e-survey

CORS System

NET20 Plus User Guide

V2.0

Shanghai eSurvey GNSS Co., Ltd.

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CAUTION

Ignoring this indication and making an operation error could possibly result in personal injury or property damage.

- Do not perform disassembly which may cause fire, electric shock or burn. Only eSurvey authorized distributors can disassemble device.
- Do not cover the charger which may causes fire.
- Do not use defection power cable, socket or plug which may cause fire, electronic shock.
- Do not use wet charger which may cause fire, electronic shock.
- Do not close the instrument to burning gas or liquid
- Do not put the battery in the fire or high temperature condition which may cause explosion.
- Do not use the battery which is not specified by eSurvey.
- Do not use the power cable which is not specified by eSurvey. Fire could result.
- Do not short circuit of the battery. Fire could result.
- When this product encounters disturbance of severe Electrostatic Discharge, perhaps it will have some degradation of performance like switching on/off automatically and so on.

1 Technical Specification

1.1 Overview

NET20 Plus is a high-precision CORS reference station receiver. LINUX system as its development platform, and it supports for secondary development. It has powerful and stable function, and can be used in many fields.

1.2 Main features

- All aluminum alloy body design, strong and reliable, can cope with all kinds of harsh outdoor environment
- 336 (NET20 Plus-T) / 800 (NET20 Plus-H) channels with Multi-constellation GNSS
- Superior carrier phase observations of less than 1mm accuracy
- Internal battery for more than 12 hours operation.
- 4G LTE and Bluetooth / WLAN datalink support.
- Easy configuration from web UI and remote server.
- NTRIP server/caster support.
- With IP67 protection

1.3 Technical Specifications

1.3.1 Physical

- Weight: 2 KG
- Dimension: 222 mm * 164 mm * 79 mm

1.3.2 Environmental

- Operating temperature: -30℃ - +65℃
- Storage temperature: -40℃ - +80℃
- Humidity: Up to 100% (non-condensing)

1.3.3 Electrical

- Input: 9-28V
- Power: 2.8W

1.3.4 GNSS

- NET20 Plus-H
  - ✓ Channels: 800
  - ✓ Tracking signals:
    - ➢ GPS: L1 C/A, L1P,L1C,L2P, L2C, L5
    - ➢ GLONASS: G1,G2,G3
    - ➢ BeiDou: B1I, B2I, B3I,B1C,B2a,B2b,ACEBOC
    - ➢ Galileo: E1, E5a, E5b, E5 AltBOC, E6
    - ➢ IRNSS: L5
    - ➢ SBAS: L1, L5
    - ➢ QZSS: L1 C/A, L1C, L2C, L5,LEX
    - ➢ L-Band: Atlas H10/H30/Basic

- NET20 Plus -T
  - ✓ Channels: 336
  - ✓ Tracking signals:
    - ➢ GPS: L1 C/A, L2E, L2C, L5
    - ➢ GLONASS: L1 C/A, L2C/A, L3 CDMA
    - ➢ BeiDou: B1, B2, B3
    - ➢ Galileo: E1, E5a, E5b, E5 AltBOC, E6
    - ➢ NAVIC: L5
    - ➢ SBAS: L1CA, L5
    - ➢ QZSS: L1 C/A, L1SAIF, L1C, L2C, LEX
    - ➢ L-Band: OmniSTAR, RTX
- Positioning accuracy

Table 1-1 Positioning accuracy

Positioning mode	Accuracy	
	Horizontal	Vertical
Static	2.5mm + 1ppm	5mm + 1ppm
RTK	8mm + 1ppm	15mm + 1ppm
DGPS	0.25m + 1ppm	0.5mm + 1ppm

- Initialization time: ＜10s
- Initialization reliability: ＞99.9%

1.3.5 Ports

- 3 RS232 serial ports (DB9 and 2 LEMO 5pin).
- 1 RJ45 Ethernet port.
- 1 power port.
- 1 USB port.
- 1 4G LTE antenna port.
- 1 UHF antenna port.(Optional)
- 1 EVENT port.
- 1 1PPS port.
- 1 SIM card slot.
- 1 GNSS antenna port.

1.3.6 Data and Storage

- Output data format: NMEA-0183, binary, RINEX,RTCM2.x, RTCM3.x
- Internal memory: 32G
- External storage: TF Card

2 Hardware Structure

2.1 Receiver Appearance

Figure 2-1

2.1.1 Front Panel

The front panel of NET20 Plus receiver includes four buttons, four LED indicators, and one OLED display.

Figure 2-2

After switching on NET20 Plus receiver, current time information and GPS status are displayed in the main interface. The default language is English, and you can press the left and right arrow keys to obtain the current IP information.

Table 2-1 Function table

Name		Function
	Direction buttons	✓ To move the cursor up or left, short press the button. ✓ To return to the previous menu, long press the button.
		To move the cursor down or right, short press the button.
	Function button	✓ To enter the main menu, long press the button. ✓ To define the direction button (◄► or ▲▼), short press the button.
	Power button	✓ To turn on/off NET20 Plus, long press the button. ✓ To confirm your selection, short press the button.
Power indicator		After switching on NET20 Plus receiver, the power light is on
Differential transmission indicator		When the differential data output, the differential indicator blinks evenly at 1-second interval
Bluetooth indicator		It will be light blue when NET20 Plus is connected via Bluetooth
Static recording indicator		When start static recording, static recording indicator blinks evenly at 1-second interval

2.1.2 Back panel

NET20 Plus receiver provides a variety of communication interfaces to facilitate users in different application scenarios.

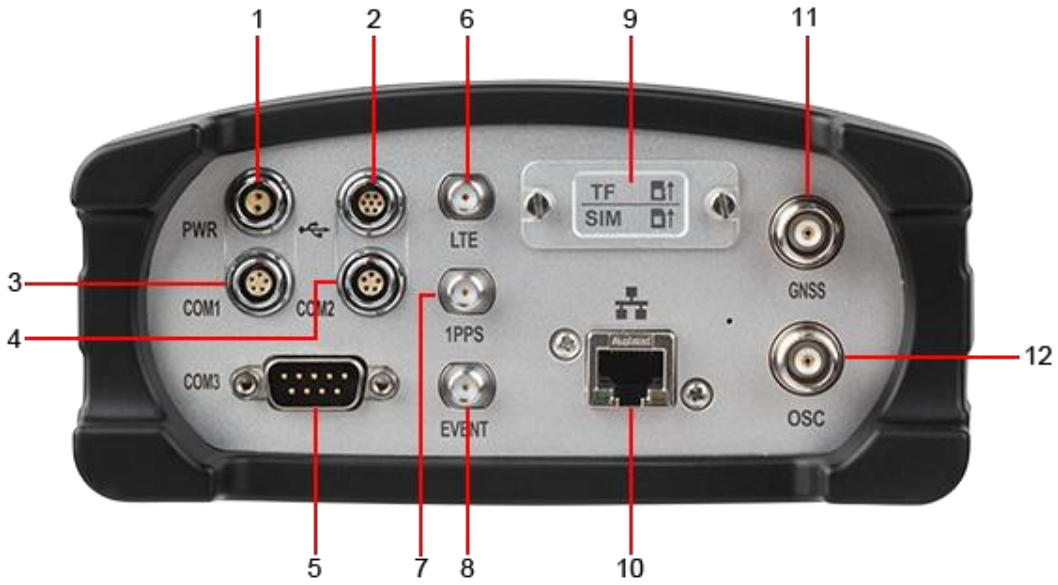
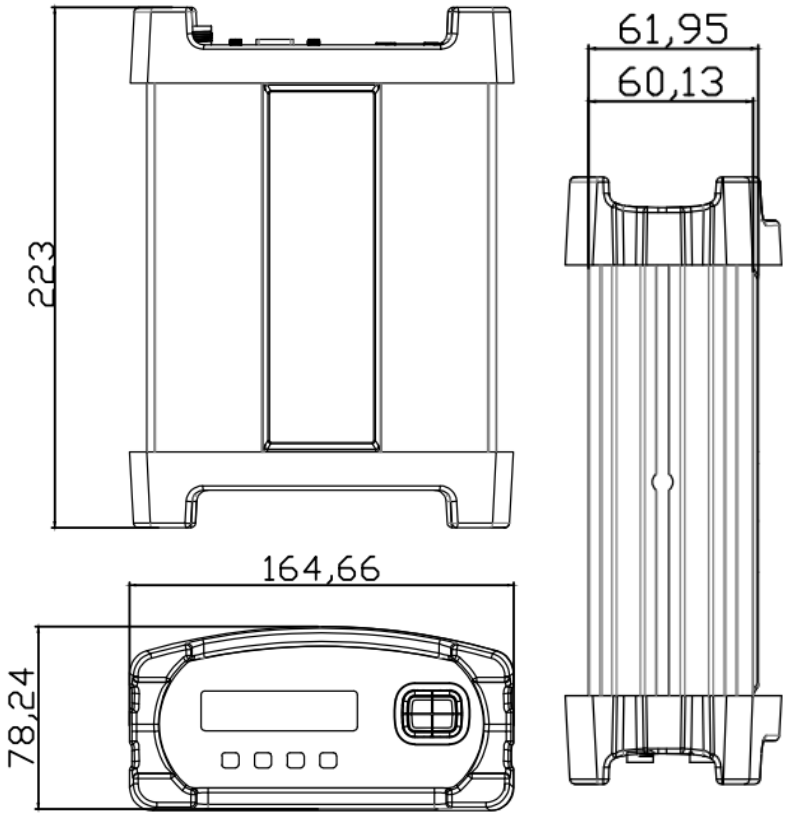


Figure 2-3 Back panel Table 2-2 Interface function table

No.	Name	Function
1	PWR	Receiver power supply interface, input voltage DC 9V-28V.
2	USB	USB interface
3	COM1	RS232 serial port
4	COM2	RS232 serial port (Optional RS485 serial port)
5	COM3	DB9 serial port
6	LTE	GPRS antenna interface
7	1PPS	1 Pulse Per Second output
8	EVENT	EVENT input
9	TF & SIM	TF interface & SIM card (standard size) interface
10	RJ45	Wired Ethernet port
11	GNSS	GNSS External receiver antenna connector
12	OSC	Access to external clock

2.2 Structural drawings / mounting dimensions



(Dimensions in mm)

Figure 2-4

3 WEB UI

There are two ways to login into the WEB interface, which are Ethernet port login and WIFI login. The WEB interface content of the two login modes is same.

1. Ethernet port login: Connect the RJ45 network port with the computer host and enter the IP address in the browser. Enter user name and password in the pop-up dialog box; the default username is *admin* and the default password is *password*.
2. WIFI login: when NET20 Plus WIFI hotspot is enable, the user can log in into the WEB interface by connecting to its WIFI network. The hotspot name is the serial number of the receiver. Enter the IP address: 192.168.10.1, a window will pop up, the default username is *admin* and the default password is *password*.

