

RTKFox V1.0

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User Manual V1.0



Document history

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1. Introduction

Together with the RTK-22 module you will find utility software. The RTKFox software offers a graphical interface that helps you configure the RTK-22 module.

1.1 System Hardware Configuration

You will need following items to complete your system hardware configuration.

1.1.1 System Requirements

Host Computer

- Microsoft Windows 7(32- or 64-bit)/10(32- or 64-bit)
- At least 32 MB RAM
- 50 MB of hard disk space available
- VGA color monitor
- Mouse or other pointing devices
- Available USB port, USB 1.0 or higher

Note: Before opening software, you might need to install .NET Framework 4.6.1 or later.

2. RTKFoxOverview

The following guidelines will give you some brief instructions on how to use this software.

2.1 RTKFox Operation Window

Double click the RTKFox.exe that you will see the operation window as Figure 1.

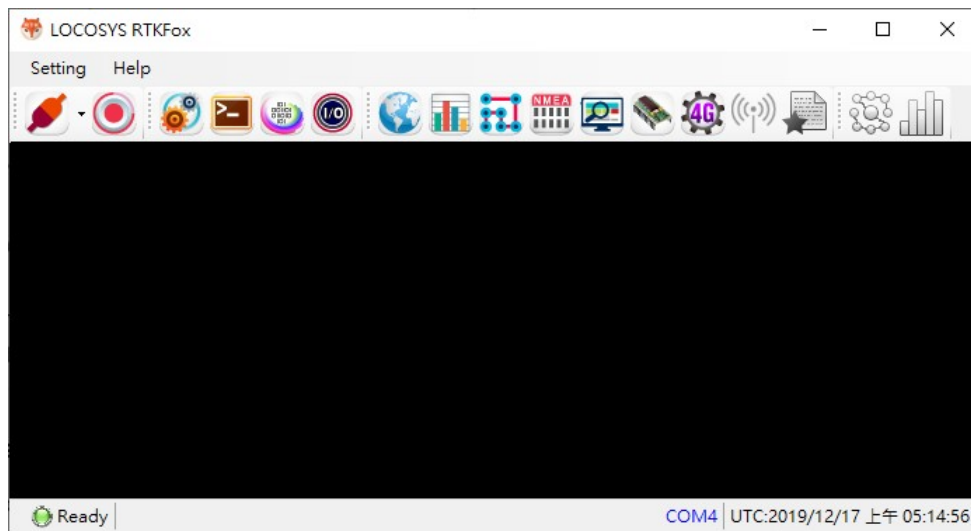


Figure 1: Operation Window

The operation window consists of four areas --- the menu, the toolbar, the main working space and status bar.

2.1.1 Menu

The menu at the top of the operation window contains "Setting" and "Help" item. Setting option have a function of factory reset. Help item have a about item, it provides the version of RTKFox.



2.1.2 Toolbar

The toolbar is the second part of the operation window. The toolbar can turn on or off the function. It provides all kinds of function, include com port connect, log record, module configuration, command line, solution result, satellite info, real-time trajectory, NMEA message,

monitor status, datalog manager, network, LoRa, information, analyze and compare.

2.1.3 Main working space

Main working space is the biggest area of the operation window. When you turn on the function on the toolbar, the main working space will display a correspond form. You can set configuration or get information in the correspond form.

2.1.4 Status Bar

Status bar is on the bottom the operation window. You can monitor the com port status and UTC time.

2.2 Connect the module

Click the arrow beside the connect button as Figure 2. The top of the list is a function of disconnect. The middle of the list shows an available com port list. You can click the com port name to connect the correspond com port. The bottom of the list is a function of scan com port. Click the "ScanPort" item will rescan available com port again.

COM port use related settings are as follow.

- Bits per second – 115200
- Data Bits – 8
- Parity – None
- Stop bits – 1

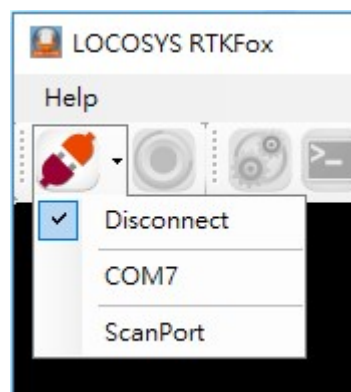



Figure 2: Com port list

2.3 Record log data

After click the record button . It will pop up a dialog to select a file to save log files as Figure 3.

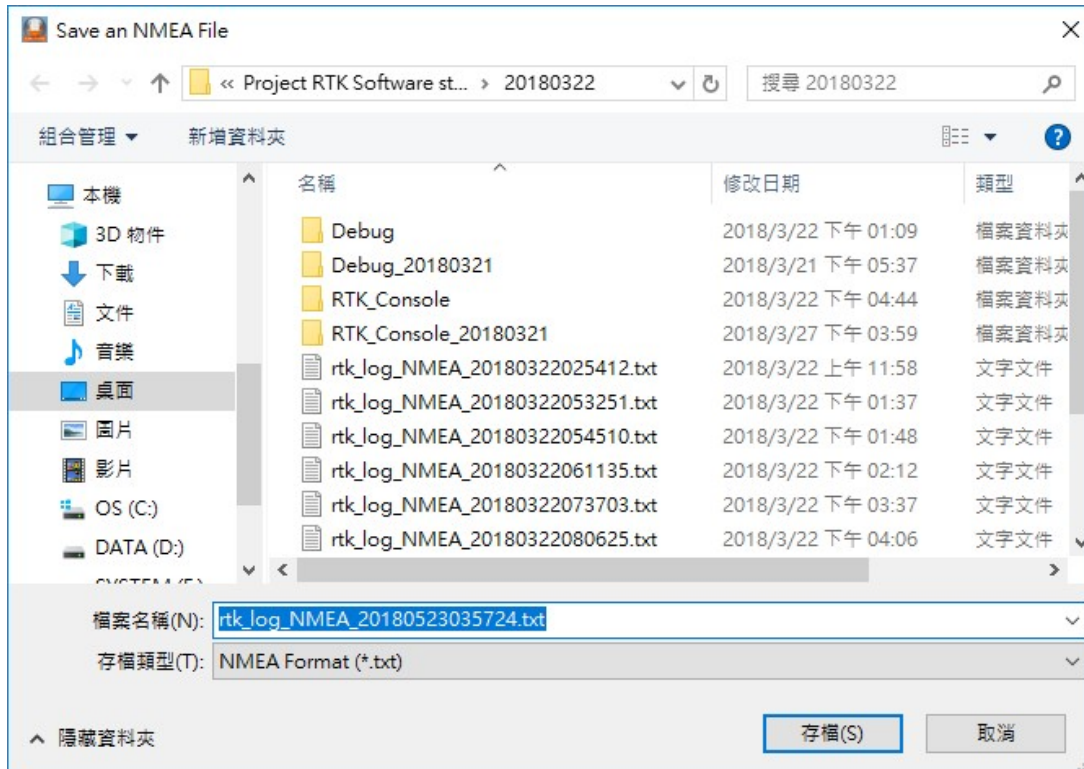




Figure 3: Log file save dialog

The format of log data is NMEA3.3 format. The NEMA content is decided by periodic message configuration. After select a file path and decide a file, click the save button will start to log data. When data is logging, the record button will transform into a stop button . Click the stop button will stop record the logging data.

2.4 Base Station Configuration

Click the configuration button  will turn on the configuration page. After you finish setting, you need to click “Apply” button to apply your configuration. There are three different configurations in this form depends on what the you select therole of it. The first important setting is role. Must selectarole of this RTK-22 module at first.

The main mission of base station is providingdata to rover for resolving position.The configuration in base station allows to control related settings are as figure 4.

