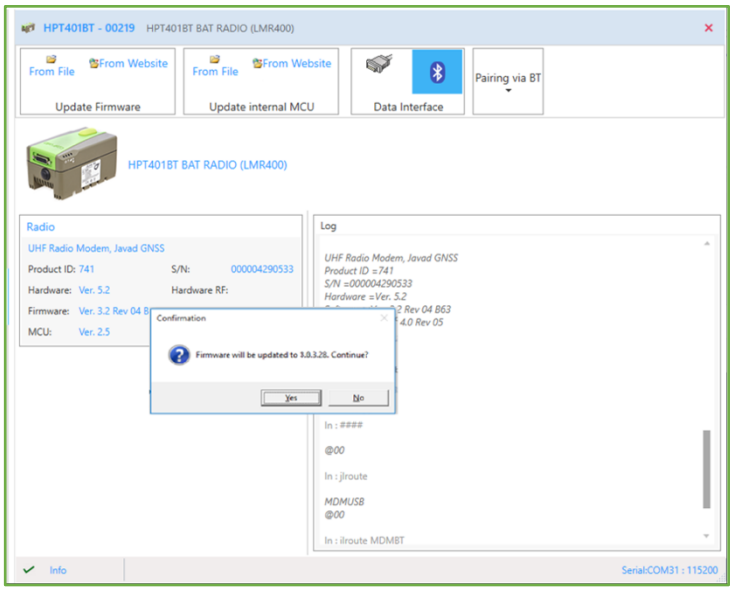


Figure 162. Modem Firmware updating confirmation.

Status bar at the bottom of the window shows process progress.

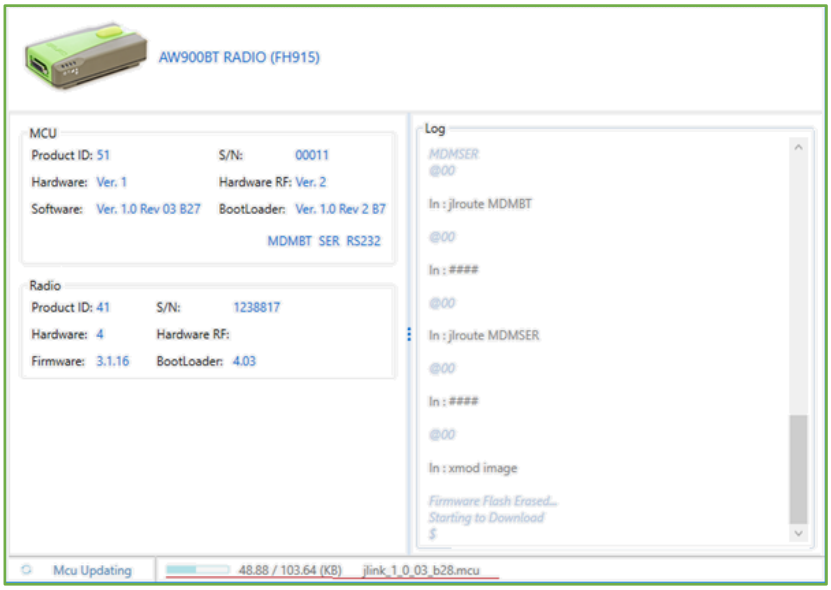


Figure 163. MCU Firmware updating.

After firmware is updated, modem will reconnect and actual information will be displayed.

4.1.3 Pair Modem and GNSS Receiver via Bluetooth

NetView allows to pair outer modem and receiver via Bluetooth. Connected receivers are available in the *Pair* drop–down if it is not paired yet.

