# NETWORK TIME SERVER

## GF-NTP-PRO

# USER GUIDE

# Contents

# 1 Introduction

The GF-NTP-PRO is a stratum 1 NTP server with an integrated GNSS receiver. It provides NTP, 1PPS and TOD timing outputs. The NTP server uses GNSS (Global Navigation Satellite Systems) signals from GPS, GLONASS, Beidou, and QZSS as the primary time source for synchronization.

The time server can use its built-in, TCXO (temperature compensated crystal oscillator) as autonomous time base for providing several hours of accurate holdover in case that GNSS signals are not available.

The time server has 6 ethernet ports isolated physically, the ports have no communication with each other to ensure network security.

The NTP server is in a 19-inch 1U chassis with rack mount ears for installation.

# 2 Key Features

- 6000 transaction/second for every port
- NTP accuracy 0.5-2ms
- 6 ethernet ports with full physical isolation to ensure network security
- TCXO (temperature compensated crystal oscillator)
- Web UI monitoring and management
- Multi-GNSS receiver (GPS, GLONASS, Beidou and QZSS)
- NTP v2 (RFC 1119)，NTP v3 (RFC 1305)，NTP v4 (RFC5905)
- SNTP v3 (RFC 1769), SNTP v4 (RFC 2030)
- NTP md5 authentication
- NTP Unicast and Broadcast mode
- 1PPS output
- 1 RS-232 serial port with ToD output (NMEA ZDA or RMC)
- GPSd is supported via ethernet port 1 (TCP protocol, port 4001)
- RTC
- OLED display
- Power consumption <10W

# 3 Mechanical Size

With rack mount ears: 482 W × 44.5 H × 250 D (mm)

# 4 Physical Specifications

## 4.1 Front panel

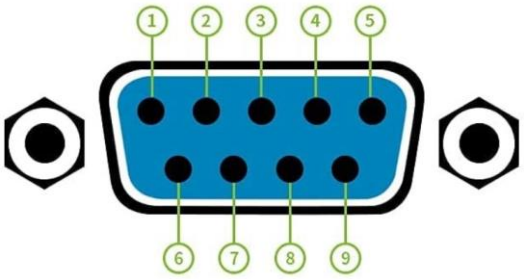

| Item | Label | Comment |
|---|---|---|
| **1** | Power | Power indication |
| **2** | GNSS | GNSS position valid indication<br>ON - Valid, OFF - Invalid |
| **3** | NTP | NTP service state<br>ON - Active, OFF - Stop |
| **4** | Alarm | NTP service stop alarm |
| **5** | OLED display | The default time zone is UTC + 8<br>GPS：GPS number BeiDou：<br>BeiDou number GLONASS：<br>GLONASS number Antenna：<br>OK - Antenna is ok<br>SHORT - Antenna is short<br>OPEN - Antenna is open |

# 4.2 Back panel


| Item | Label | Comment |
|---|---|---|
| **1** | ANTENNA | GNSS input, TNC connector |
| **2** | COM1 | 1PPS and TOD output<br>1PPS with LVTTL 3.3V, TOD with RS232 level |
| **3** | COM2 | 1PPS and TOD output<br>1PPS with LVTTL 3.3V, TOD with RS232 level |
| **4** | ETH1 | RJ45 connector, 10BASE-T/100BASE-TX<br>Default IP: 192.168.0.101 |
| **5** | ETH 2 | RJ45 connector, 10BASE-T/100BASE-TX<br>Default IP: 192.168.0.102 |
| **6** | ETH 3 | RJ45 connector, 10BASE-T/100BASE-TX<br>Default IP: 192.168.0.103 |
| **7** | ETH 4 | RJ45 connector, 10BASE-T/100BASE-TX<br>Default IP: 192.168.0.104 |
| **8** | ETH 5 | RJ45 connector, 10BASE-T/100BASE-TX<br>Default IP: 192.168.0.105 |
| **9** | ETH 6 | RJ45 connector, 10BASE-T/100BASE-TX<br>Default IP: 192.168.0.106 |
| **10** | ON/OFF | On-off switch |
| **11** | 100-240V AC | AC power input |
| **12** | ⏚ | Ground |

## 4.3 1PPS+TOD

1PPS and TOD output via the male DB9 connector, below table is the pin assignment.




| Pin | Name | Comment | Type | Levels |
|---|---|---|---|---|
| **1** | 1PPS | 1PPS output | Output | 3.0-3.6V |
| **2** | RXD | Data Receive | Input | RS-232 |
| **3** | TXD | Data Transmit | Output | RS-232 |
| **4** | - | - | - | - |
| **5** | GND | Ground | - | - |
| **6** | - | - | - | - |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |

# 5 GNSS Antenna Placement

The antenna receives the GNSS satellite signals and passes them to the receiver. The GNSS signals are spread spectrum signals in the 1575 MHz to 1610 MHz range and do not penetrate conductive or opaque surfaces. Therefore, **the antenna must be located outdoors with a clear view of the sky.**