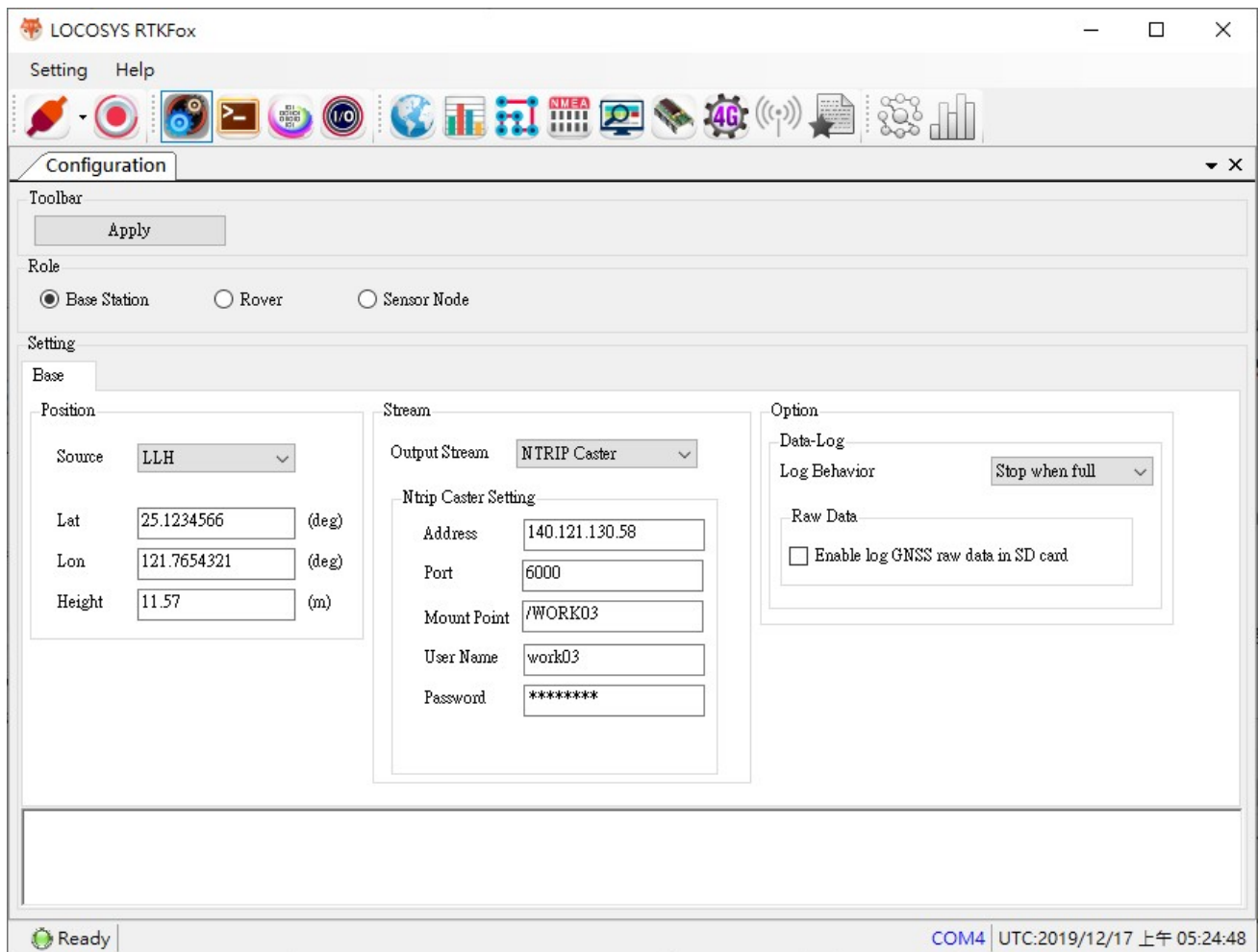


Figure 4: Base configuration page

2.4.1 Position

In the base station configuration, you can select the source of base position. Source provides two modes to select. “Survey In” let base module get position by itself and average the position data to be the final result. If you select “LLH”, you can set base position by yourself.

2.4.2 Stream

There are two ways to output stream. One is LoRa, another is NTRIP caster. If you select LoRa. The base station data will be transmitted via LoRa. If you select NTRIP caster. You need to config the NTRIP caster information.

2.4.3 Option

Log behavior means when the storage space is full, what behavior should be executed. If

you select “Stop when full”, datalog will stop record when storage space is full. If you select “Recursive(FIFO)”, datalog will record continuously, but overwrite the earlies data.

Enable log GNSS raw data in SD card means GNSS raw data will be logged and store in the SD card.

2.5 Rover Configuration

The main mission of rover is resolving position. The configuration in rover allows to control related settings are as figure 5.

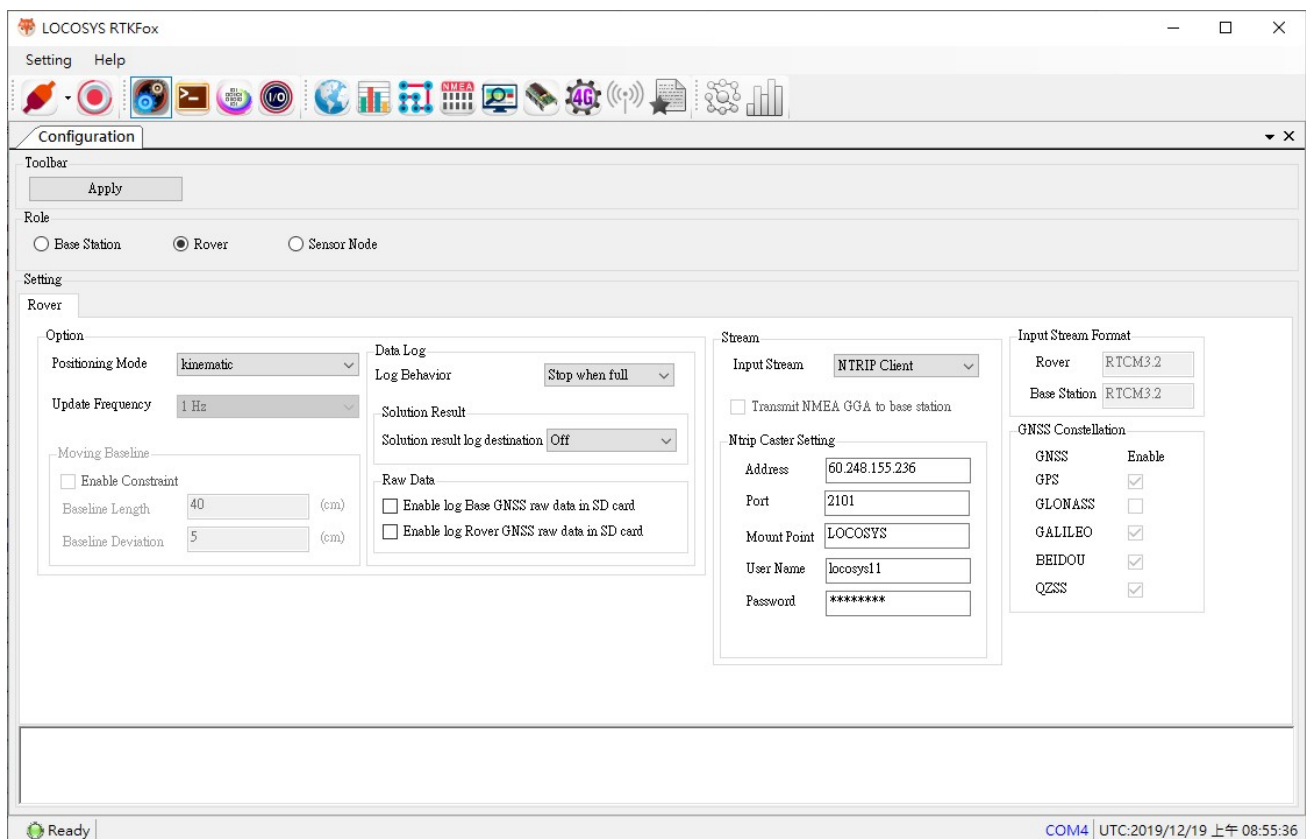


Figure 5: Rover configuration page

2.5.1 Positioning mode

Positioning mode provides three modes to select.

- Kinematic
- Movingbaseline
- Kinematic+Movingbaseline

Only when positioning mode select the “moving baseline”, the baseline length and base deviationfile will allow input value.

2.5.2 Update Frequency

Update frequency shows the update frequency of the device output data.

2.5.3 Moving baseline

When you select the “Moving baseline” option or “Kinematic+Movingbaseline” option in positioning mode, moving baseline setting will enable. You can select enable constraint or not after then decide the baseline length and deviation.

2.5.4 Datalog

Log behavior means when the storage space is full, what behavior should be executed. If you select “Stop when full”, datalog will stop record when storage space is full. If you select “Recursive(FIFO)”, datalog will record continuously, but overwrite the earliest data.

Enable log GNSS raw data in SD card means GNSS raw data will be logged and store in the SD card. You can log base and rover raw data individually.

Solution result log destination provides three items. If you don’t want to log solution result, please select “OFF”. If you want to log solution result in your SD card, please select “SD card”. If you want to log solution result in the internal flash, please select “Internal flash”.

2.5.5 Stream

Input stream provides two interfaces to receive base station information. If you select “LoRa”, RTK-22 module will get base station data from LoRa. If you select “NTRIP Client”, RTK-22 module will get base station data from 4G or Ethernet. RTK-22 decide to use 4G or ethernet automatically.

Only you select “NTRIP Client” in base interface, it is allowed to setting NTRIP server data. You can set server address, port, mount point, user name, password.

2.6 Sensor node Configuration

The main mission of sensornode is pass GNSS data to NTRIP caster. The configuration in sensor node allows to control related settings are as figure 6.