3.1 Summary

After a successful authentication to the WEB interface of NET20 Plus, the main page contents: Reference information, device version, system version, network parameters, memory status and so on. It is shown as below:

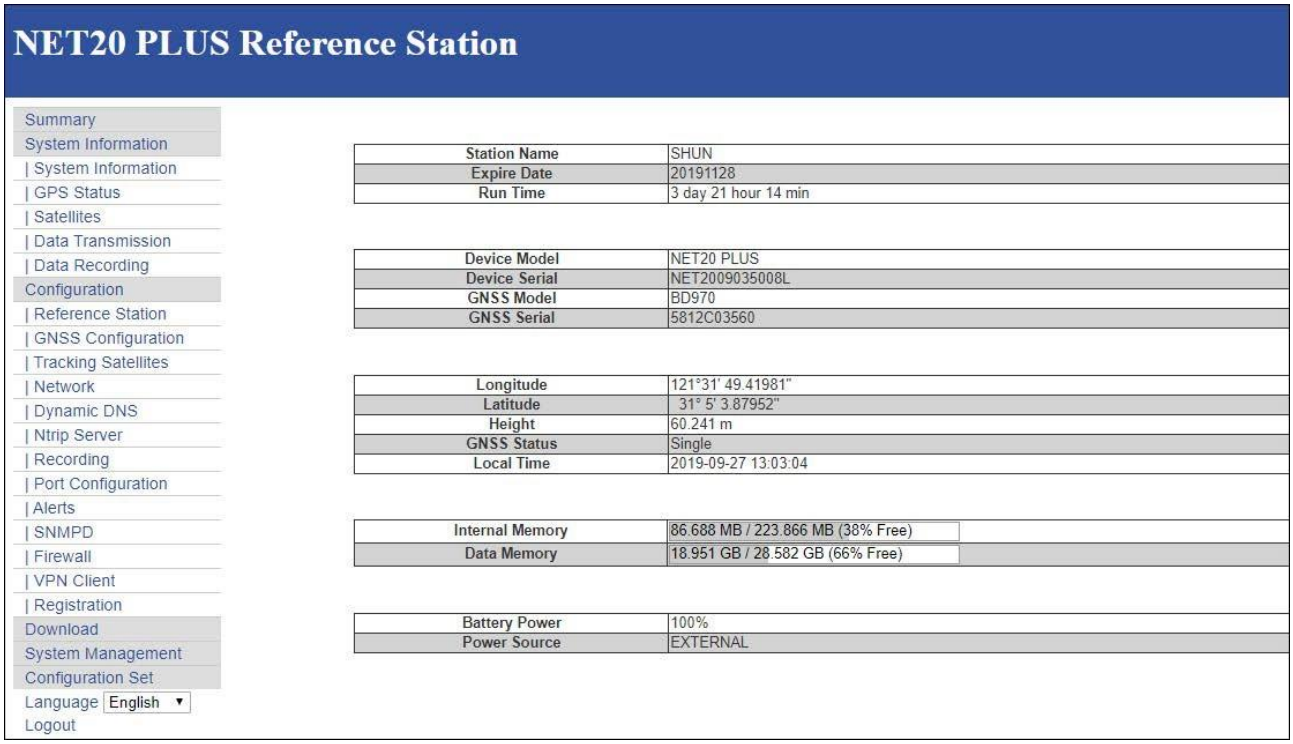


Figure 3-1

Note: The effect of different browsers display may be slightly different, recommend using Google Chrome or IE.

3.2 System Information

3.2.1 System Information

The system information screen will display the station name, device model, device serial number, system version, application version information, built-in OEM board model and network parameter information.

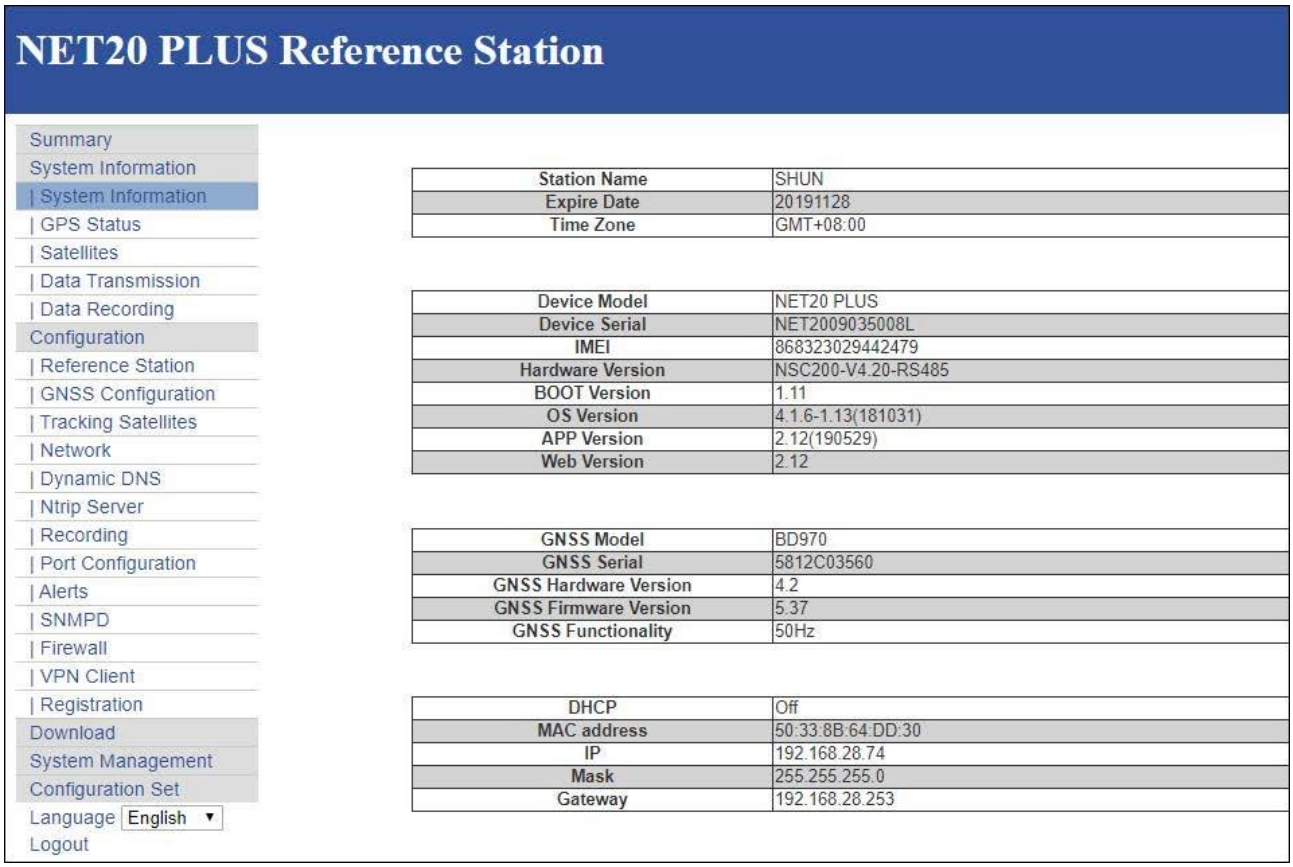


Figure 3-2

3.2.2 GPS Status

The GPS Status page displays the current NET20 Plus positioning, the base station coordinates and antenna type.

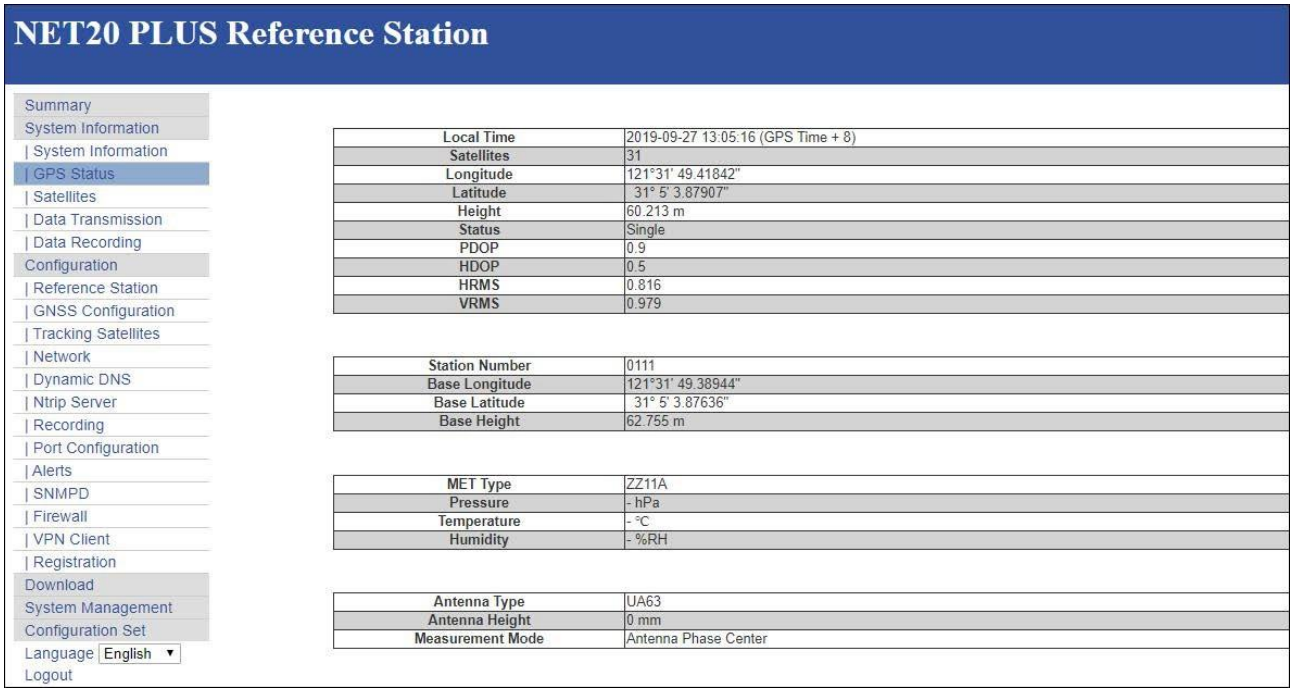


Figure 3-3

3.2.3 Satellites

This page shows the current satellite signal-to-noise ratio, elevation mask angle, azimuth and other information. The information of GPS, BEIDOU, GLONASS and GALILEO are displayed separately.