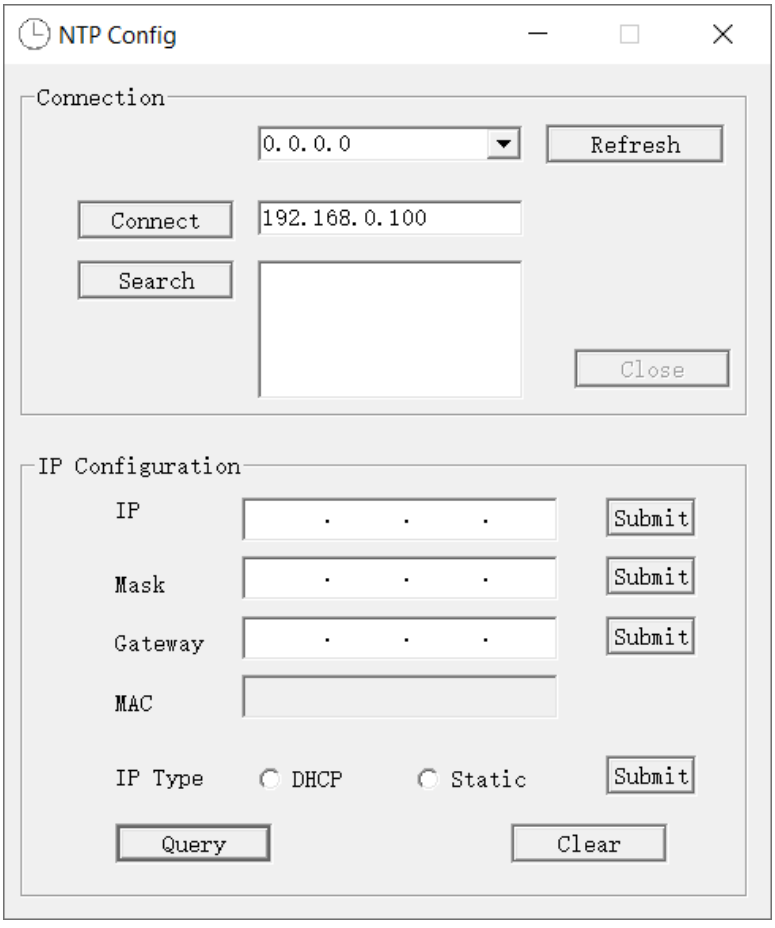
GNSS signals can only be received on a direct line of sight between antenna and satellite. The antenna should see as much as possible of the total sky. Seen from the northern hemisphere of the earth, more satellites will be visible in the southern direction rather than in northern direction. The antenna should therefore have open view to the southern sky. If there are obstacles at the installation site, the antenna should be placed south of the obstacles, preferably, in order not to block sky-view to the south.

If the installation site is in the southern hemisphere of the earth, then the statements above are reversed – more satellites will be visible in the northern direction. Near to the equator, it doesn't matter.

# 6 IP Configuration with Software

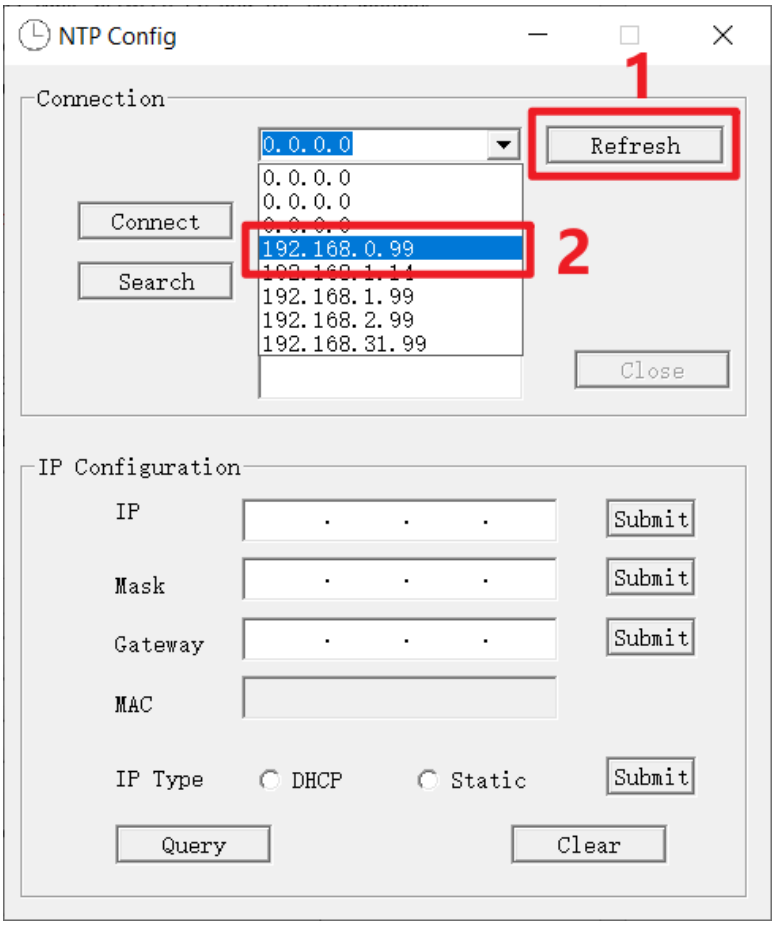
Prepare a PC and plug the ethernet cable between PC and the corresponding ethernet port which to be configured. For example, if you want to configure the IP address of ethernet port 2, then should connect the cable to it. The IP configuration software looks like below picture.