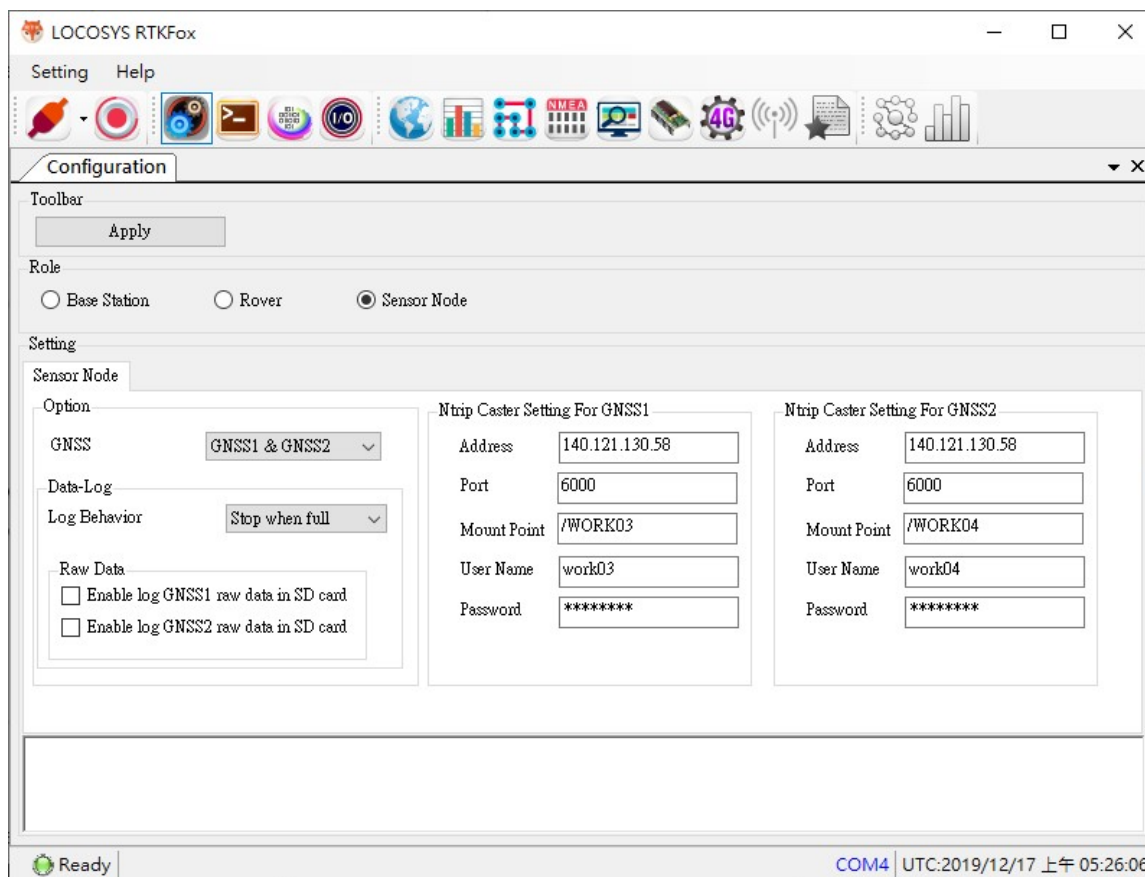


Figure 6: Sensor Node configuration page

2.6.1 GNSS

There are two ways to transmit data. One is GNSS1, another is GNSS1&GNSS2. If you select GNSS1, sensor node will pass GNSS1 data to NTRIP caster. If you select GNSS1&GNSS2, sensor will pass GNSS1 and GNSS2 data to individual NTRIP caster.

2.6.2 Datalog

Log behavior means when the storage space is full, what behavior should be executed. If you select "Stop when full", datalog will stop record when storage space is full. If you select "Recursive(FIFO)", datalog will record continuously, but overwrite the earliest data.

Enable log GNSS raw data in SD card means GNSS raw data will be logged and store in the SD card. You can log GNSS1 and GNSS2 raw data individually.

2.6.3 NTRIP caster

You can set NTRIP caster information include address, port, mount point, user name,

password.

2.7 Command line

If you want to input command by yourself, you can use this function of command line as figure 6. Command line provides an input field and an output display. Input field divide two part. One part is a textbox for key in command. Another part is a button for executing command. You also can repeat last command by press arrow up key. Output display will show your command text in black and result text in blue. If command text is invalid, it will show an error message in red.

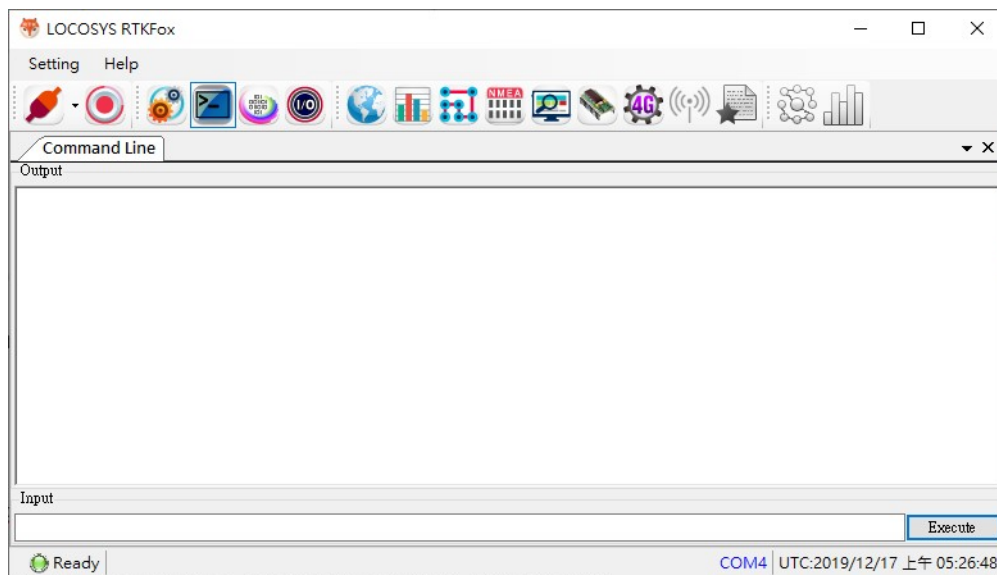


Figure 7: Command line

2.8 Periodic message

You can manage the periodic message here. RTK-22 will output the data every second. Output data divided into two major categories. One is command data format, another is NMEA format.

Some command data also affect other form. The high-resolution solution result and trajectory need the command of NAV-PVTHR. The satellite info needs the command of NAV-SATR for rover satellite info and the command of NAV-SATB for base station satellite info. The pure command of NAV-SOL, NAV-STATUS and NAV-VELNED will not affect other form. NMEA message provides four types. Three are GGA, RMC, GSA, GSV and PMB in NMEA message.

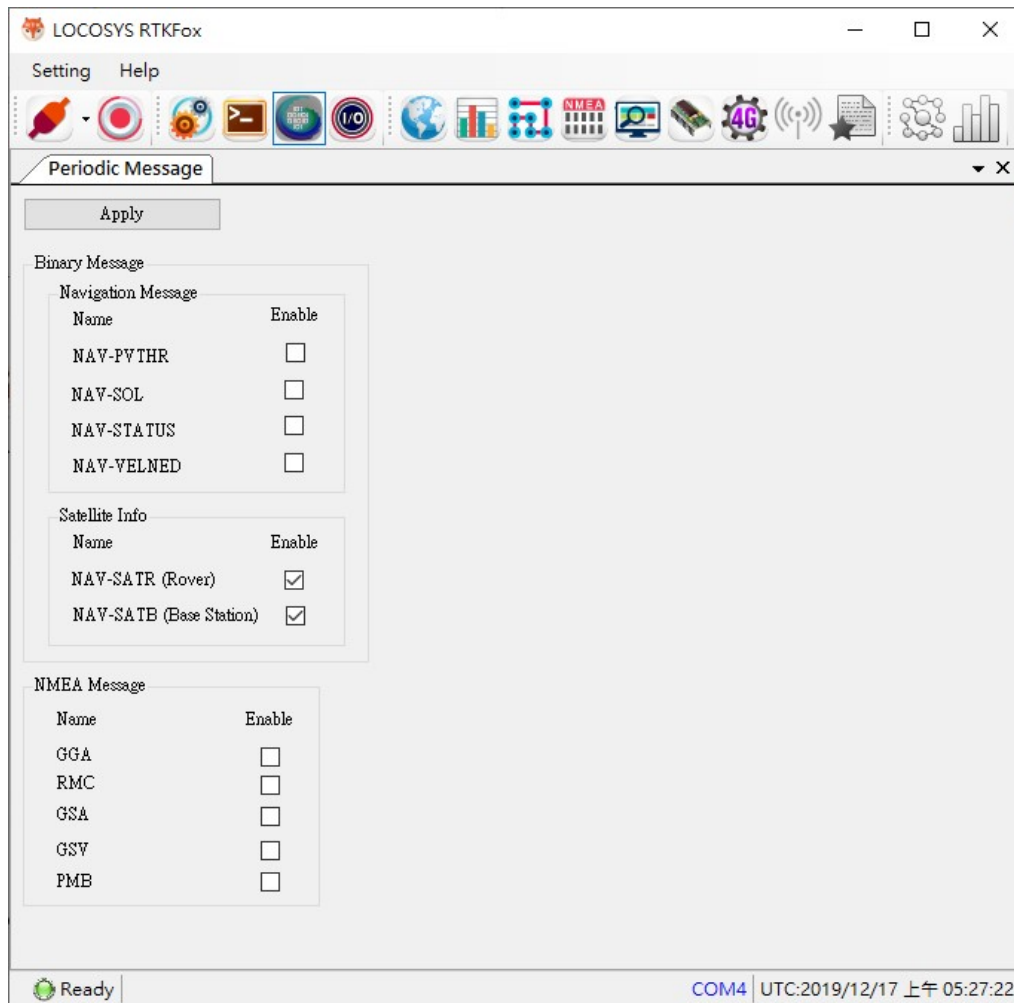


Figure 8: Periodic Message

2.9 GPIO

You can control four GPIO pins in this form. The four GPIO pins are CSI_DATA01, CSI_DATA02, CSI_DATA03 and GPIO3_PWM. You can control the direction and value of the pins. You can decide the input or output of the pin direction. You can decide high or low of the pin value. Click the set button will apply changes Individually.