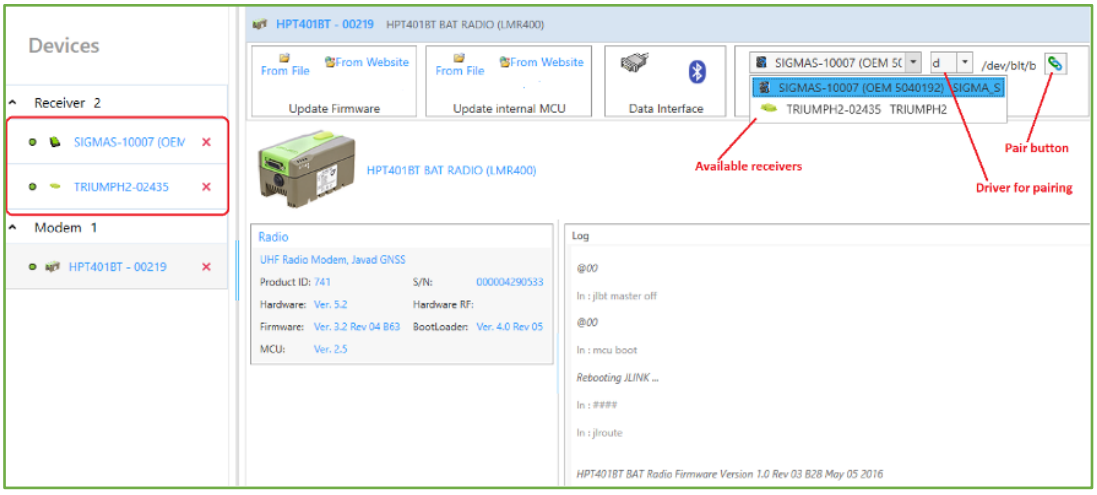


Figure 164. Select Pairing group.

Follow the next steps to pair modem to the receiver:

- Select *Receiver* from the drop–down.
- Select *Receiver Modem Driver.*
- Click *Pair* to start

Receiver modem driver *Port* should be set to *dev/ser/blt/a (b)* and *Mode to off*

Otherwise, error window will be displayed and pairing process will not start.

While pairing window is disabled, commands to modem are output to the Log panel and status is displayed in the status bar.

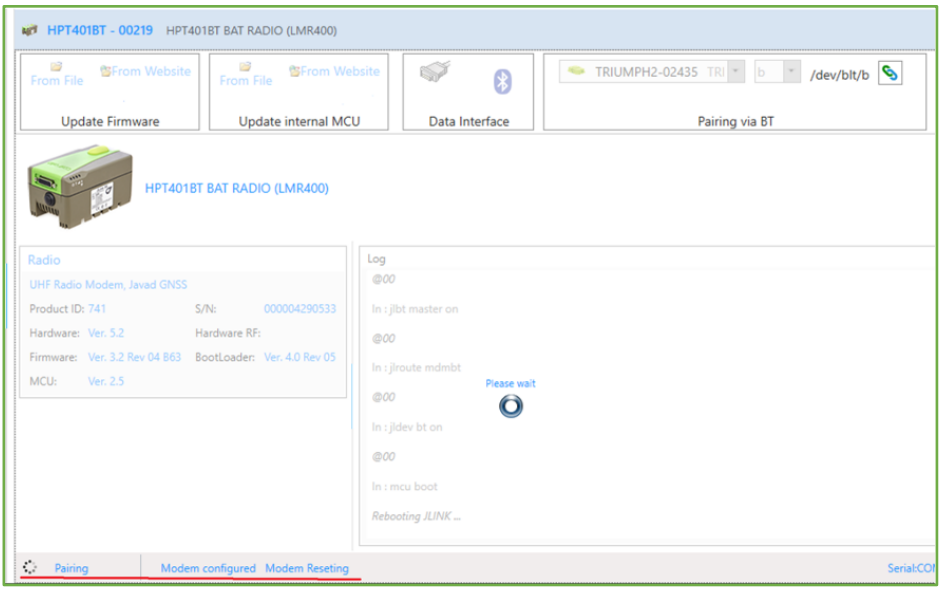


Figure 165. Pairing process.

After receiver is paired, it is displayed instead of *Pair* drop–down and followed by the *Unpair* button.

Clicking *Unpair* button starts unpair procedure. It is going on in the similar way as pairing.

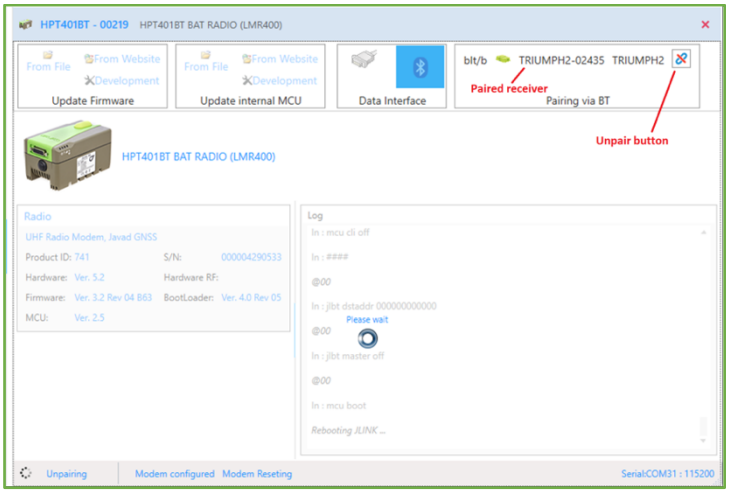


Figure 166. Outer Modem via Bluetooth paired. Unpairing started.