**The default subnet is 192.168.0.X for this NTP server, so the IP address of the PC must been set to the same subnet before the configuration.**



1. Click the Refresh button

2. Select the IP which connected to NTP server port from the list box

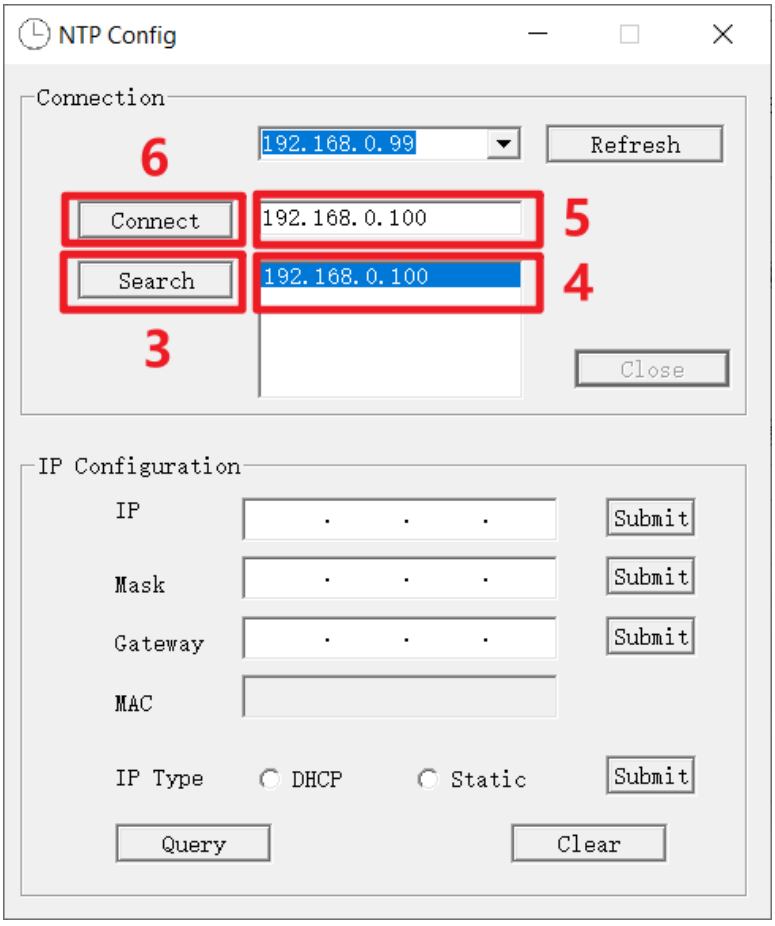


3. Click the search button

4. The IP address will be scanned on the edit box

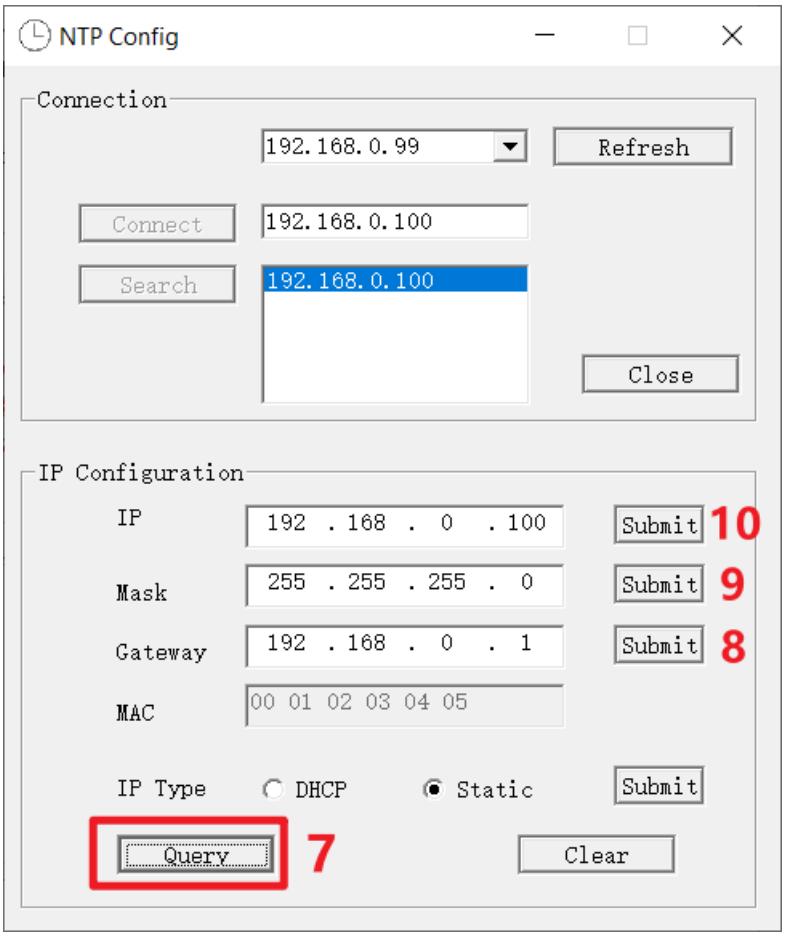
5. Input the scanned the IP address on the edit box right of connect button

6. Click the connect button



7. Click the Query button

8. Edit the value on the IP edit box, and then click the set button to modify the IP. The suggested modification order is Gateway - > Mask - > IP address




Note: If you want to check the configuration then click the Close button and reconnect the port from step 1 and query the IP parameters.

# 7 Web Interface

## 7.1 Main Page

Web access is permitted only through Ethernet port 1. Launch a web browser and open a connection to the NTP Server by entering the URL that specifies the IP address, http://192.168.0.101 with username admin, password admin by default. Internet Explorer is not supported, Edge and Chrome are recommended.