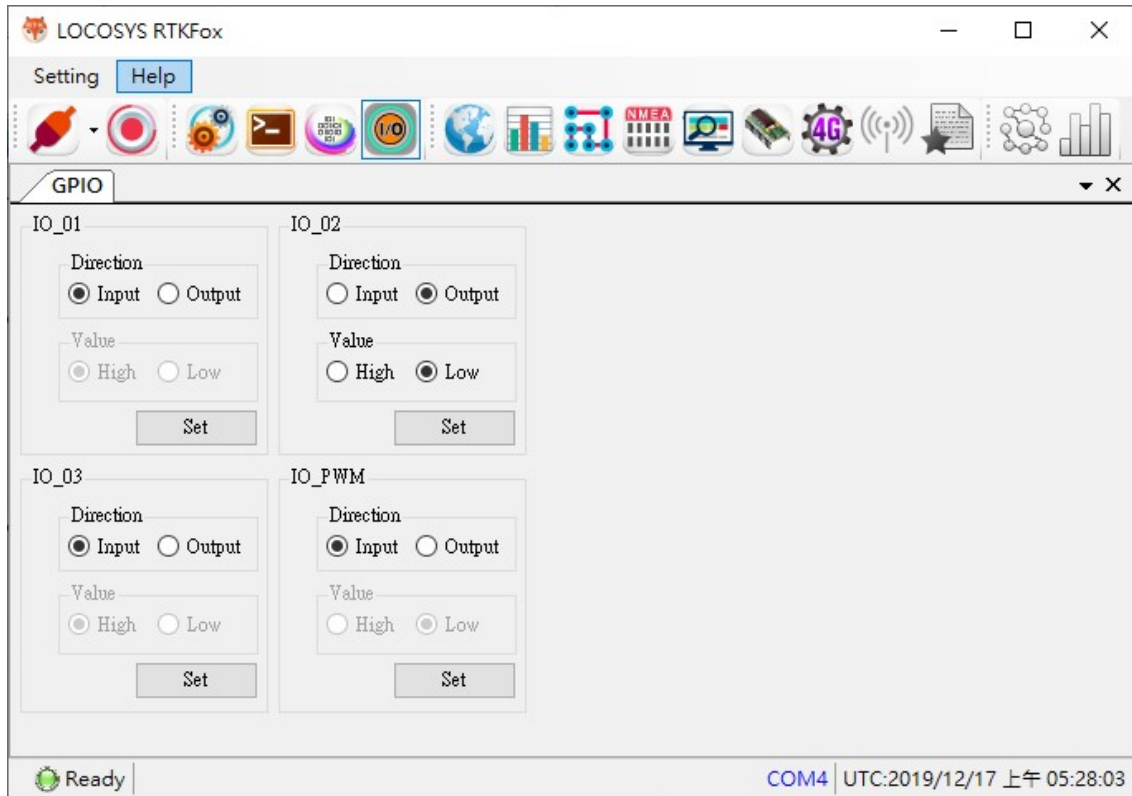


Figure 9: GPIO

2.10 Solution result

In the solution result you can see many information about RTK solution as figure 7.

- UTC means UTC time.
- Kinematic means kinematic solution status. Solution status has four statuses. That four statuses are fixed, float, single and invalid respectively.
- Moving Baseline means moving baseline solution status. Solution status has four statuses. That four statuses are fixed, float, single and invalid respectively.
- Latitude, longitude and height means rover location information.
- Base position has a button for refresh base location information.
- Latitude, longitude and height below the refresh button means baselocation information
- Ground speed means speed over the ground
- Pitch means the pitch angle between GNSS1 and GNSS2.
- Yaw means the yaw angle between GNSS1 and GNSS2.
- Length between base and rover means literal meaning

Click the refresh button will request the base position information again and refresh the value of base position.

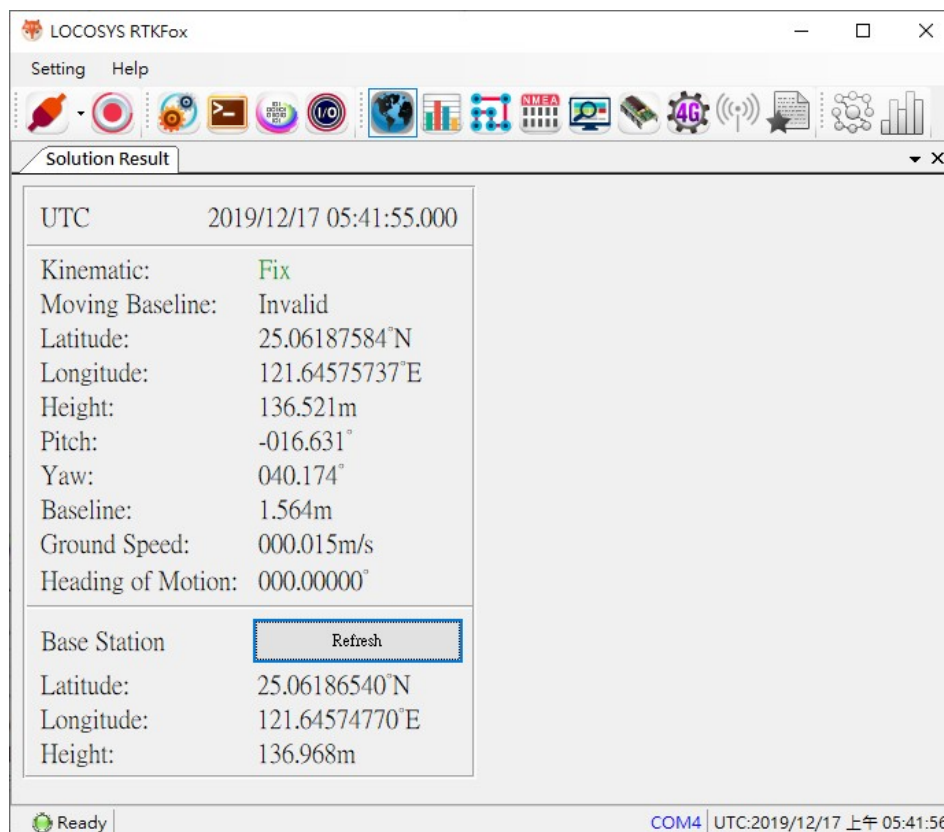


Figure 10: Solution result

2.11 Satellite resource

There two display methods and two frequency to observe satellite resource. You can change different observation methods by select the different item in the combo box in top left corner of the form. You also can switch the frequency combo box to change the current frequency. Non-current frequency will display in dotted line.

The first display method of satellite resource is "Rover Only". You can observe the satellite resource of rover individually as figure 10. The second method of satellite resource is "Rover & Base". You can observe the satellite resource of base and rover at the same time as figure 11.