5. Terminal

NetView allows interacting with devices in terminal mode. It means that the application opens the channel, reads data from it and sends user's input as is.

Switch connection mode to Terminal and connect to the device as described in *2.2. Connection Mode Switcher.*

Connection will be added to the *Terminal* list on *Devices* pane and the *Terminal* page will appear.

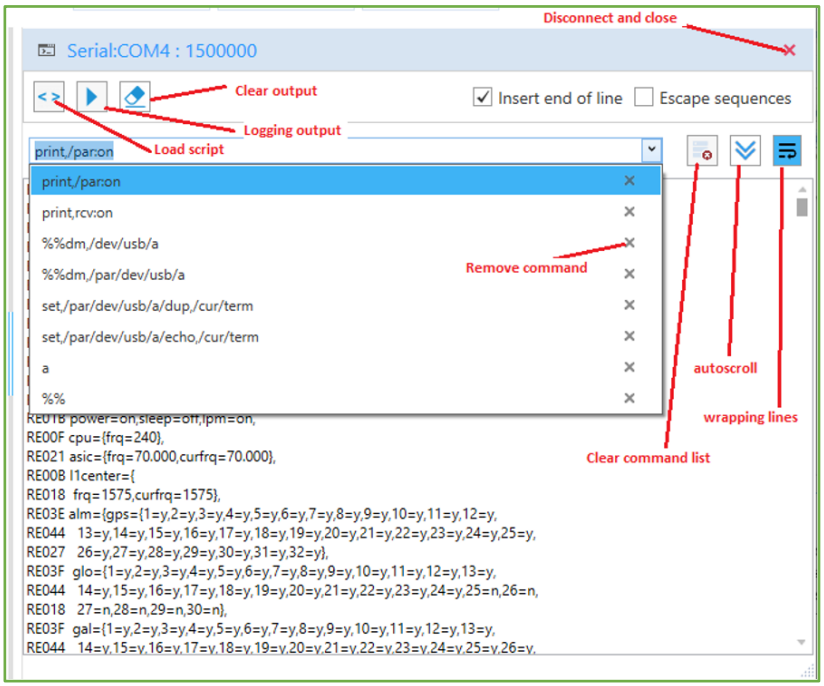


Figure 167. Terminal window.

The following controls serve the terminal operation:

- *Input Line* – As you type press enter key to send command to the device.
- *Output Window* – Displays device replies.

- *Last Commands List* – Allows select one of the previously sent commands. Up to 50 commands are stored. Command can be removed from the list.
- *Load Script Button* – Sends a content from the selected file to the device.
- *Start Logging* (*Stop Logging*) *Button* – Saves output to the selected file. After starting the button changes to *Stop Logging*. Log file path is displayed at the bottom.
- *Clear Button* – Clears the *Output Window*
- Insert End of Line Flag – Adds "\r\n" to the end of the typed line.
- *Escape Sequence* – Convert user's input of "\\\\","\\\"","\\0","\\b","\\f","\\n","\\r","\\t","\\v" to the corresponding Unicode characters.
- *Clear Command List Button* – Remove all commands from the list.
- *Auto Scroll Button* – On/off auto scrolling of the output window.
- *Line Wrapping Button* – On/off wrapping of output lines.