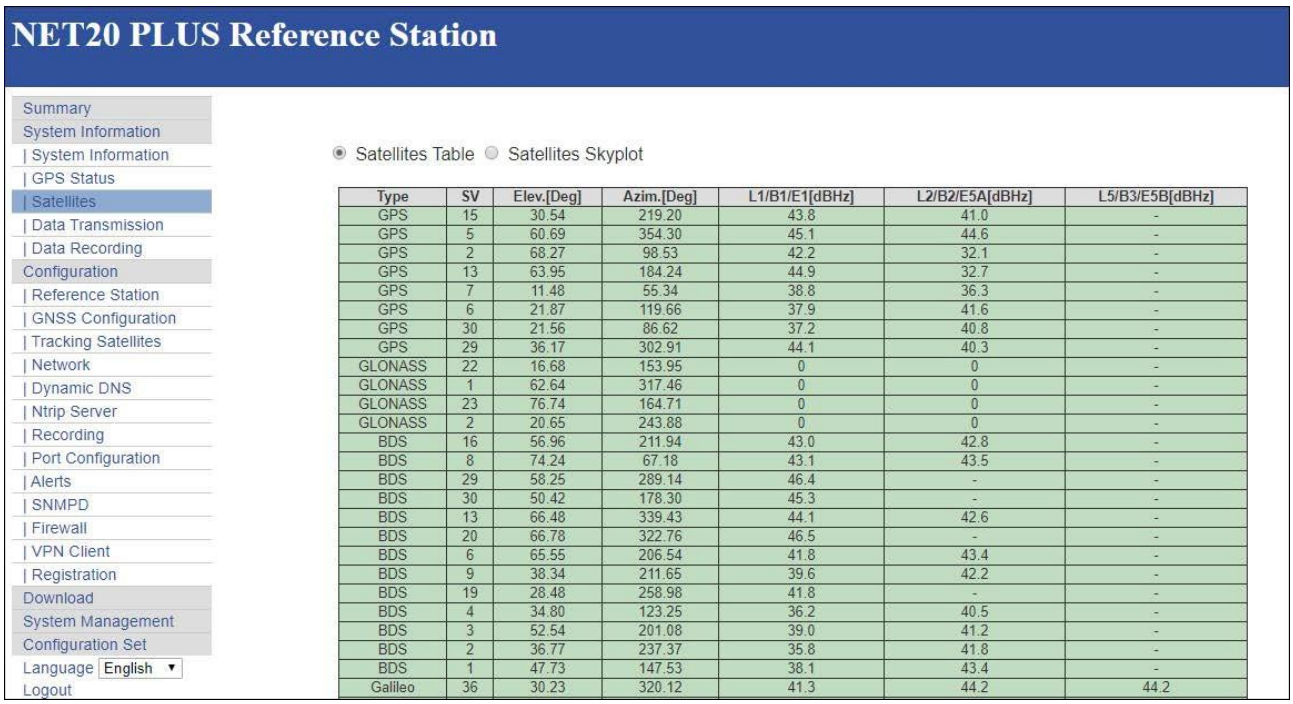


Figure 3-4

3.2.4 Data Transmission

After setting up the data transmission, the user can see the current data transfer status on the page as shown in figure 3-5. Click [Edit] to directly jump to [Ntrip Server].

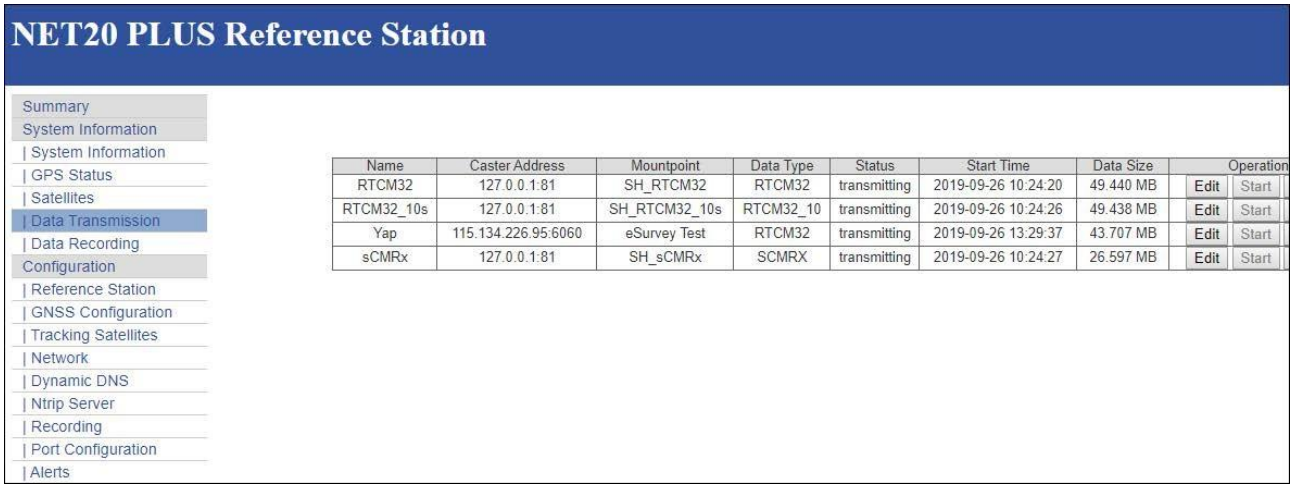


Figure 3-5

3.2.5 Data Recording

In this page, the user can see the specific data recording information as shown in figure 3-6. Click [Edit], the user could modify the parameters like path type, file name, interval, duration time, etc. as shown in figure 3-7.

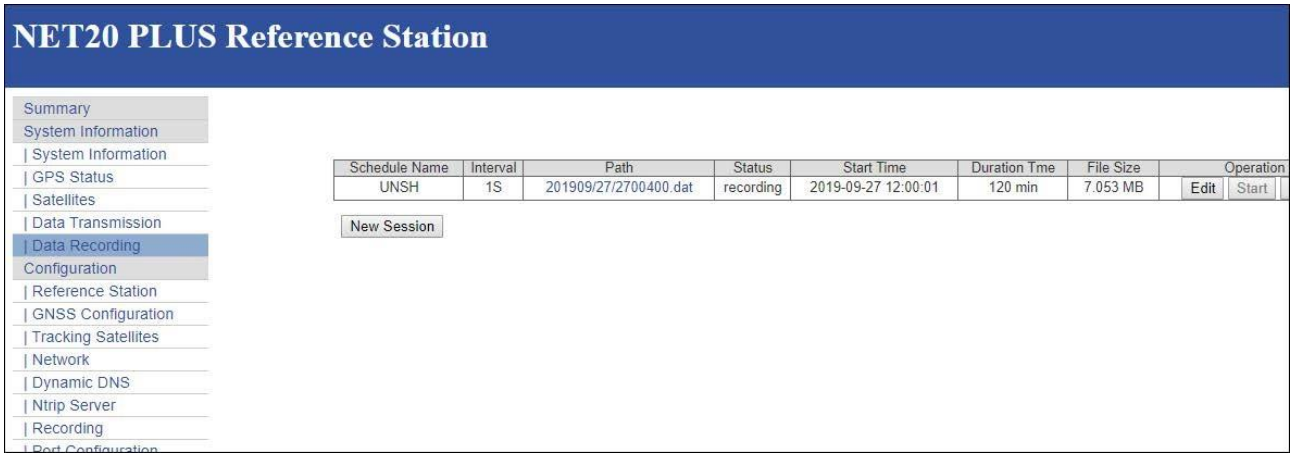


Figure 3-6

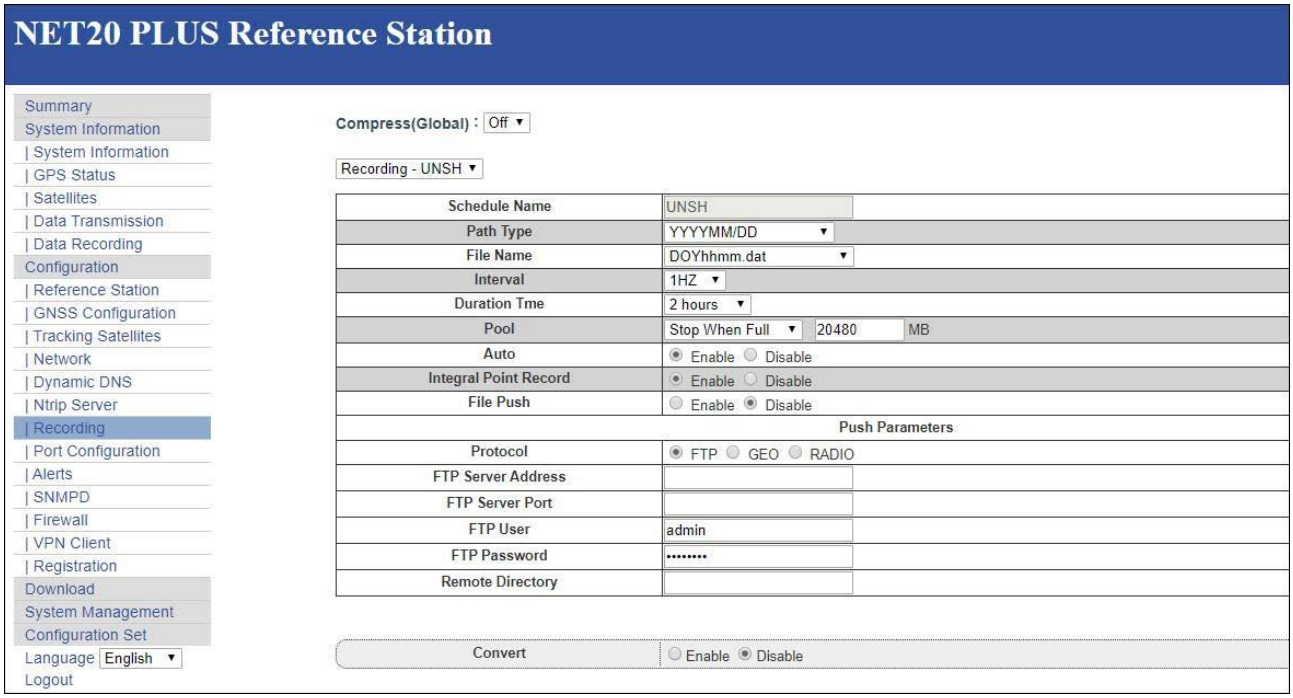


Figure 3-7

3.3 Configuration

3.3.1 Reference Station

On this page the user mainly can set the reference station, antenna, coordinate system and station coordinates, as shown in figure 3-8.