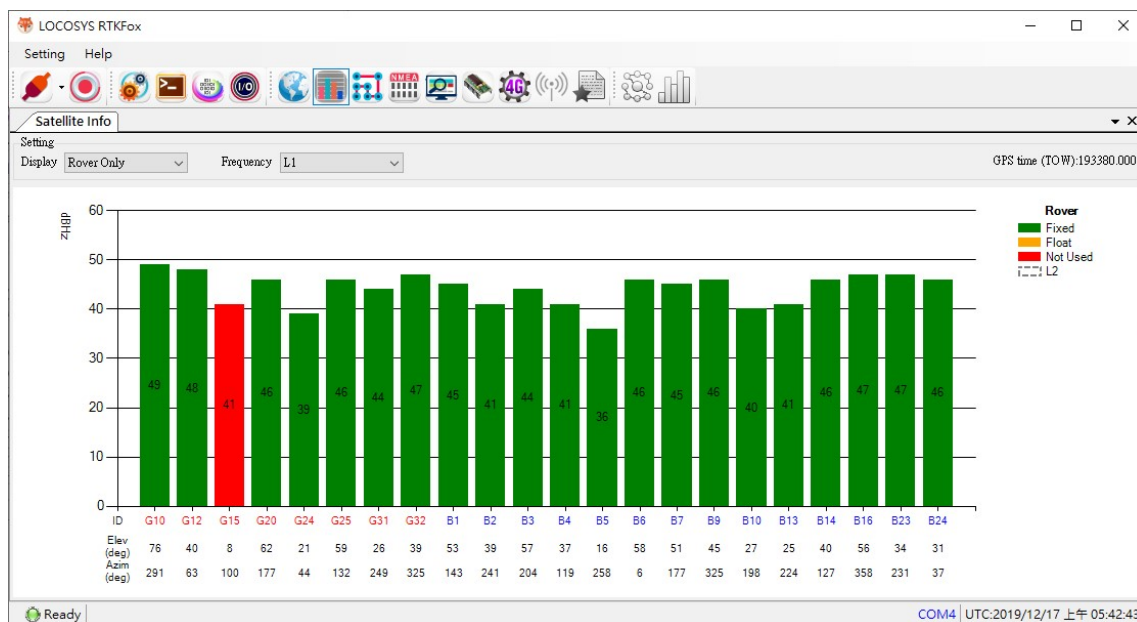


Figure 11: Satellite resource in “Rover Only” method

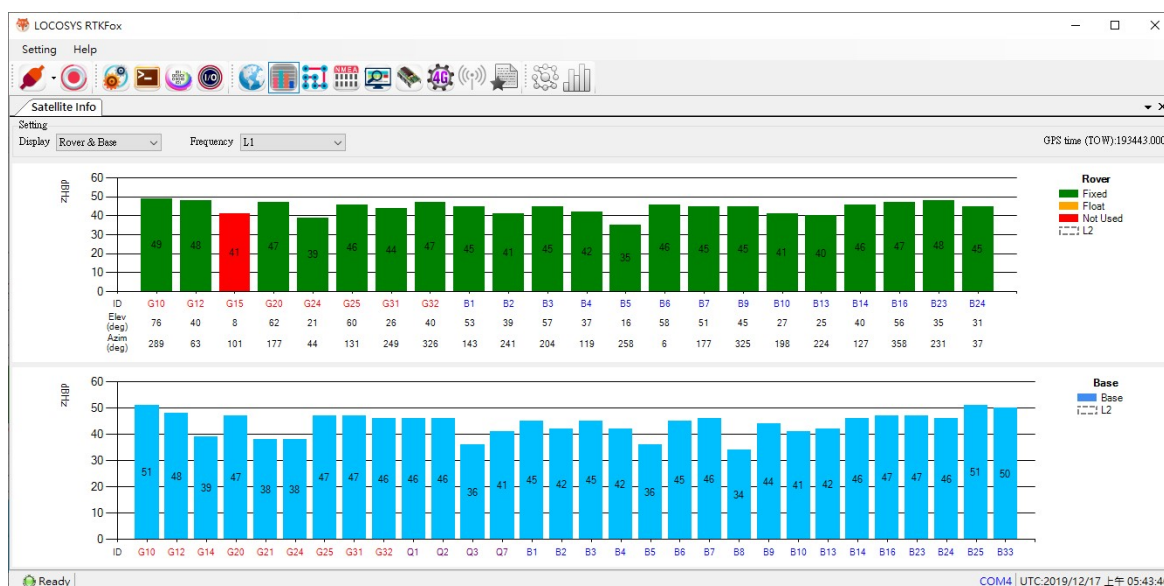


Figure 12: Satellite resource in “Rover & Base” method

In the satellite resource of rover, we use three different color to represent three different status. Fixed status is green color. Float status is yellow color. Not used satellite is red color. In the bottom of satellite resource of rover has three data of satellite as figure 12.

ID	G2	G3	G6	G9	G17
Elev (deg)	16	27	47	22	60
Azim (deg)	271	41	303	130	12

Figure 13: Satellite resource data

Three are ID, Elev and Azim. ID is composed of a word and a number. A word means the

satellite system and a number means the satellite number. Elev means elevation. Azim means azimuth.

The word of the satellite system is:

Code	System
G	GPS
B	BeiDou
S	SBAS
E	Galileo
Q	QZSS
N	GLONASS

2.12 Trajectory

You can observe rover position continuously in real time. Each rover position will be a point. From a point to the next point will be connected by line. Color of points express different solution result. Green points mean solution result is fixed. Yellow points mean solution result is float. You can shift the plot by drag the mouse. You can zoom in or zoom out the plot by mouse wheel.

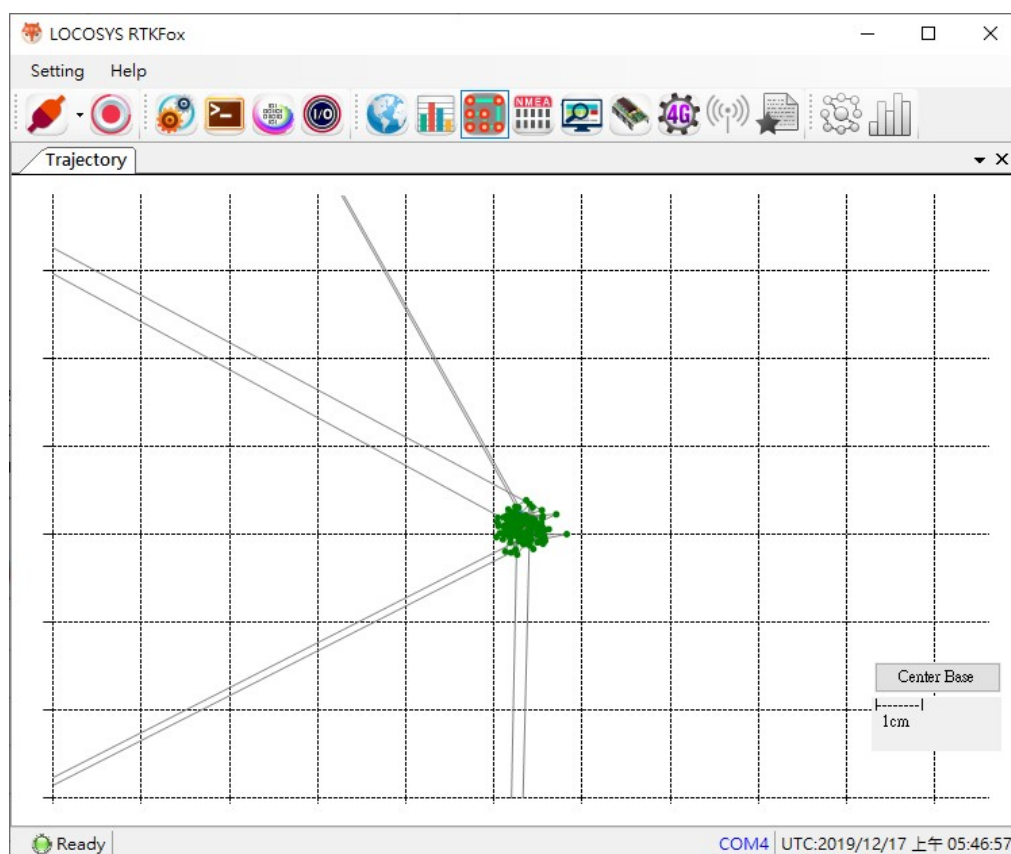


Figure 14: Trajectory

2.13 NMEA message

When get NMEA message from com port, then NMEA message will display here continually.

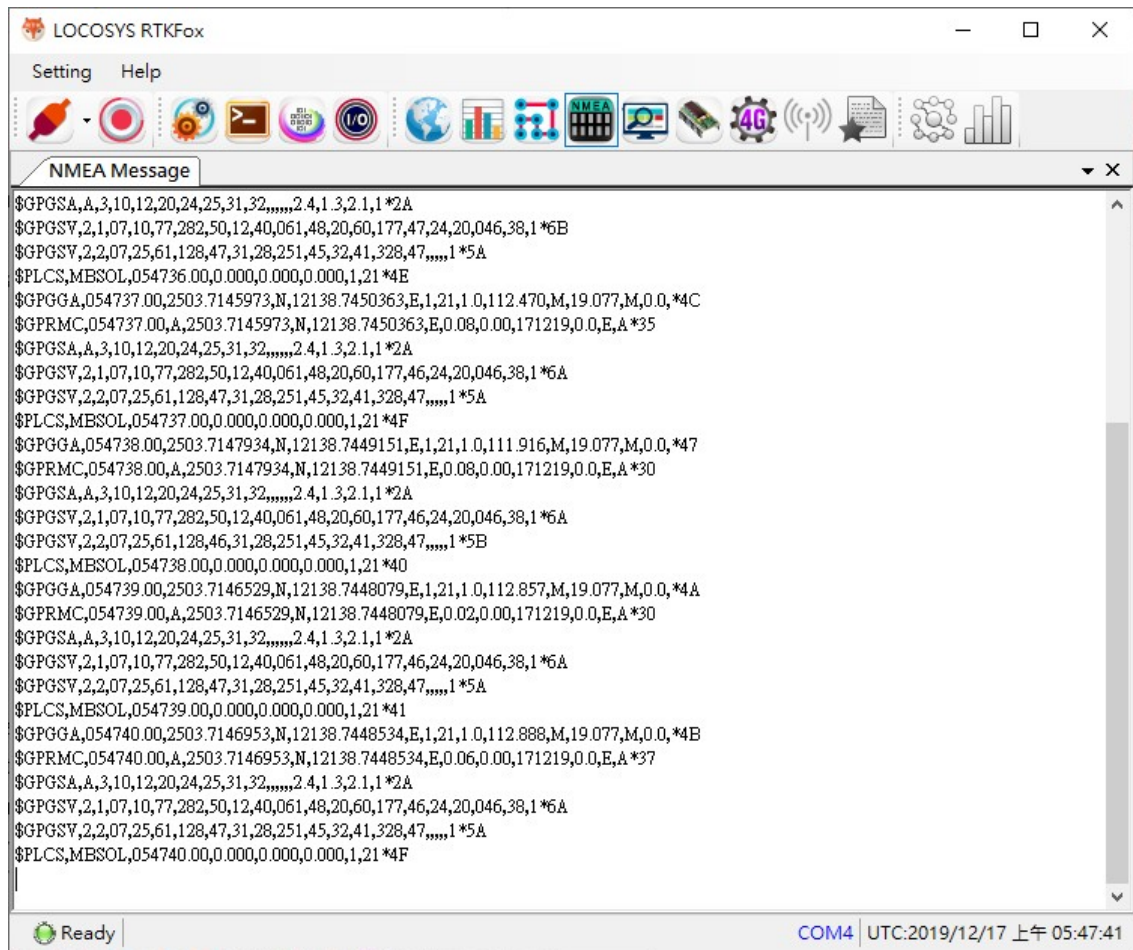


Figure 15: NMEA message

2.14 Monitor status

Input and output streams status will display here. Input streams has three channels. There are three field in input streams which is physical name, total data and bits per second. Output stream has four channels. It's also has the same field as input streams.