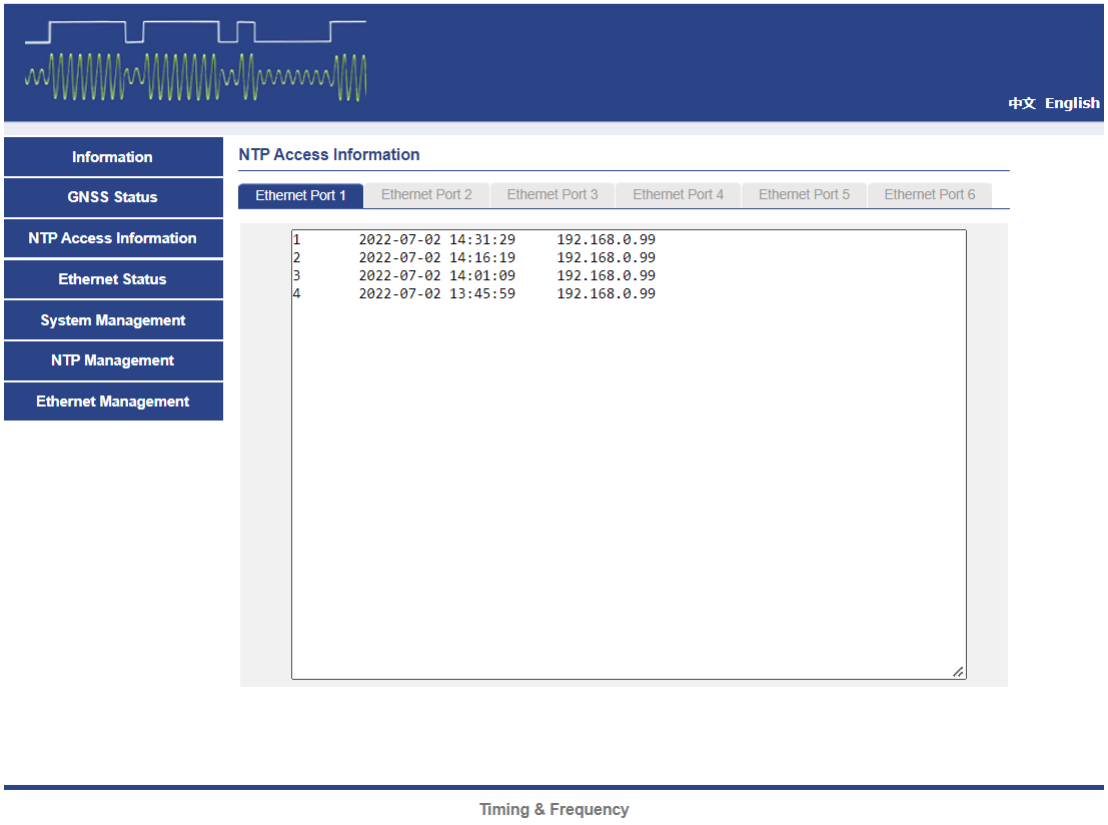
Entering the IP address will launch the main page.

# 7.2 GNSS Status

The antenna connection, constellation, satellites tracking, and position information can be viewed on the GNSS status page.

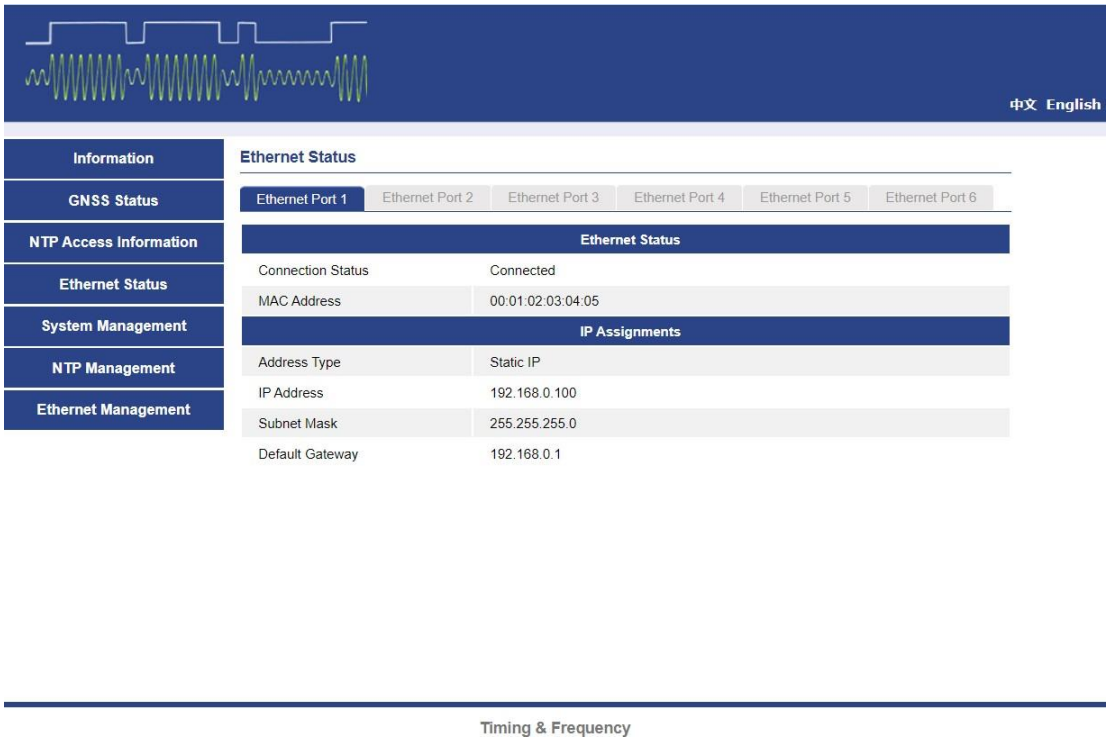
# 7.3 NTP Access Information

The NTP clients access information can be viewed on this page.