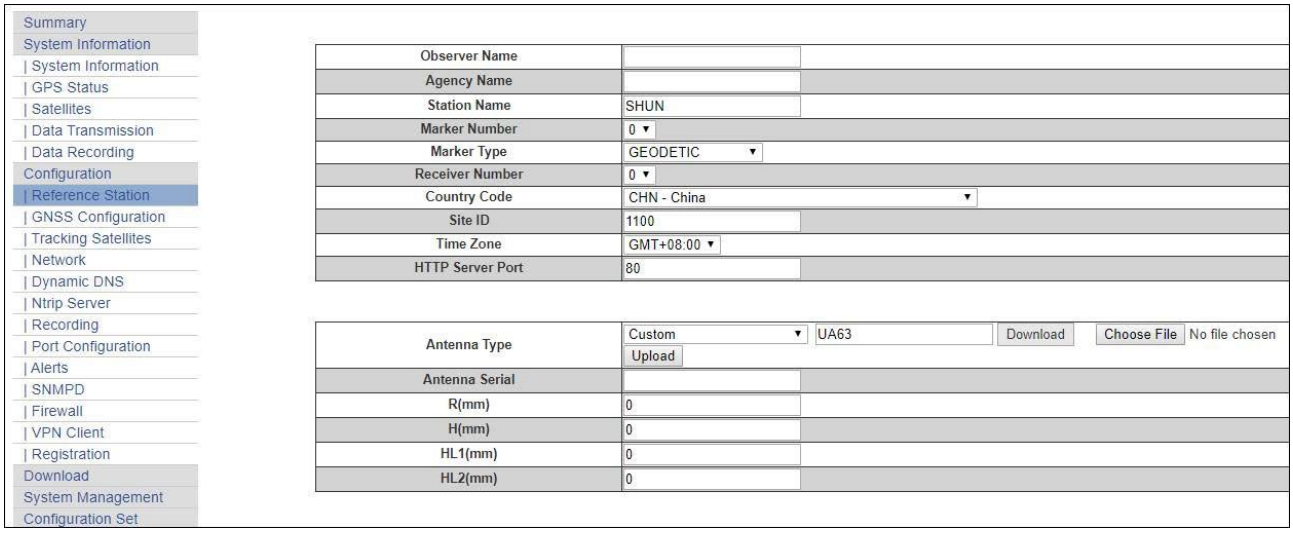


Figure 3-8

Reference station coordinates: If you do not need known coordinates to start the reference station, then click on "Load Current Position" to get the reference station coordinates approximately. However, if you need known coordinates, please input them according to the appropriate format.

The web access port is 80. After setting mapping in the router device, then you can access the NET20 Plus by Internet, enter the ip address and the port, e.g. 113.109.179.180:80

3.3.2 GNSS configuration

This menu is mainly for the satellite systems and the cutoff angle settings, as shown in figure 3-10.

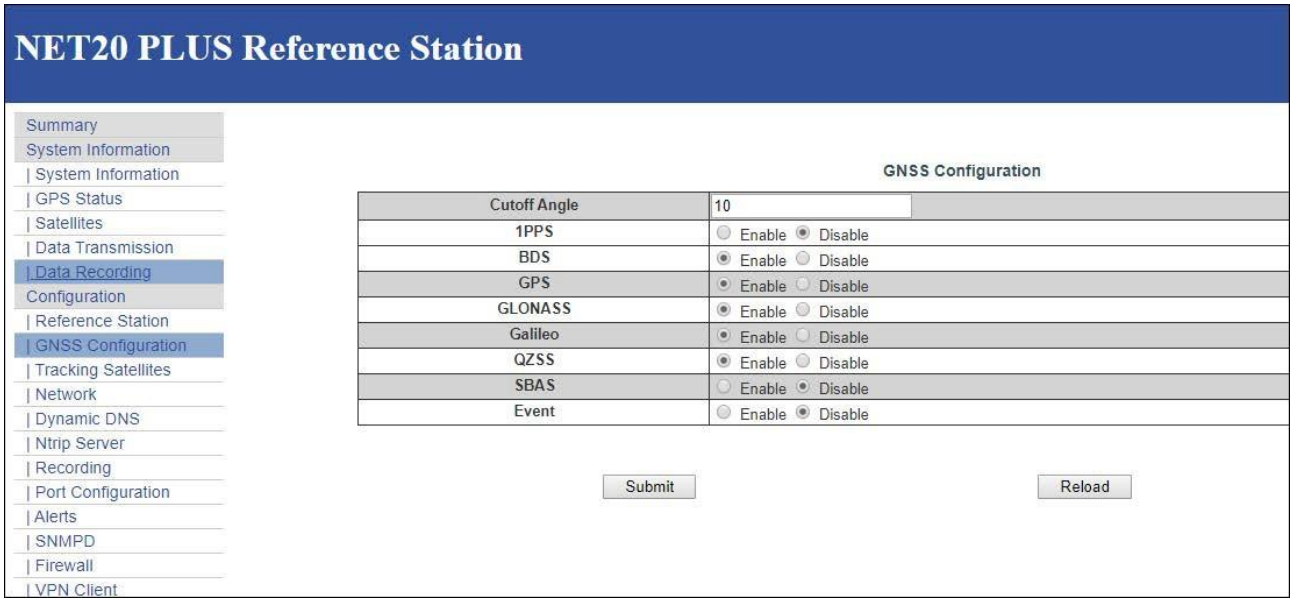


Figure 3-10

3.3.3 Tracking satellites

In this page, the user can select the satellites they want to track, as shown in figure 3-11.

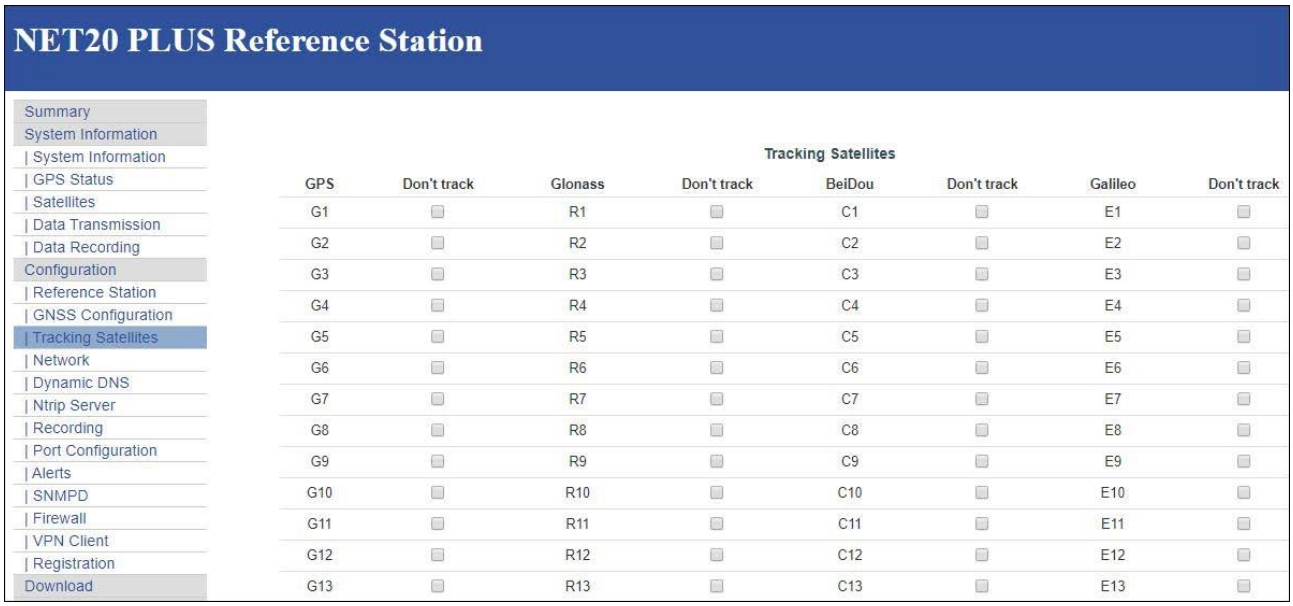


Figure 3-11

3.3.4 Network

From Network option, the user can set the device network and FTP server settings as shown in figure 3-12.

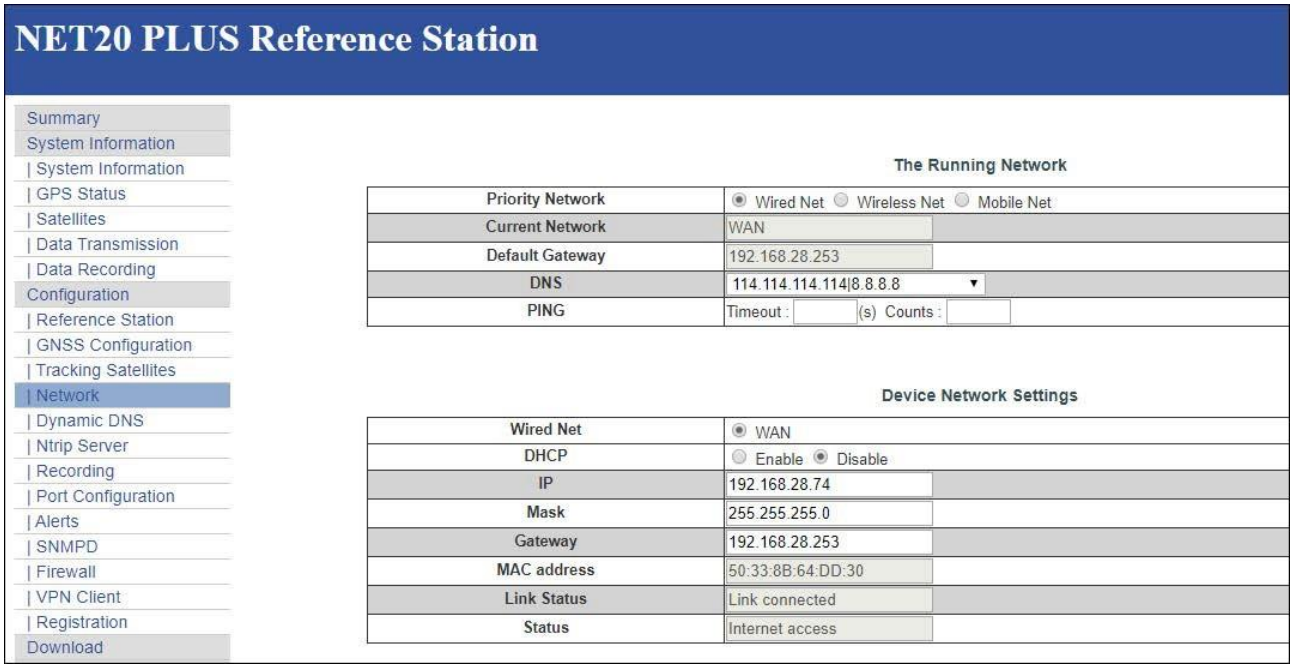


Figure 3-12

DHCP: If the mode DHCP is enable, the NET20 Plus receiver will auto get an IP address, otherwise it uses the static IP.

WIFI hotspot: If WIFI hotspot option is enable, then you can use other devices equipped with WIFI to search and connect to the NET20 Plus receiver. The hotspot is named by the serial number of the receiver. You don't need to input a password. Access NET20 Plus by IP address 192.168.10.1. The hotspot only play the role of control and can't access to internet.

WIFI Client: When selecting WIFI client, in SSID box input a name of WIFI hotspot can be used for the search, and in the Password box input the password for connecting to WIFI hotspot, then submit. After connecting to the connection WIFI, the password can be seen in system terminal or panel interface (the displayed place will be different in different versions).

Mobile network: enable Mobile Net to use the SIM card into the NET20 Plus, it supports 4G network. Users can set the user name and password if required.

FTP download: You can set the parameters of the FTP server. If anonymous access is turned on, it does not require a user name and password to connect to the NET20 Plus. If anonymous access is turned off, enter the user name and password.