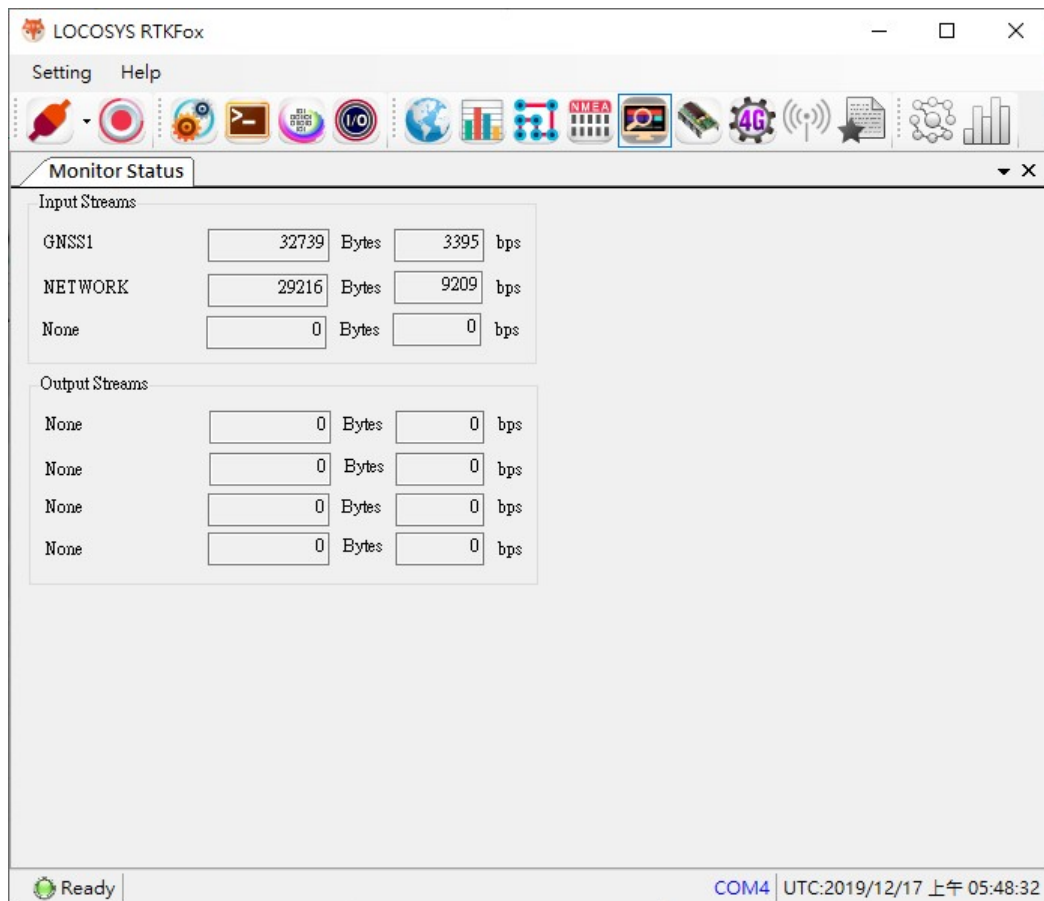


Figure 16: Monitor status

2.15 Internal Flash Manager

Internal flash manager is a tool for manger RTK log file in internal flash. Left part of internal flash manager is file information. Right part is file list.

The file information has available space, total space and total files. Bottom of the file information has a button to delete all files. The file list has four parameters. The first from the left is file name, type, size and file data. The file list shows 20 files per page at once. Top of the file list has a navigation bar to change pages.

You can delete multi files or upload multi files at one time. First select files which you want to delete or upload to host. Second click the delete button or upload button beside the navigation bar.

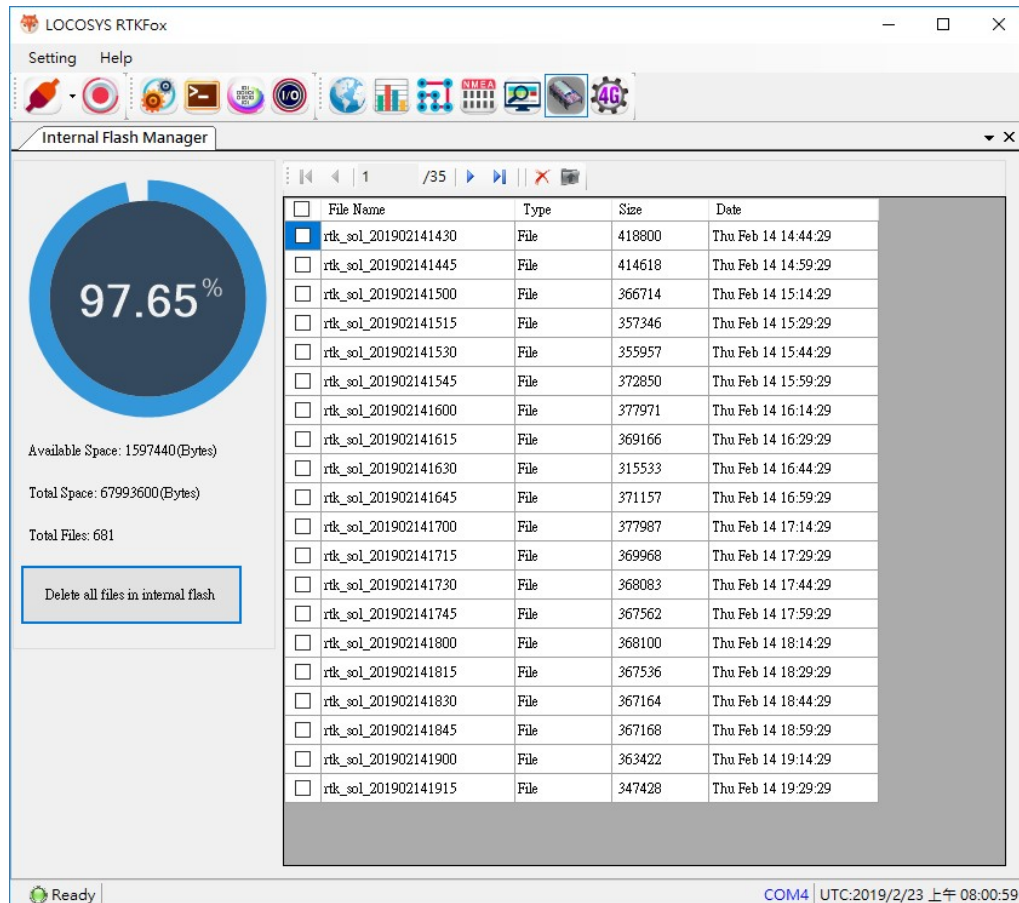


Figure 17: Internal Flash Manager

2.16 Network

Network has two pages, which is 4G and ethernet. You can operate network device and observe network information in correspond page. The top of the form shows network service is via 4G or ethernet.

4G page has two parts. The left part of 4G page is network configuration and 4G status. Network configuration provides PDP type and access point name to set. The type of the PDP is:

PDP Type	System
0	IP
1	IPV4
2	IPV4V6

To Dial 4G network, the first step is select the PDP type and input the access point name. The second is click the connect button and wait for the execute result.

4G status shows IP address, sub-net mask address, receive data, send data, received packets and send packets. The right part of 4G page is network interface. Top of network interface has a refresh button to refresh signal strength. The signal strength has 6 levels. The

icon of strongest signal strength level is . The icon of weakest signal strength level is

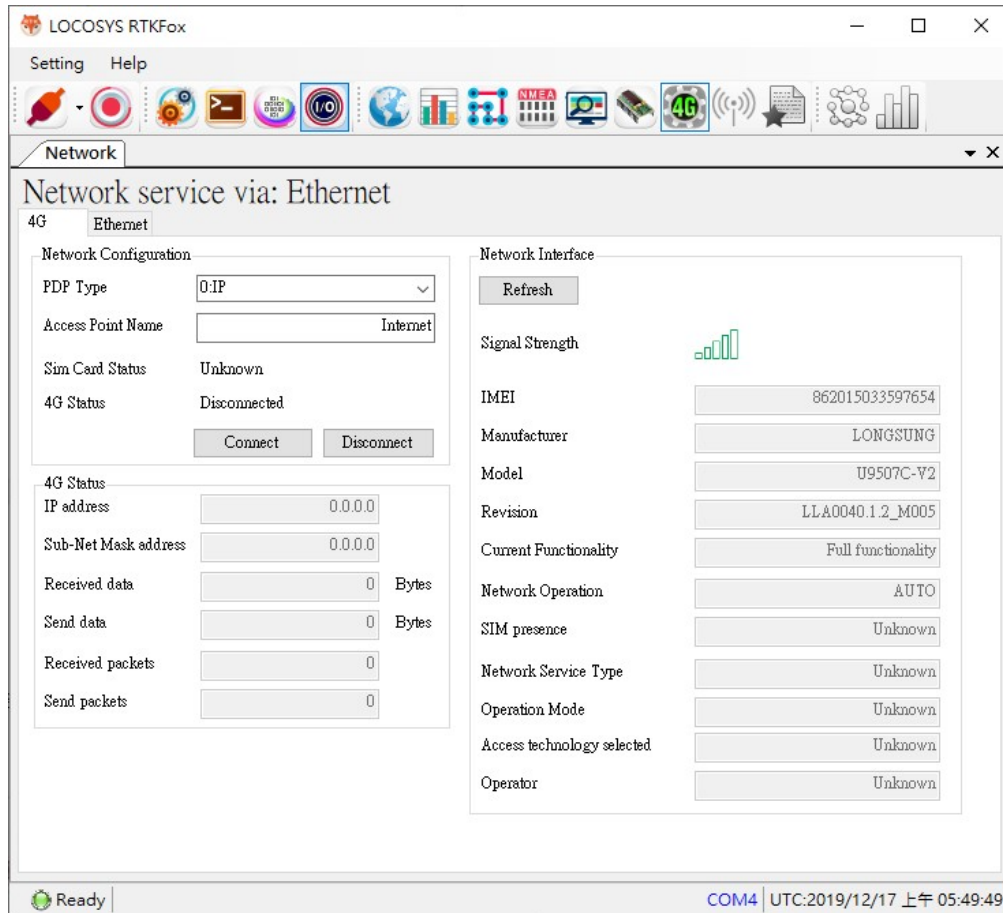


Figure 18: 4G network

Ethernet status shows IP address, sub-net mask address, receive data, send data, received packets and send packets.