# 7.4 Ethernet Status

The connection status and IP address configuration can be viewed on this page.



# 7.5 System Management

## 7.5.1 System

**Timing Service:**

By default, this NTP server will allow the timing service for a period of 24 hours from loss of the GNSS. The NTP service can be enabled when GNSS available only.

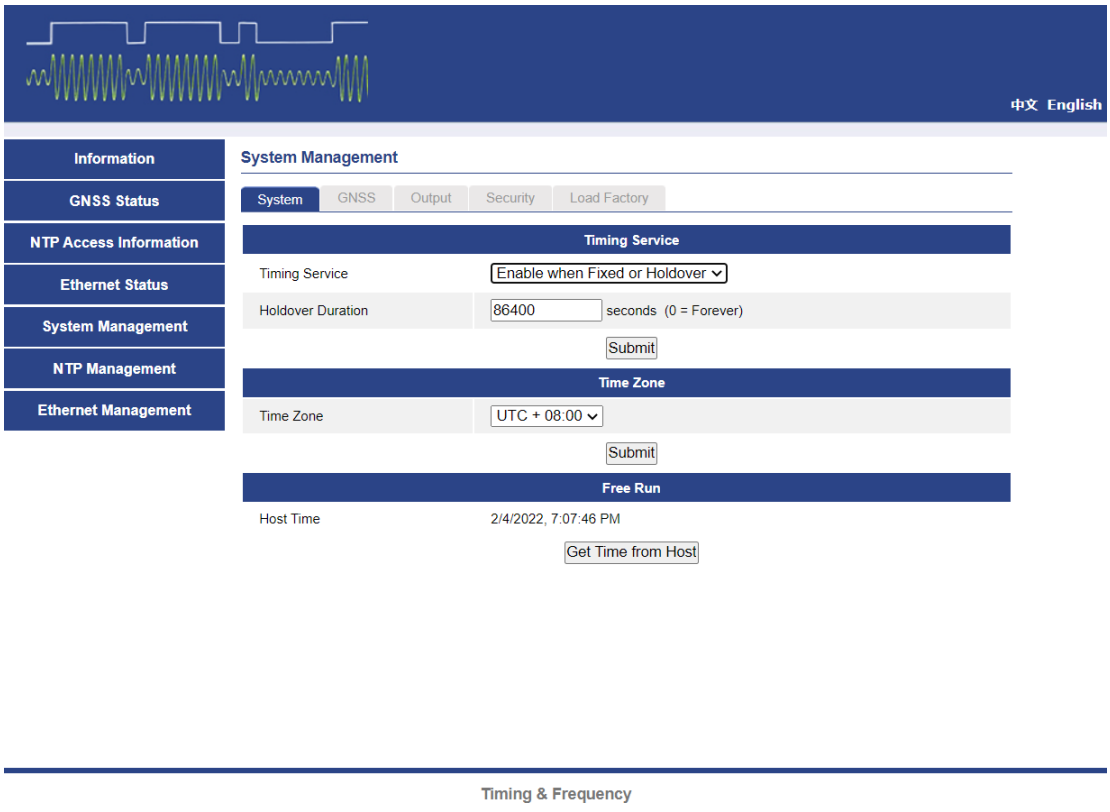
The holdover duration is adjustable in ‘seconds’ increments. To always allow time dissemination and always consider the internal clock source “valid”, set the duration to a value of zero “0”

**Time Zone:**

The time zone is UTC+8 by default.