After using the FTP tool to connect to the NET20 Plus, the data appears as follows:

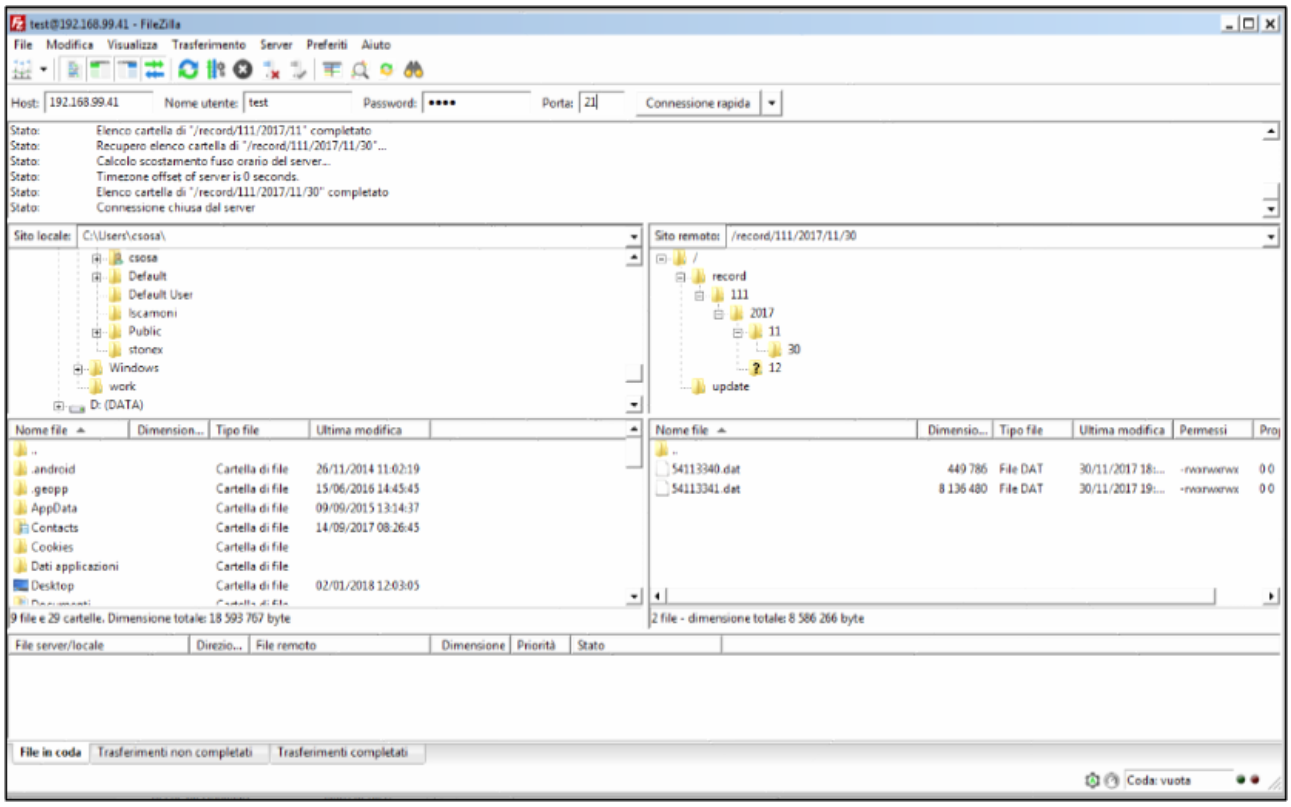


Figure 3-13

3.3.5 Ntrip Server

In this page, the user can set the NTRIP connection parameters of the reference station:

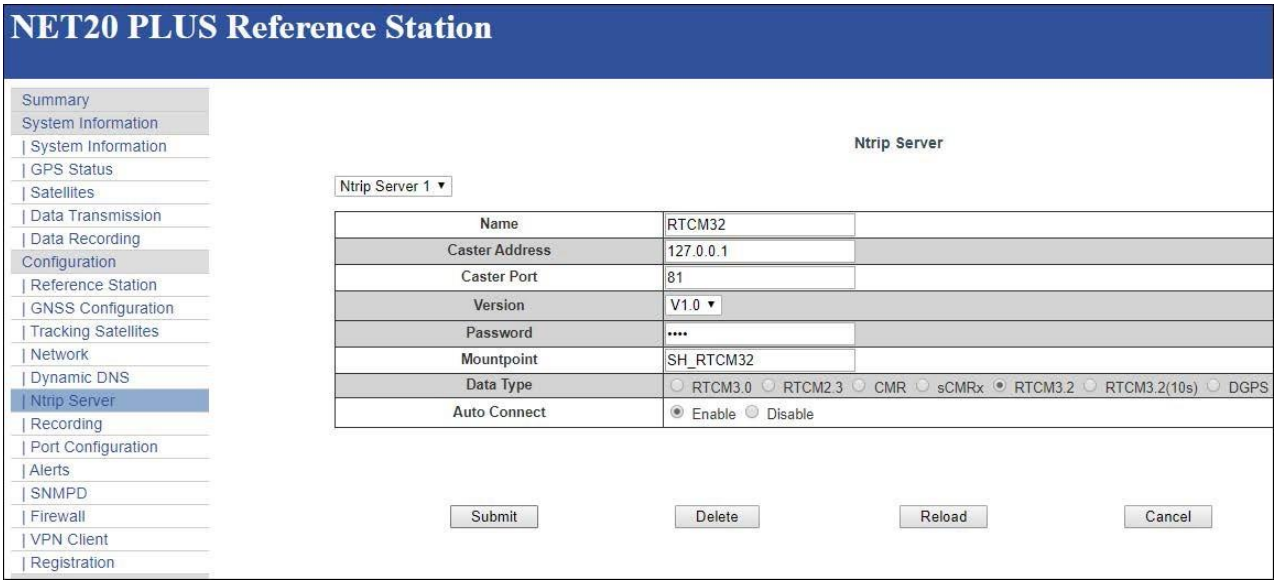


Figure 3-14

Remarks:

a. The password in this page must match the password of the server NTRIP if it is required. If the password is not required by the server you can enter any value.
b. When the [Auto Connect] option is chosen, after the network is disconnected, the data transmission will be automatically connected. If the option is disable will be necessary

to start the connection manually from the Data Transmission menu by clicking on start.

c. Before setting the parameters, check in the page Reference Station if the coordinates are correct. Wrong coordinates cannot allow to transmit data to the server.

Click "Submit" to start the data transmission. In the Data Transmission page you can see the data transfer status displayed as "transmitting". The differential transmission indicator in the front panel of the receiver starts to blink.

3.3.6 Recording

In this page, the user can set the data recording parameters:

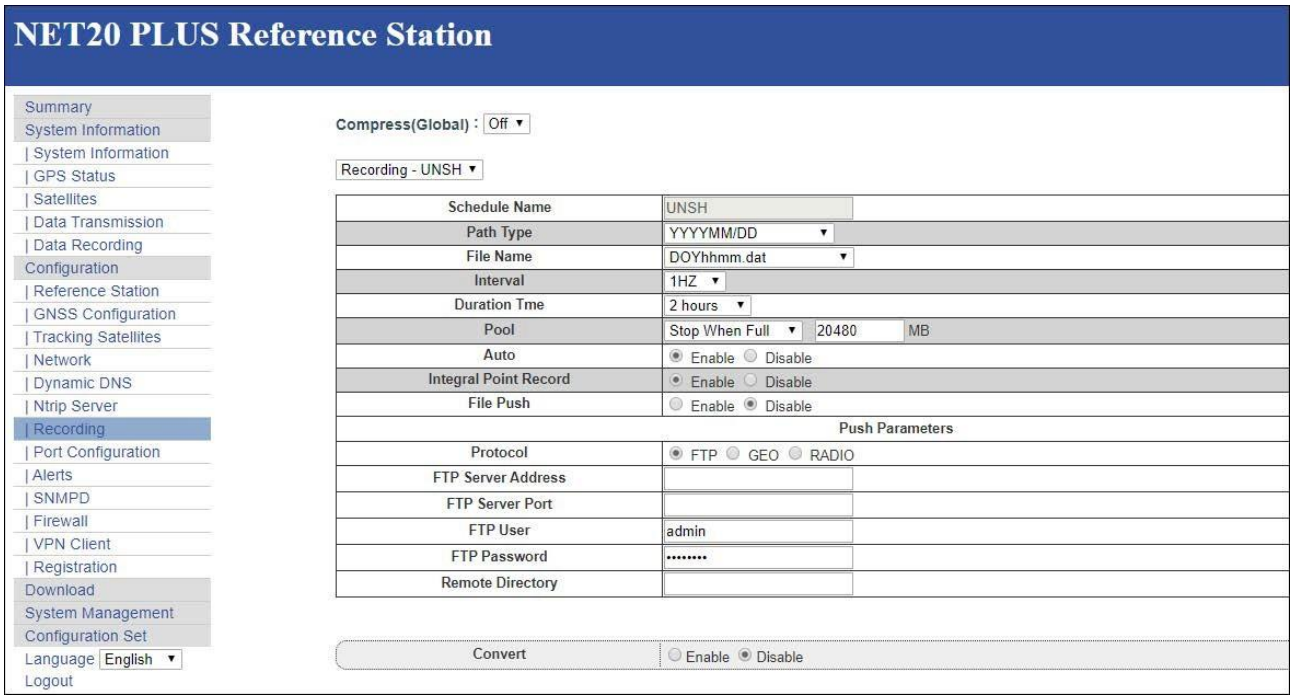


Figure 3-15

File name: The static date can be recorded in 4 ways.

Table 3-1 The rules of Static record file name

File name	Annotation
YYYYMMDDhhmmss.dat	Date and when, minute and second
YYYYMMDDhhmm.dat	Date and when, minute
DOYhhmm.dat	Day of year, hour and minute
YYYYDOY?.dat	Year, day of year, period of time
ssssdddf.yyt	Station name, day of year, period of time
Rinex302.dat	Named by rinex3.02 standard
Custom	Manually input the file name by the way of name + .dat

Duration time: After setting the record length, the file will be recorded depending on the setting time, and it will be stopped at the end of the record length. If you enable the auto record option, the NET20 Plus will start a new file automatically.

FTP push: First you should set the FTP server parameters. When it records the data in the internal memory, NET20 Plus will also send the data to FTP server automatically.

3.3.7 Port Configuration

Port setting includes Bluetooth port, COM1 port and Socket settings. They can support the function as follow:

- CMD(INPUT/OUTPUT): NET20 Plus commands
- NMEA(OUTPUT): Output Specified NMEA sentences
- RTK(INPUT): Differential Input
- RTK(OUTPUT): Differential Output
- RAW(OUTPUT): Raw data output
- BINEX (OUTPUT) Output Specified BINEX sentences COM1 can be used also to establish the communication with OEM.