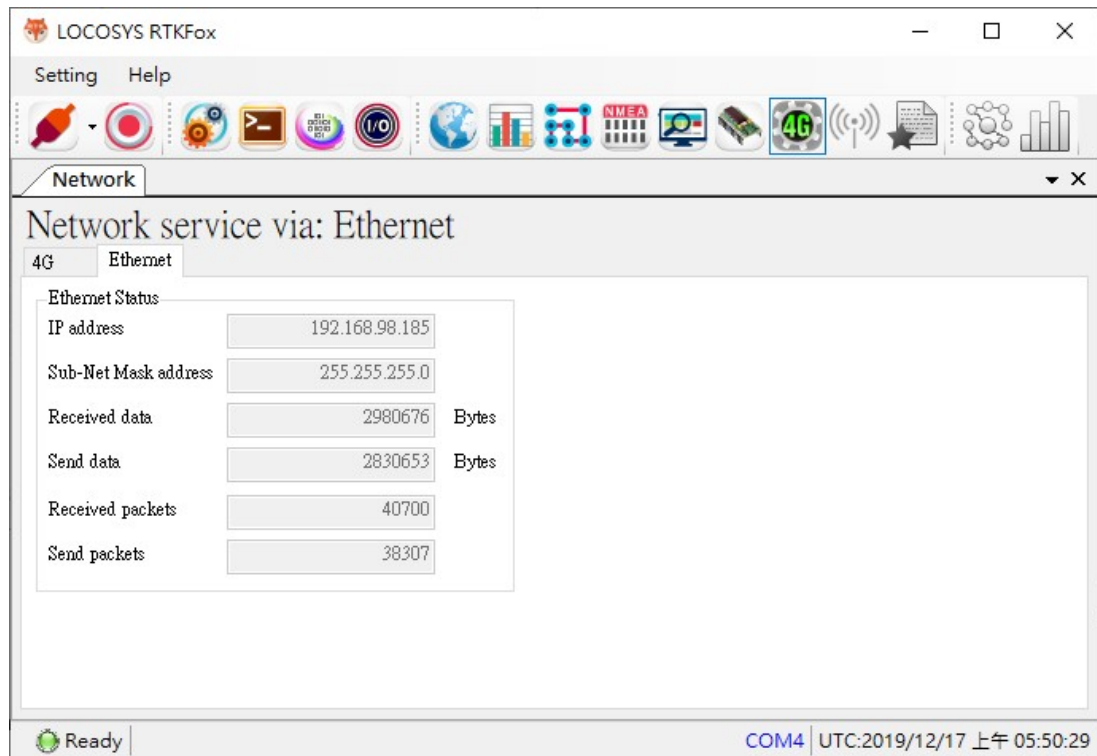


Figure 19:Ethernetnetwork

2.17 LoRa(Optional)

RTK M100R and RTK M101R has LoRa module. LoRa setting can change the transmitting power, the group ID and the channel by user. It's also shows the LoRa module product ID and frequency.

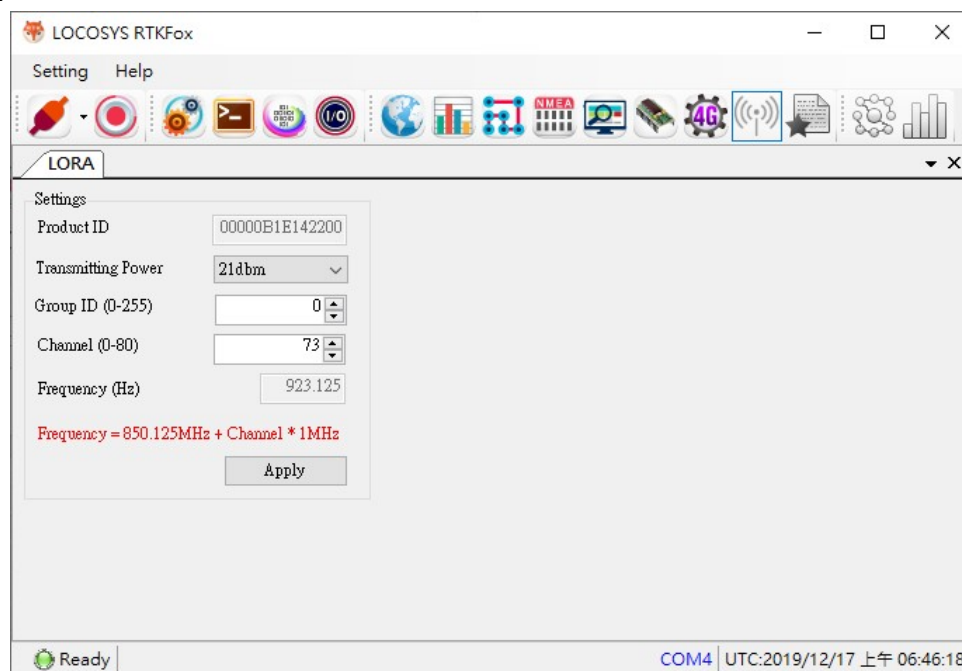


Figure 20: LoRasetting

2.18 Information

Information has four field which are model, chip ID, software version, hardware version, firmware version, GNSS1 and GNSS2 firmware version. Software version means RTK algorithm version. Hardware version means device version. The chip ID is a unique ID. Every module has itself own unique ID. It helps user to distinguish different modules.

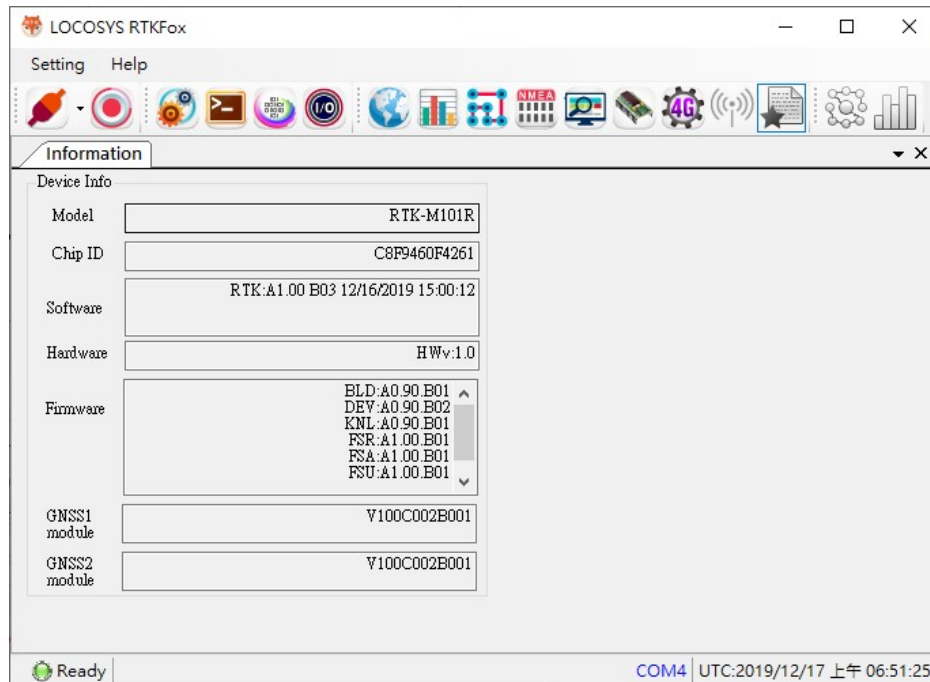


Figure 21: Information

2.19 Analyze

Analyze is a post processing for log files. As figure 22 shows it divided into three parts. The top of analyze is the function of file and map selection. The middle of analyze is statistics of RTK and moving baseline. The bottom of analyze is a map with points.