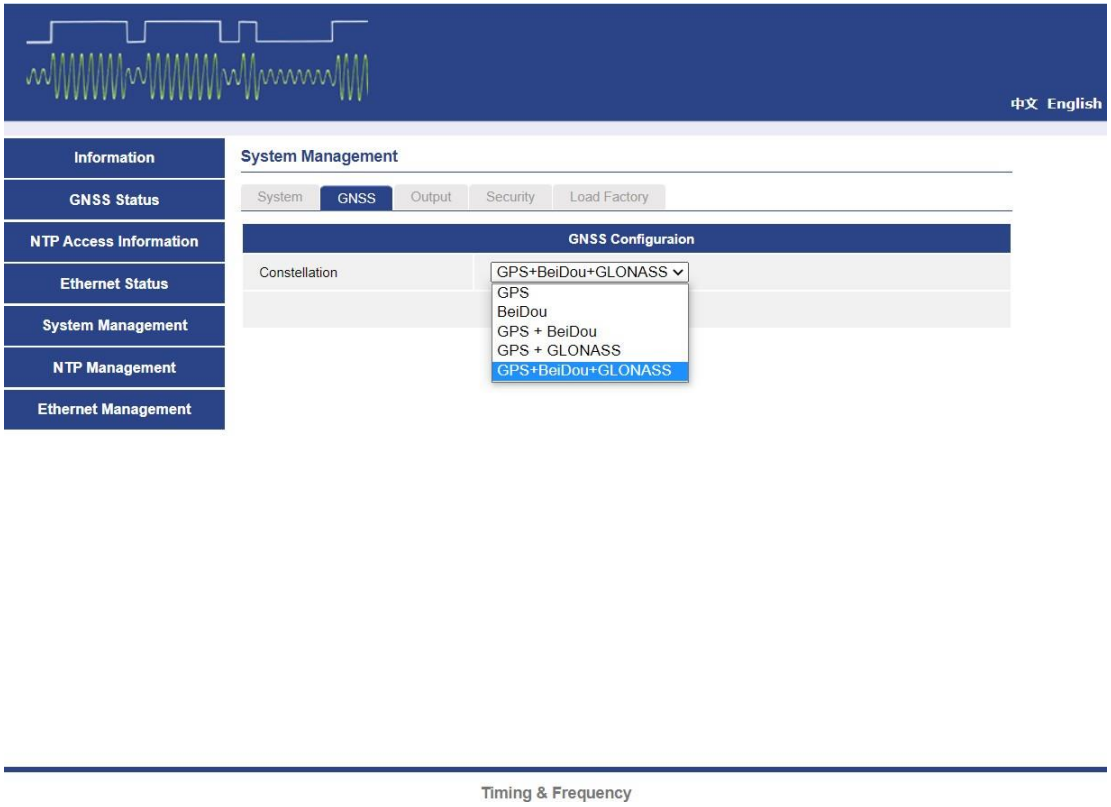
**Free Run:**

When the time cannot be received from GNSS, the time can be configured manually from local PC and provide NTP service.



## 7.5.2 GNSS

The constellation can be configured as GPS only, BeiDou only, GPS + BeiDou, GPS + GLONASS, GPS + GLONASS + BeiDou.



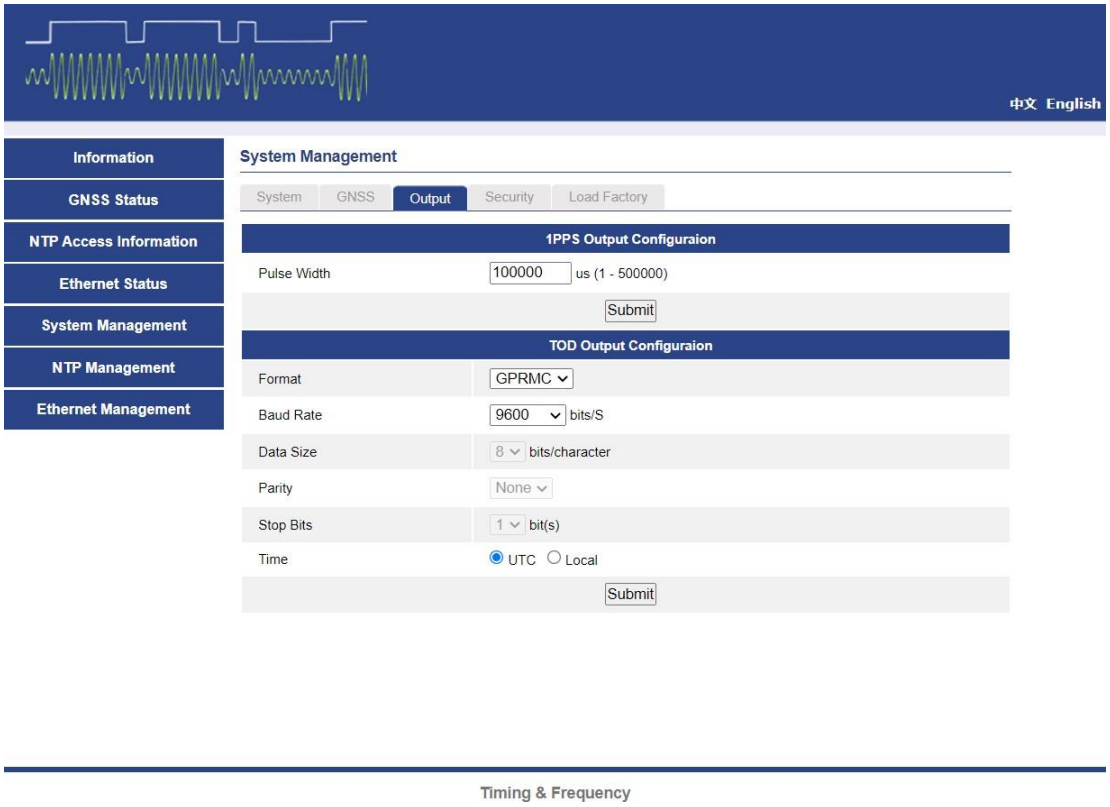
## 7.5.3 Output

**1PPS Output:**

The pulse width is 100 000 us by default, the value range is 1-500000 us.