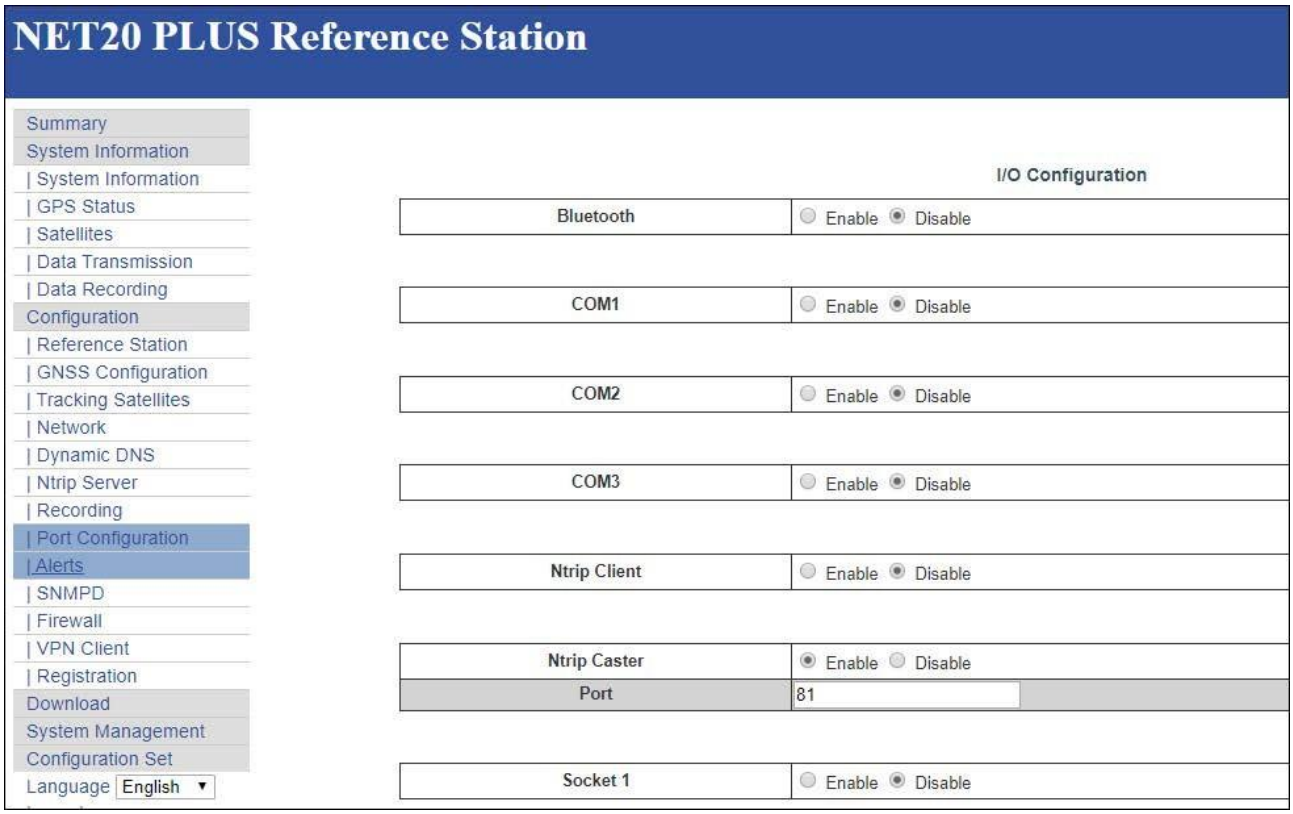


Figure 3-16

3.3.7.1 Bluetooth

After opening the Bluetooth and choosing the output/input type, then click “submit”, you can use Bluetooth driver to scan the NET20 Plus. The Bluetooth of NET20 Plus is named by driver serial. Now we use the PDA to access the NET20 Plus by Bluetooth. The page of PDA will be shown as follow:

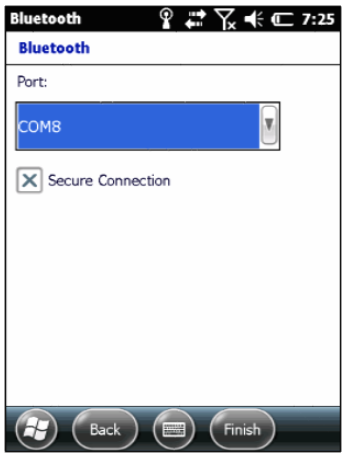


Figure 3-17

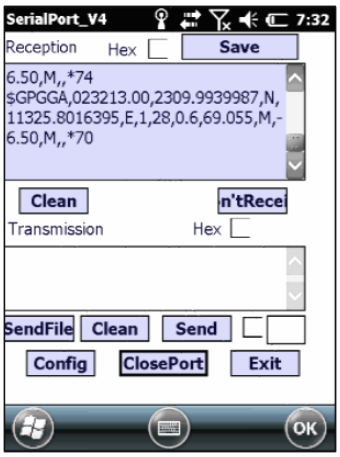


Figure 3-18

Figure 3-19

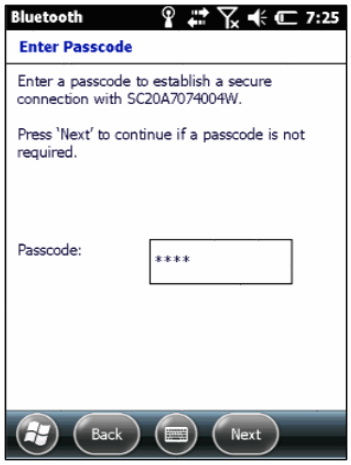


Figure 3-20

3.3.7.2 COM1

Note:

1. When data transmission on com1 is enabled, use the standard seven-pin cable to connect seven-pin interface in the back panel.
2. The baud rate of com1 must be consistent with the baud of receiving device. Figure 3-21 and Figure 3-22 are the process of the COM1 port output RTCM3.2.

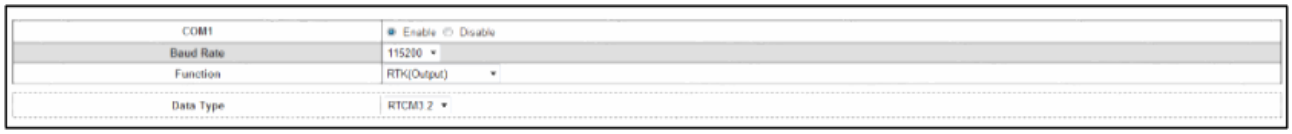


Figure 3-21

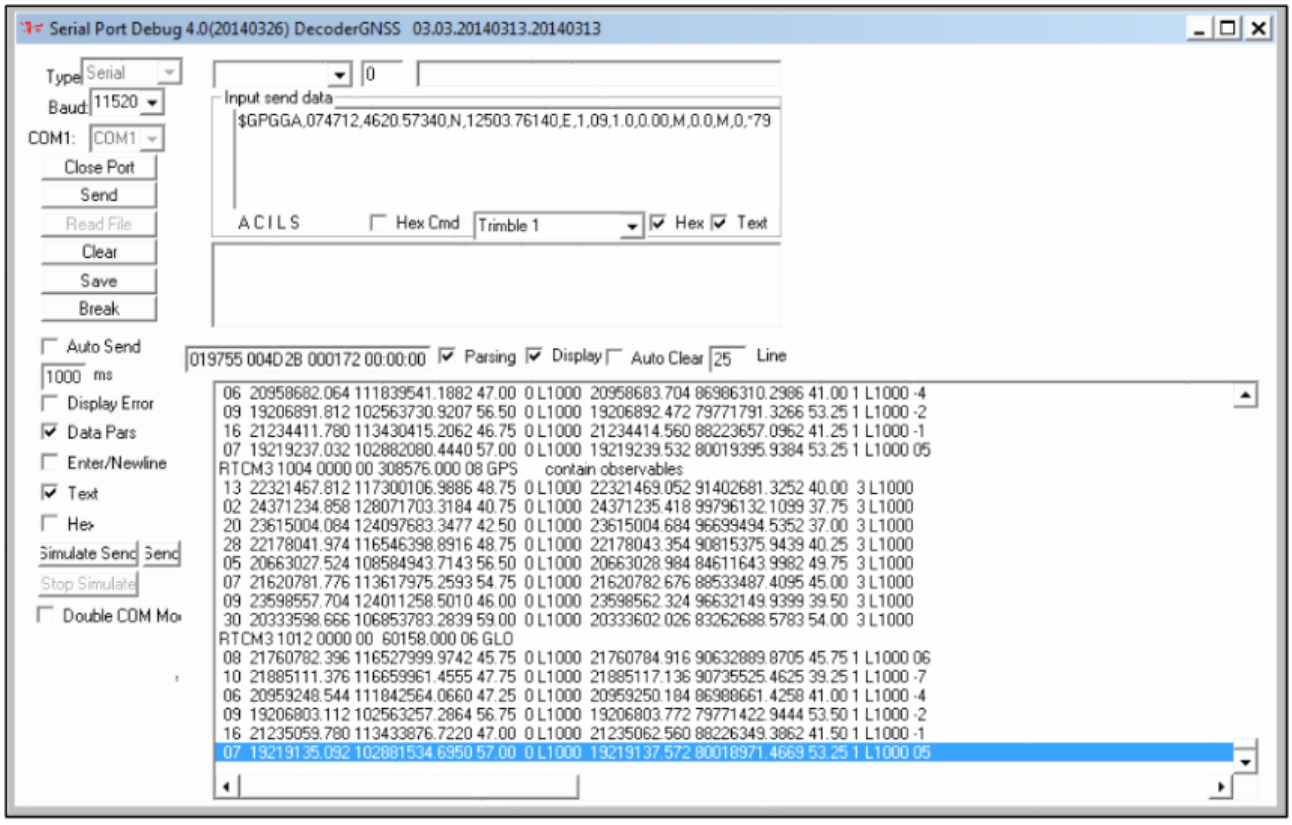


Figure 3-22

3.3.7.3 SOCKET

Figure 3-25 and Figure 3-26 are the process of output RAW data via socket.