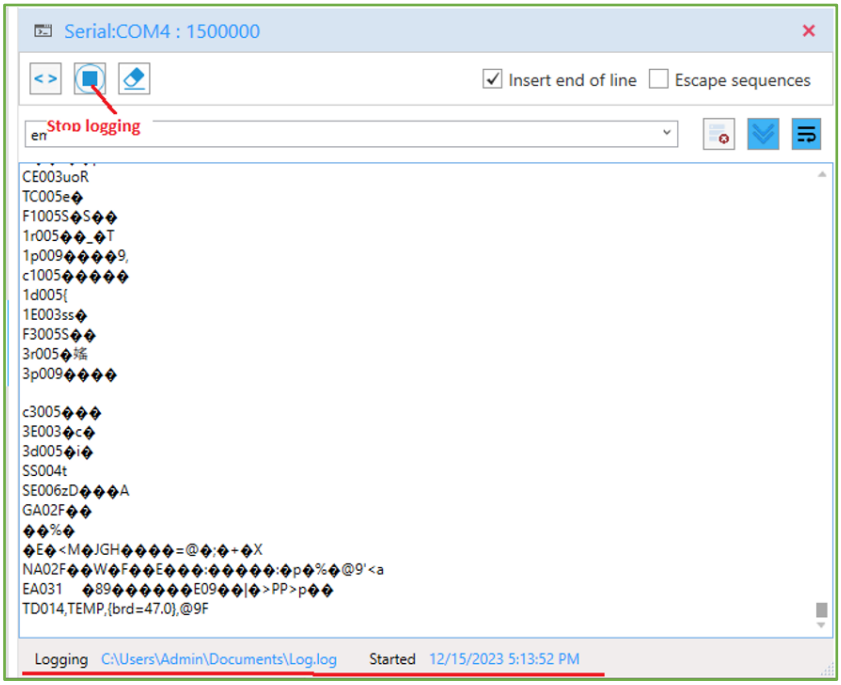


Figure 168. Terminal Output and Logging.

6. Appendices

Appendix 1 – Predefined Sets of Messages

Name	Solution	Messages IDs (interval, s)
DGPS RTCM {1,31,3}	DGPS (Code diff)	1, 31, 3(10)
DGPS RTCM {41,3}	DGPS (Code diff)	9, 34, 3(10)
DGPS RTCM {9,34,3}	DGPS (Code diff)	41, 3(10)
RTK RTCM {18,19,22,3}	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	18, 19, 22(10), 3(10)
RTK RTCM {20,21,22,3}	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	20, 21, 22(10), 3(10)
RTK RTCM {18,19,23,24}	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	18, 19, 23(10), 24(10)
RTK RTCM {20,21,23,24}	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	20, 21, 23(10), 24(10)
RTK RTCM3 GD min	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1006(10), 1008(10), 1033(10), 1003
RTK RTCM3 GD full	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1006(10), 1008(10), 1033(10), 1004
RTK RTCM3 GGD min	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1006(10), 1008(10), 1033(10), 1003, 1011
RTK RTCM3 GGD full	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1006(10), 1008(10), 1033(10), 1004, 1012

RTK RTCM3 GGD full eph	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1006(10), 1008(10), 1033(10), 1004, 1012, 1019, 1020
RTK RTCM3 3.0	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1003 , 1011, 1005 (10), 1007 (10), 1033 (10)
RTK CMR {10,0,1}	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	10, 0, 1(10)
RTK CMR+ {10,0,9}	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	10, 0, 9(10)
RTK JPS min	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	RT, GT, NT, SI, rc, cp, 2r, 2p, BI, ET
RTK JPS max	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	RT, GT, NT, SI, rc, cp, DC, EC, 2r, 2p, D2, E2, BI, ET
RTK RTCM3 MSM	RTK float (Phase diff) RTK fixed (Phase diff) Fixed	1006(10), 1008(10), 1074, 1084, 1094, 1104, 1114, 1124

Appendix 2 – Script Example

The script should start from string: *#!/usr/bin/tcl*.

Below is the example of the script. It requests the receiver *baud rate* for serial *a* and checks that it is *115200.*

```
#!/usr/bin/tcl

puts "Checking of baud rate of serial port a. Expected value is
115200"

set result [send "print,/par/dev/ser/a/rate"]

#      variable 'result' contains result of operations 'send'

#      [lindex $result 0] shows error code. If code is "none" it
means no errors.

if {[lindex $result 0] == "none"} {

#      Error code is 'none'

#      [lindex $result 1] contains answer on command
print,/par/dev/ser/a/rated if {[lindex $result 1] == "115200"} {

puts [concat "Correct baut rate: " [lindex $result 1]]

} else {

puts [concat "Incorrect baut rate: " [lindex $result 1]]

}

} else {

#      # Error code is NOT 'none', [lindex $result 1] contains
error text

puts [concat "Error while read baud rate. Error code '" [lindex
$result 0] "' " [lindex $result 1]]

}

puts "Script stopped"
```

7. Web Resources

JAVAD GNSS Web Site

GNSS Receiver External Interface Specification

JAVAD GNSS Update Page

NetBrowser

Real – Time Logger

Kvaser