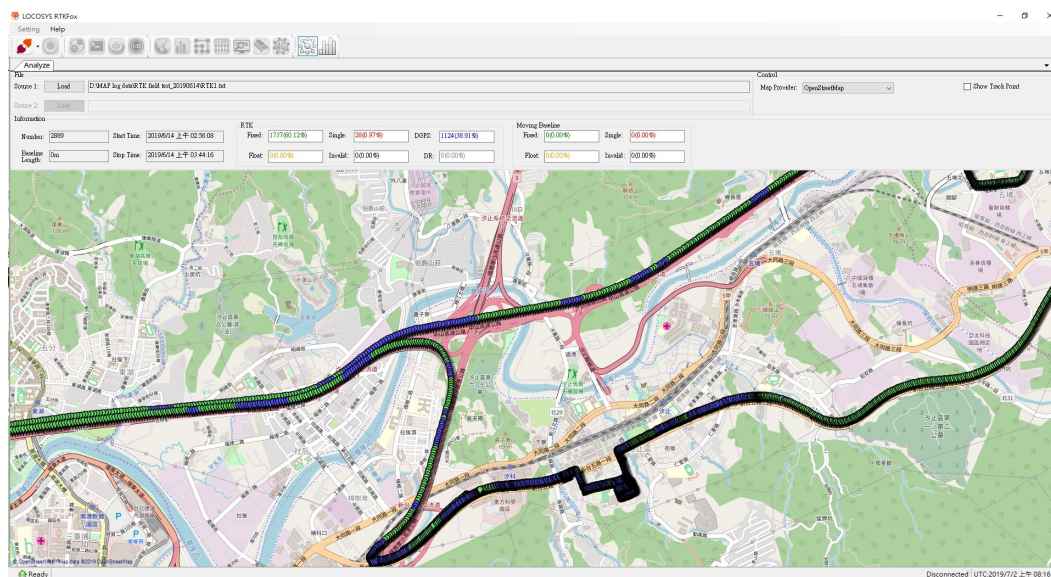


Figure 22: Analyze

The map provider provides open street map, google map, google china map, satellite map and hybrid map. When you enable “Show Track Point” and click a point on the map, the left side of the map will display information of the point as figure 23

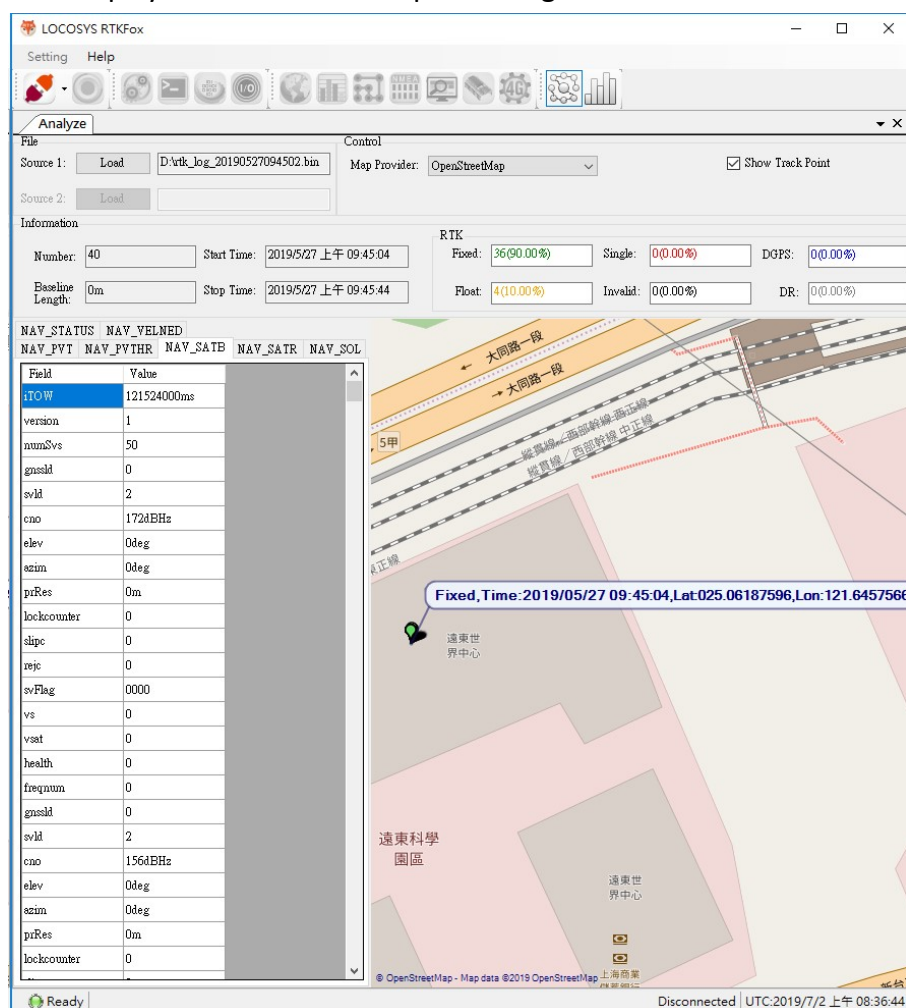


Figure 23: Track point

The information shows total point number, start time, stop time baseline length, RTK solution and moving baseline solution. The RTK solution number includes fixed, float, single, invalid, DGPS, and DR. The moving baseline solution number includes fixed, float, single and invalid.

2.20 Compare

Compare can plot the difference of two log files. There has two type for compare, which is position difference and angle difference. Position difference divided into three plots which is horizontal difference, vertical difference and total difference. Angle difference divided into three plots which is yaw angle difference, pitch angle difference and baseline distance difference.

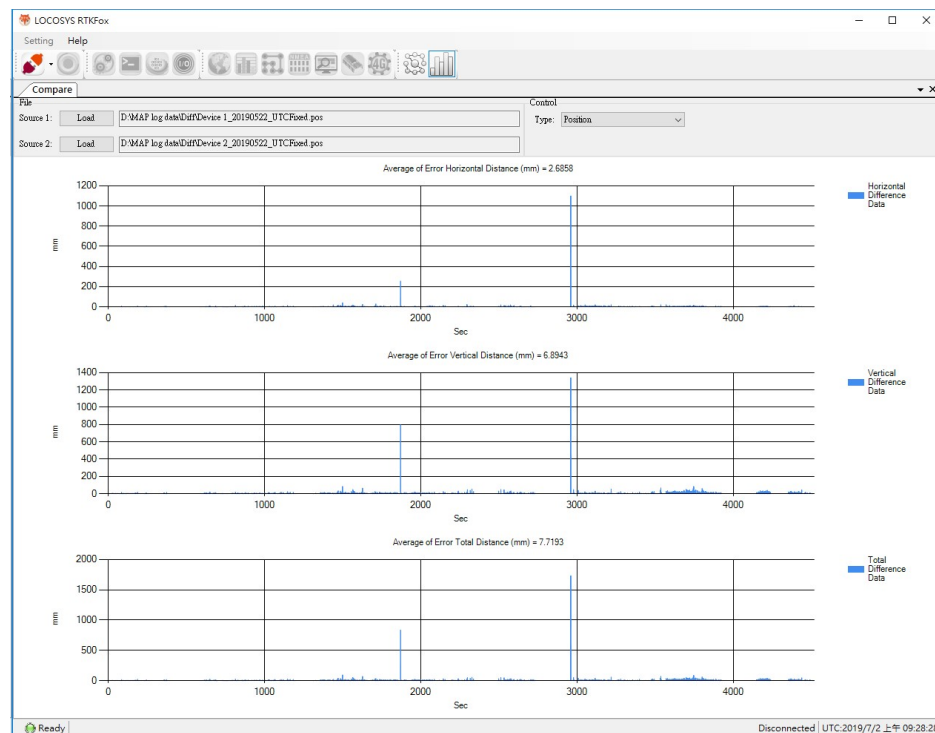


Figure 24: Position difference plot

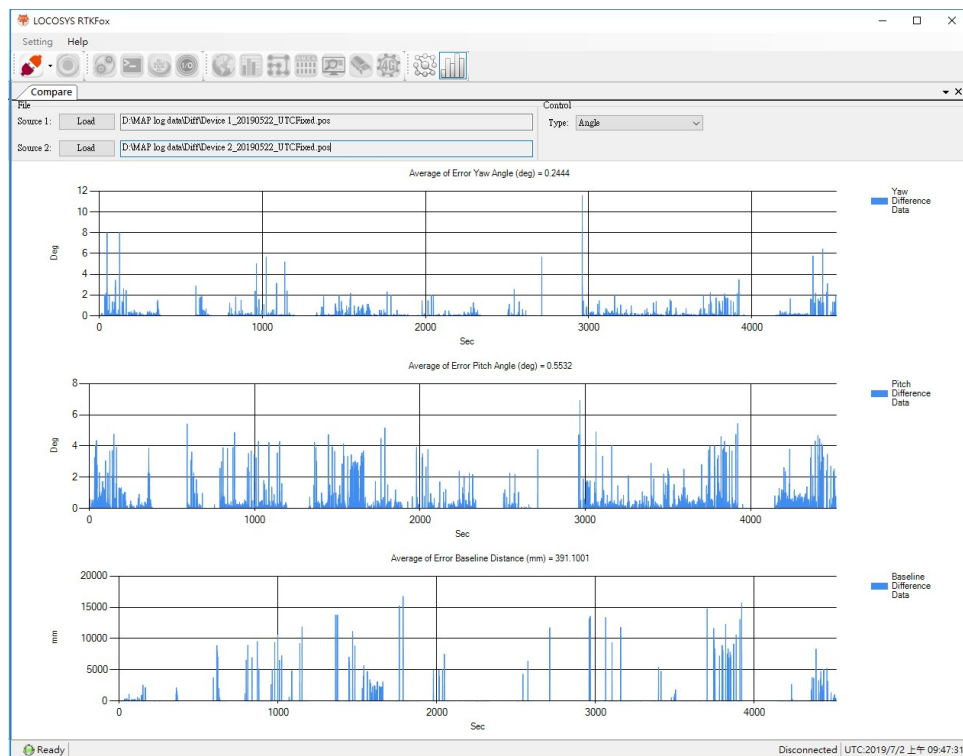


Figure 25: Angle difference plot

3. Contact

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