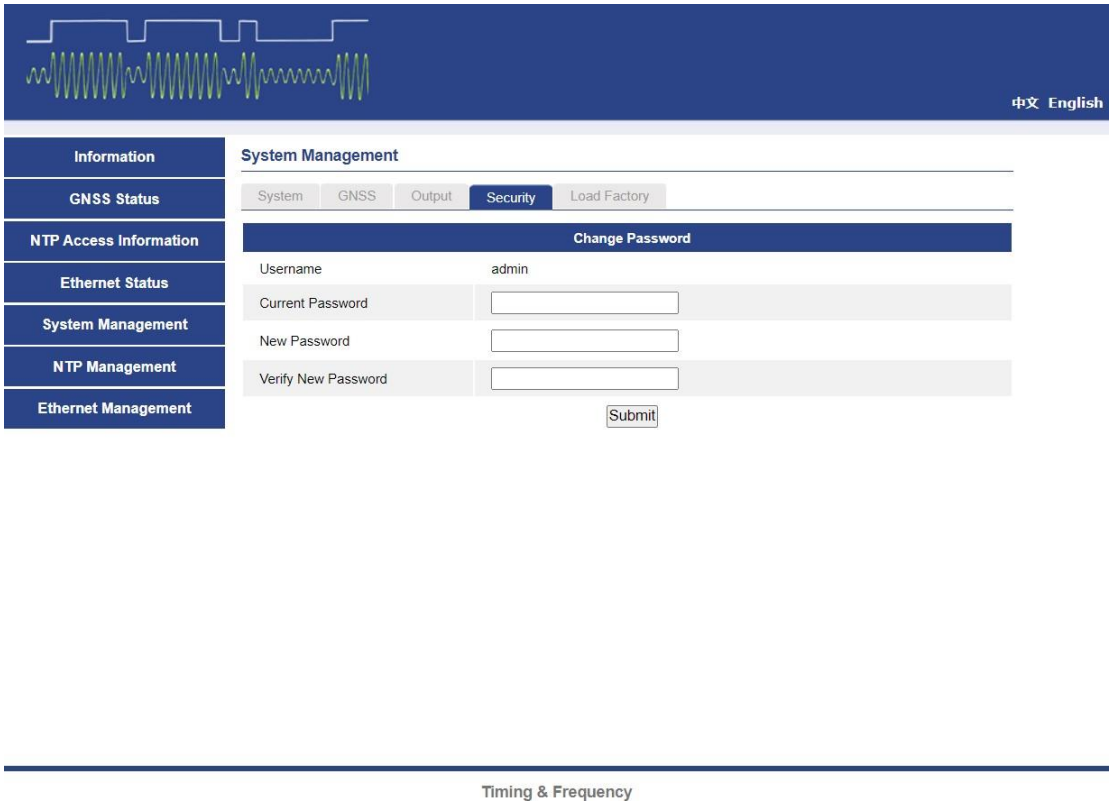
**TOD Output:**

The TOD format is GPRMC or GPZDA, baud rate is 9600 by default, the date size, parity and stop bits are not configurable. The time can be configured as UTC or local.



## 7.5.4 Security

The password can be changed on this page, please note that the default login name is admin, and can't be modified.

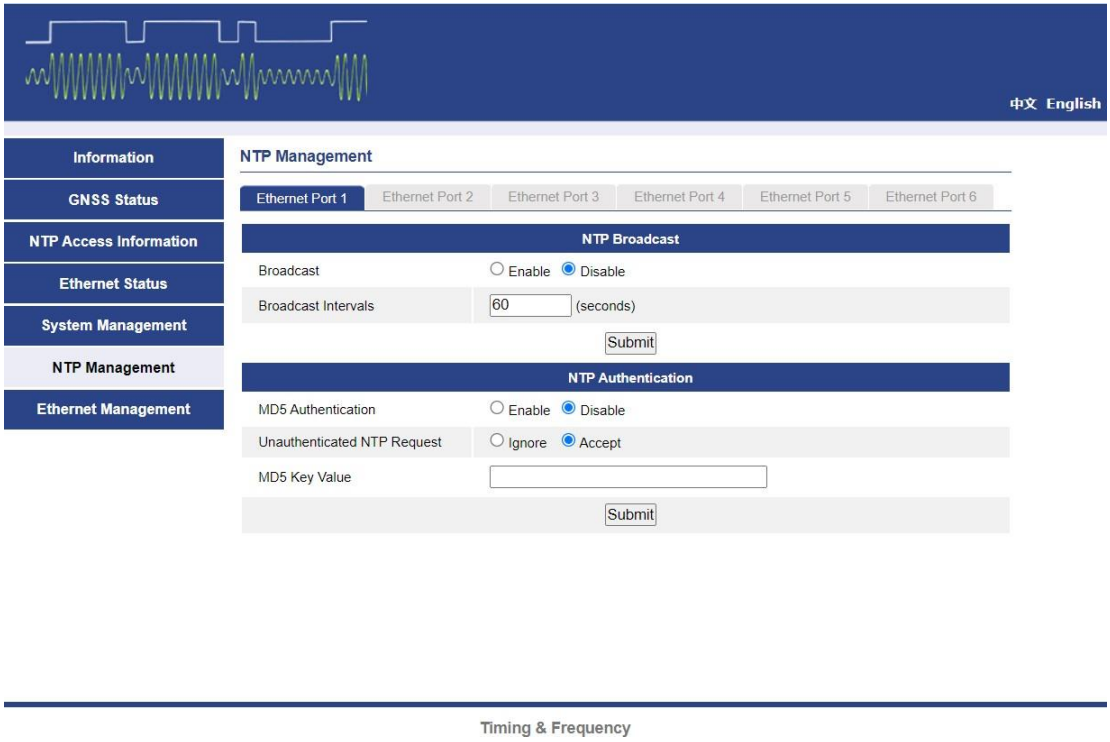


## 7.5.5 Load Factory

The configuration can be restored to factory default on this page.