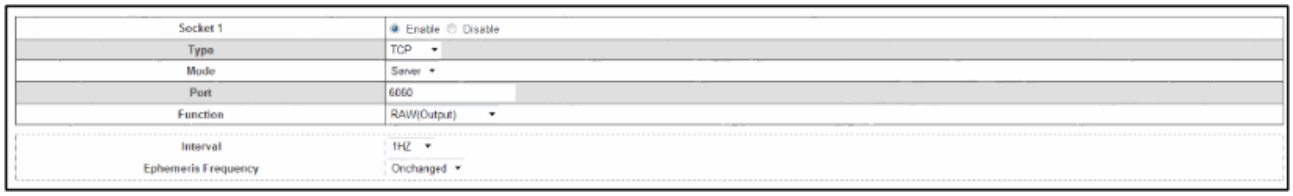


Figure 3-25

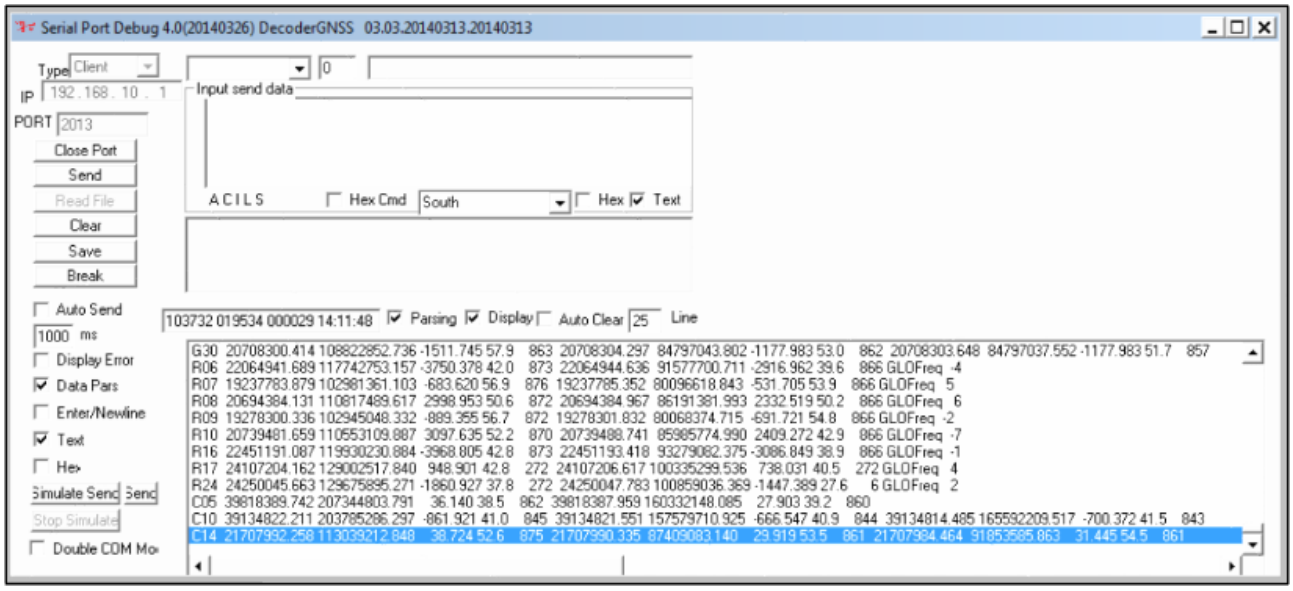


Figure 3-26

3.3.8 Alerts

When NET20 Plus system or program exception occurs, NET20 Plus will use e-mail or cell phone text messages to notify manager in time for maintenance.

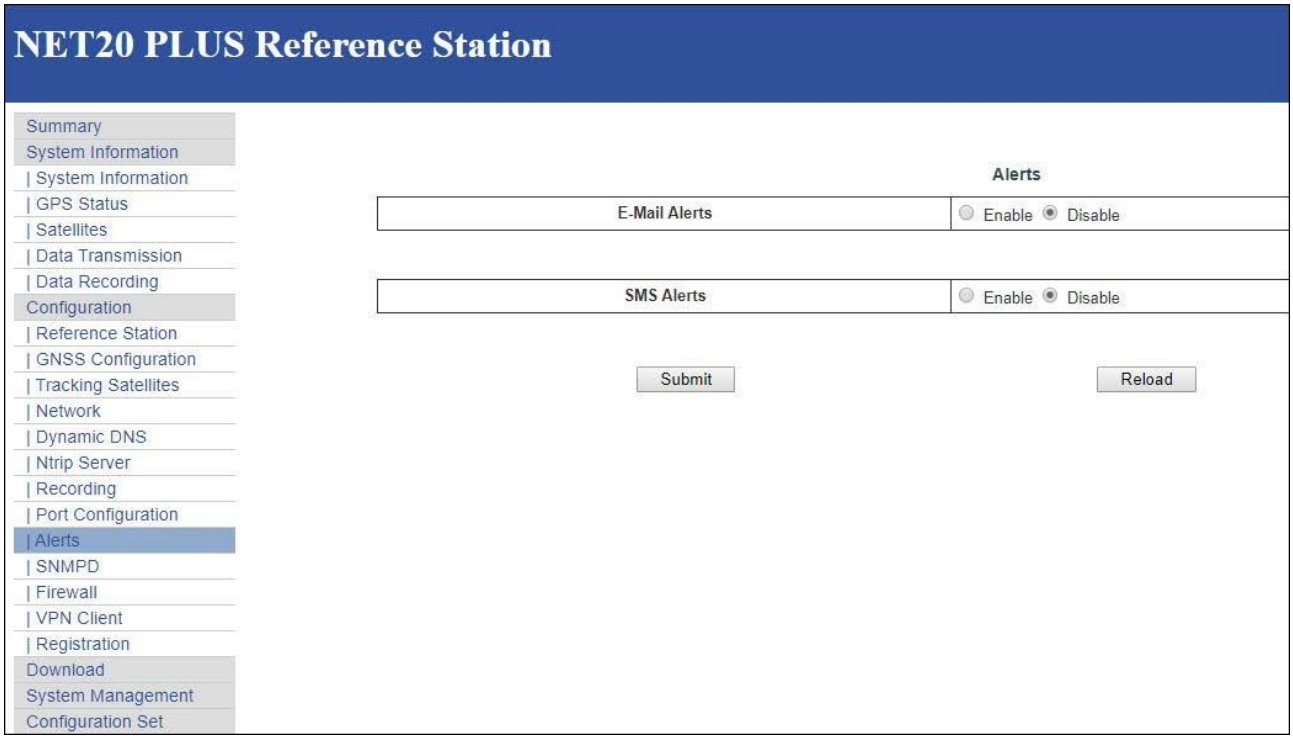


Figure 3-27

3.3.9 Registration

When NET20 Plus receiver expires, you need to register it. Enter the registration code and click Submit, then instrument registration will be completed.

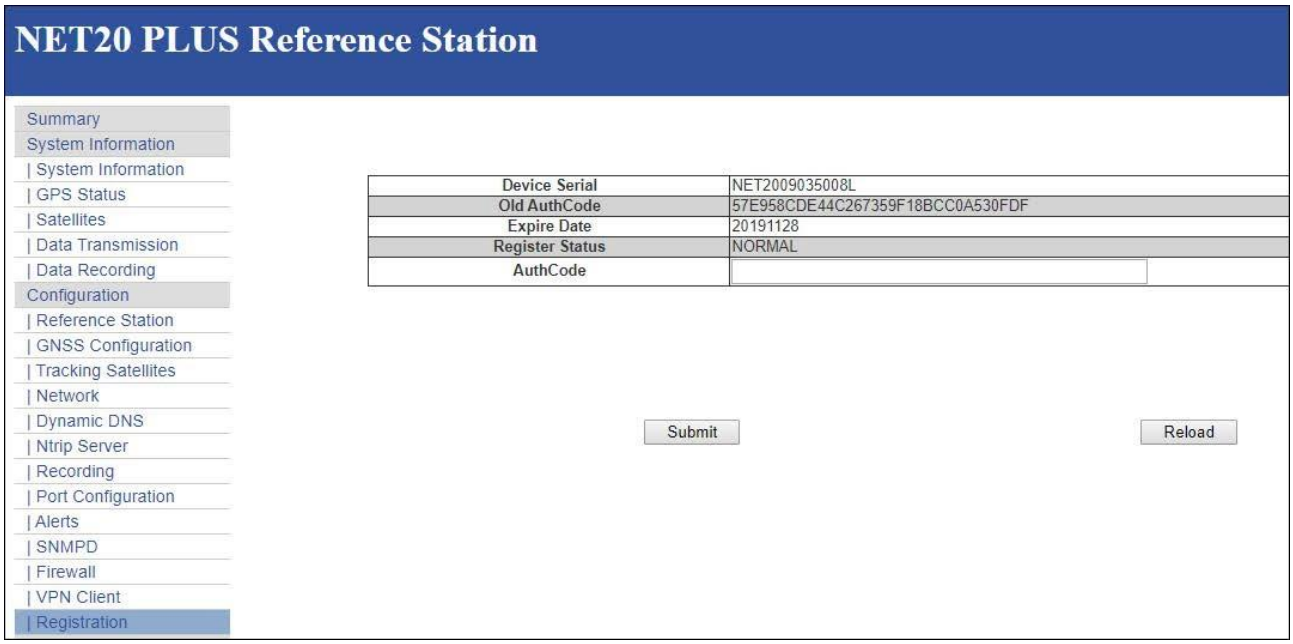


Figure 3-28

3.4 Download

Download data stored in the NET20 Plus receiver through the network connection. Alternatively, you can connect to NET20 Plus receiver for copying data via USB cable.

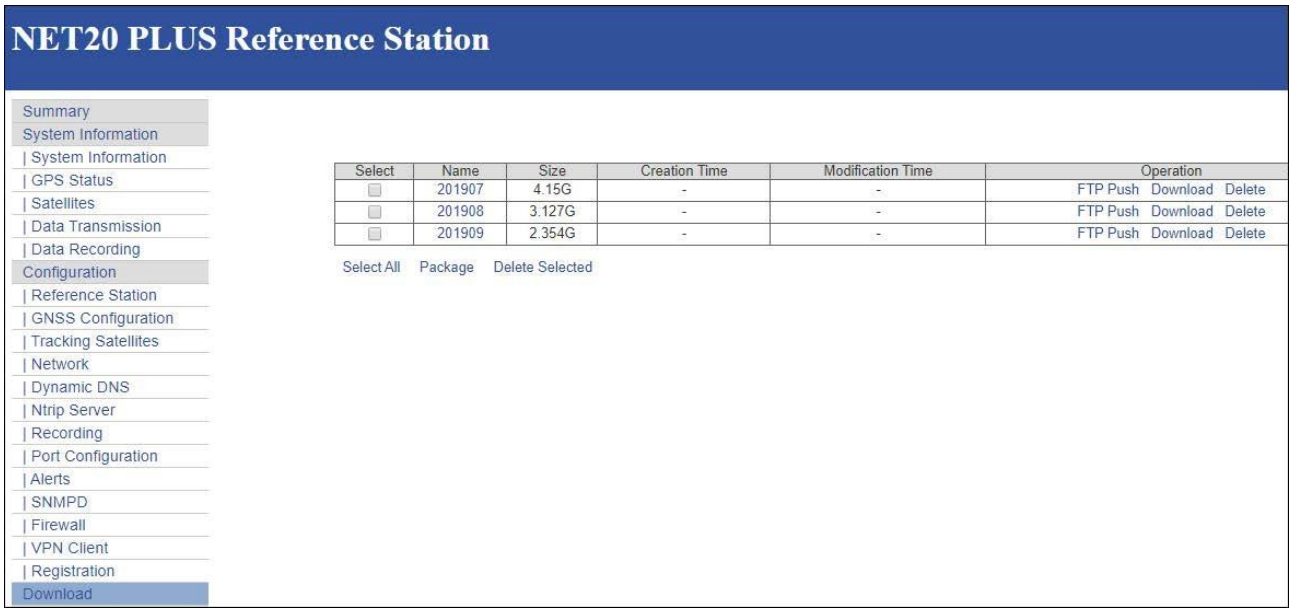


Figure 3-29

3.5 System Management

The users can upgrade the firmware, view logs, enable or disable the login, and format internal disk.