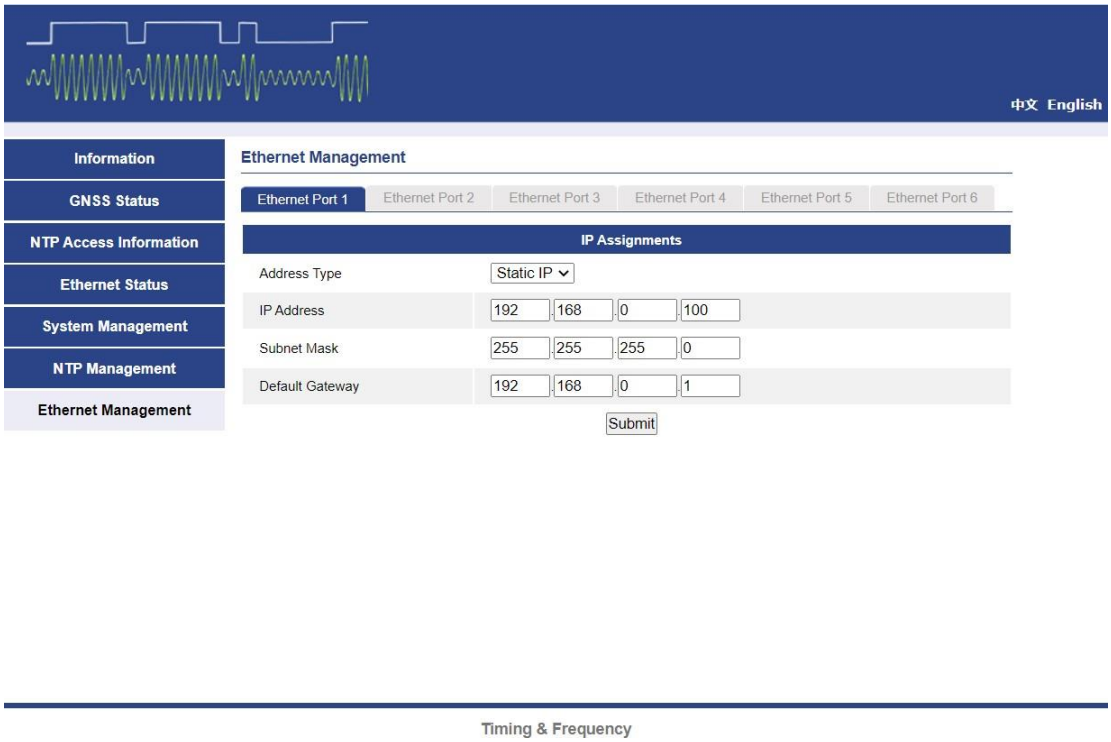
# 7.6 NTP Management

NTP broadcast and authentication of all ethernet ports can be configured on this page.



# 7.7 Ethernet Management

The IP address of all ethernet ports can be configured on this page.



# 8 Specification

## NTP

| Parameter | Description |
|---|---|
| **Interface** | 10BASE-T/100BASE-TX<br>Conforms to the IEEE 802.3 |
| **Connector** | RJ-45 |
| **Accuracy** | 0.5-2ms |
| **Standard** | NTP v2 (RFC 1119)<br>NTP v3 (RFC 1305)<br>NTP v4 (RFC5905)<br>SNTP v3 (RFC 1769)<br>SNTP v4 (RFC 2030) |
| **MD5 Authentication** | Yes |
| **NTP Broadcast** | Yes |

## 1PPS

| Parameter | Description |
|---|---|
| **Connector** | DB9 male |
| **Level** | 3.3V LVTTL |
| **High Level Width** | 100ms (default) |
| **Rising Edge** | ⩽5ns |
| **Timing Accuracy** | ⩽20ns (1σ) |
| **Holdover** | ⩽1s (7 days) |

## TOD

| Parameter | Description |
|---|---|
| **Connector** | DB9 male |
| **Level** | RS232 |
| **Format** | GPRMC or GPZDA |
| **Baud Rate** | 9600 (default) |

## GNSS Receiver

| Parameter | Description |
|---|---|
| **Constellation** | GPS L1<br>Beidou B1<br>GLONASSL1<br>QZSS L1 |
| **Antenna Power Feed** | 3.3V |
| **Horizontal Position Accuracy** | <2.5 m CEP50 (autonomous)<br><2 m CEP50 (SBAS) |
| **Vertical Position Accuracy** | <5 m CEP50 (autonomous)<br><3 m CEP50 (SBAS) |
| **Time to First Fix** | <46s (50%), <50s (90%) cold start |
| **Sensitivity** | Tracking: -160 dBm<br>Acq: -148 dBm |
| **Dynamic** | Velocity 515m/s |

## Power

| Parameter | Description |
|---|---|
| **AC Input Voltage** | AC 100V - 240V |
| **Power Consumption** | < 10W |

## Environmental

| Parameter | Description |
|---|---|
| **Operating Temperature** | -20 ~ 45℃ |
| **Storage Temperature** | -45 ~ 85℃ |
| **Operating Humidity** | 5% ~ 95% RH (non-condensing) |
| **Storage Humidity** | 5% ~ 95% RH (non-condensing) |