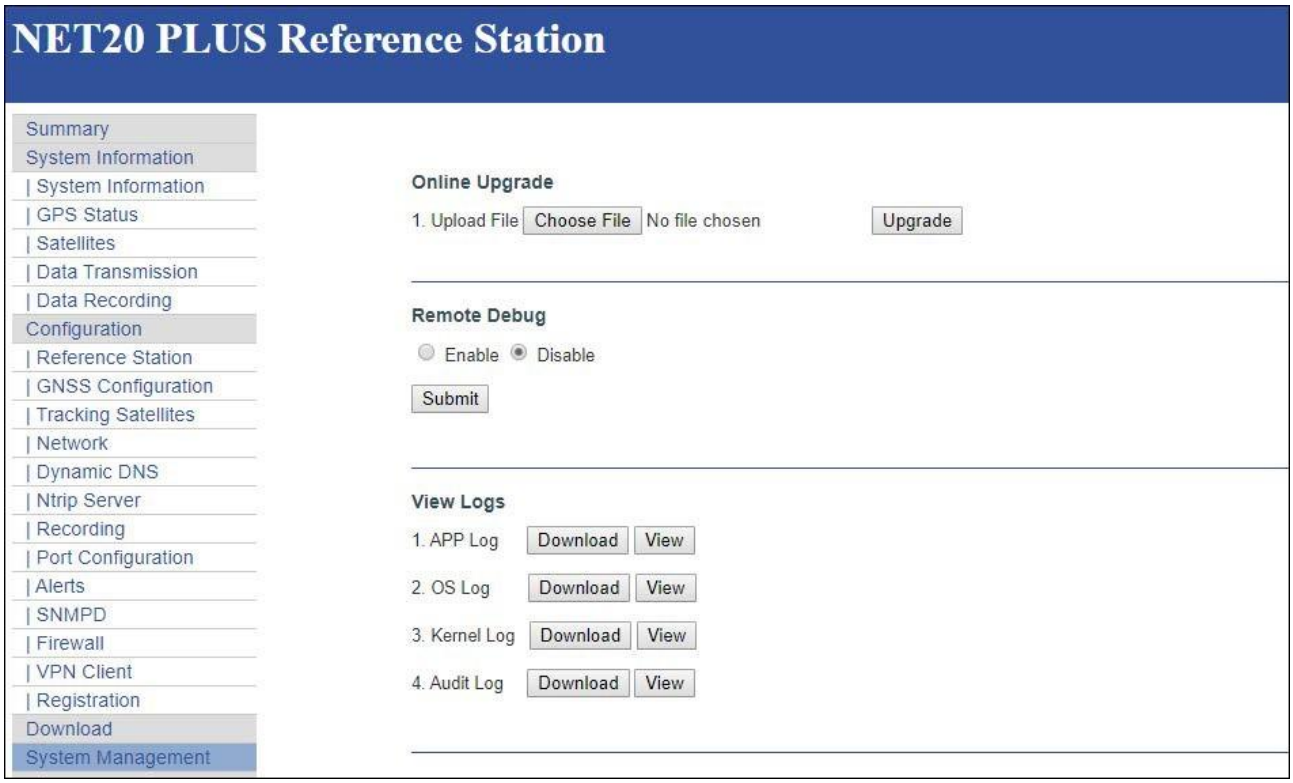


Figure 3-30

Note:

1. Log view part are abnormal operation of storage systems and procedures of a record;
2. When setting the security login, the admin account is the administrator account and the guest account can only view the information.

3.6 Help

Here provide operating guidelines for NET20 Plus introductory guiding.

4 Operation

4.1 Power on

Press the red power button on the panel, and until the initialization is completed, you can see the main menu display on OLED screen as shown in figure 4-1.

Figure 4-1

Press left or right soft key to view the current IP information of Ethernet, WIFI, GPRS and VPN.

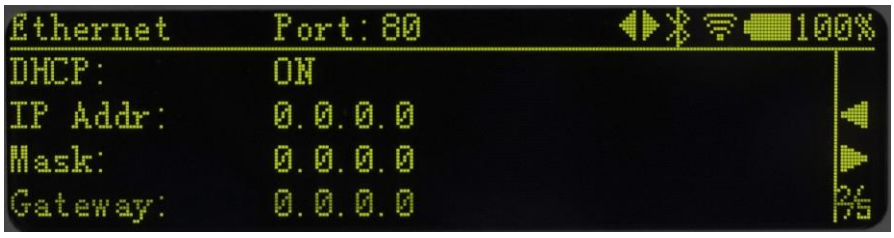


Figure 4-2

Figure 4-3

Figure 4-4

Figure 4-5

4.2 Quick setting

You can quickly set the receiver by the panel key. It includes six parts: device info, start record, transmit data, network settings, antenna settings and other settings.

Start Record: In the main interface, lightly press F2 key you can see the options shown in figure 4-6.

Figure 4-6

Lightly press power key to confirm, then enter into “Start Record”, you can see the page shown in figure 4-7.

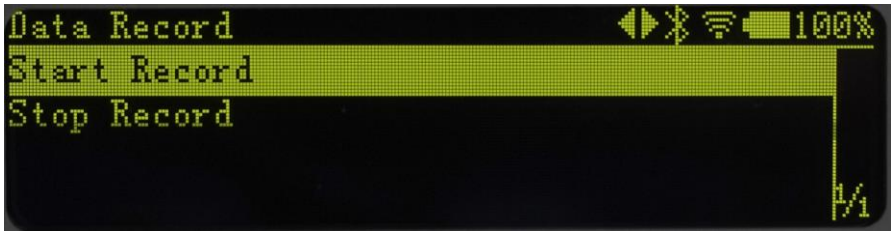


Figure 4-7

When the static is stopped, the cursor stops at the row of "Start Record"

Transmit Data:

When you transmit data by the panel, first you need to set the transmission parameters in the WEB UI page, then you can operate the panel. There are not transmission parameters settings on the setup panel.

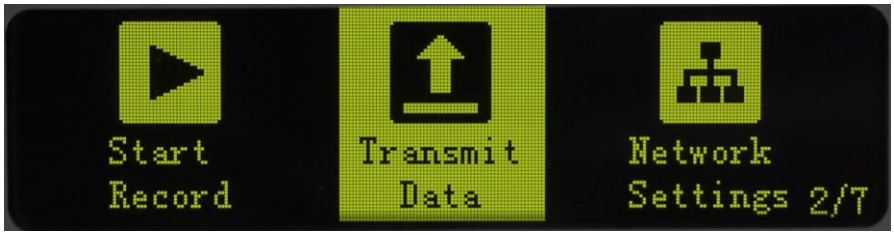


Figure 4-8

Figure 4-9

You can quickly set differential type, start and stop transmit data.

Network Settings:

NET20 Plus network settings can be set to automatically obtain the IP or choose a static IP mode.

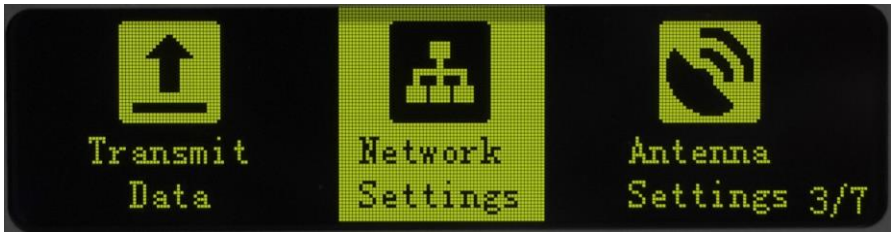


Figure 4-10

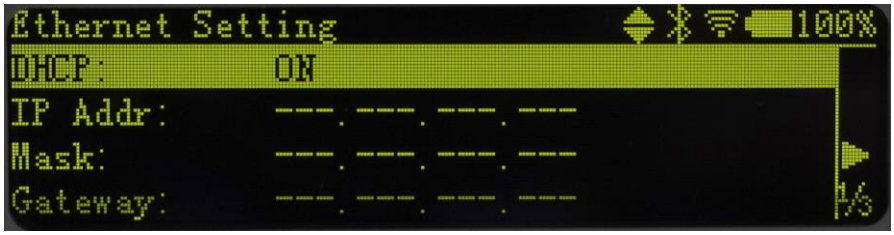


Figure 4-11

Figure 4-12

Figure 4-13

Antenna settings:

It shows the antenna parameters, including station name, antenna type and antenna height, set in the Web UI.

Figure 4-14

Figure 4-15

Other settings:

Other settings could set the OLED language display, OLED brightness, OLED turned off interval.

Figure 4-16

Figure 4-17

Device information:

In this page, you can get the information of device model, device serial, hardware version and BOOT version.

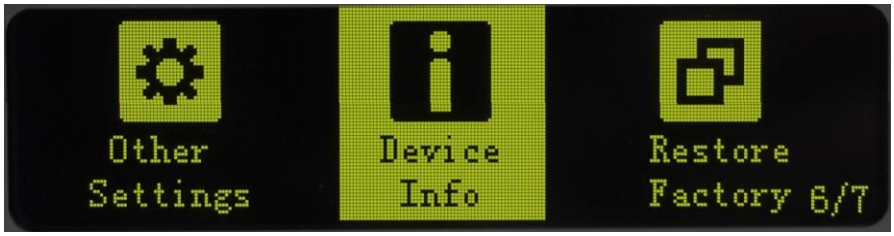


Figure 4-18

Figure 4-19

Figure 4-20

Restore factory

In this page, you can restore to factory settings.

Figure 4-21

Figure 4-22

5 Accessories

Table 5-1 Accessories of NET20 Plus

Net20 Plus					
NO.	Items	Quantity	Model	Description	Picture
1	Carton Box	1	---	---	
2	Net20 Plus	1	---	---	
3	Charger	1	PSAA30R-150	2-pin Lemo power cable Input: 100~240V~0.8A 50-60Hz Output: 15v, 2A	
4	5-Pin Cable	1	TC-183	For serial data output	
5	7-Pin Cable	1	TC.GK428.ABL	For internal storage access only	
6	Serial Cable	1	---	Female to female, cross serial cable	
7	4G Antenna	1	---	External 4G network antenna	
Optional					
1	Antenna	1	UA91	Choke Ring Antenna, Multi-frequency	
2	Antenna	1	CM004	Choke Ring Antenna, Multi-frequency	
3	Antenna	1	UA35	GNSS Antenna	
4	Cable	1	TNC-TNC	5m, 15m, 30m	---
5	Software	1	NTRIPCaster	Single base station	---
6	Software	1	GNSS.Net	VRS network	---

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Shanghai eSurvey GNSS Co., Ltd.

Address: Building 4, No.651 Wanfang Rd, Pujiang Town, Minhang District, Shanghai, China

E-mail: Sales: info@esurvey-gnss.com Support: support@esurvey-gnss.com

Hotline: +86 400-999-8088

Website: https://esurvey-gnss.com/