



# User Manual

## Quad Port NTP Time Server

### NTP-800

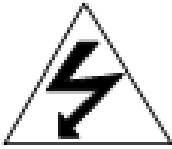
For Brandywine Communications and Time &  
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## Revision History

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A	2024/04/09	For NTP800 S/W V2.2	ECO13028

# Safety Warnings



**WARNING:**

The lightning flash with an arrowhead inside of an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure. The “dangerous voltage” may be of sufficient magnitude to constitute a risk of electrical shock to people.



**WARNING:**

This unit contains dual power supplies. Isolate **BOTH** power supplies from power before removing the top cover.



**CAUTION:**

Observe all necessary precautions for handling electrostatic discharge sensitive devices when handling component modules. Improper handling will damage internal circuitry.



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# Chapter 1

## System Overview

### 1.1 Introduction to the NTP800 Multi-port Time Server

This manual shows you how to install, configure and operate your NTP800 to provide a Network Time Protocol (PTP) time server for your network. Once up and running the NTP800 will provide accurate time synchronization for your computer clients to within nanoseconds on a Local Area Network (LAN) and tens of microseconds over a Wide Area Network (WAN).

Prior to installing the NTP800 please read the site preparation section first to ensure the smooth operation of your NTP800 when it is installed. Then follow the quick setup guide to get your NTP800 up and running. The remaining sections give more details on the configuration and operation of the NTP800.

## 1.2 NTP800 System Overview

The NTP800 time server is a Stratum 1 NTP time server that can synchronise from up to three external reference sources: Global Navigation Satellite Systems (GNSS)—such as the Global Positioning System (GPS)—Inter Range Instrument Group (IRIG) Time Code and serial time of day with Pulse Per Second (PPS). There is also a 10 MHz input to maintain the timescale during periods of holdover.

The user can choose to select which of the reference sources is in use or allow the unit to arbitrate amongst the available sources by using the TimeWall™ time validation & verification algorithm. In this mode the sources have a default priority order of GNSS, IRIG, Time of Day and 10 MHz. Any of the reference sources can be promoted to the top priority, the remaining ones demoted in the same order. All the sources are continually monitored to ensure that they are the best source of time synchronization. In the absence of all these timesources the NTP800 will attempt to synchronize to NTP Peers.

The network interfaces to NTP800 allow either a Small Form Factor Pluggable (SFP) module to be fitted or the Reference Jack 45 (RJ45) associated with a port to be used. If an SFP module is fitted the RJ45 connection is disabled. The four network ports are entirely isolated from each other.

The NTP800 provides frequency output of 1 PPS and 10 MHz and time outputs of IRIG Direct Current Level Shift (DCLS) or AC (depending on model) and serial time of day in RS422 and RS232.

See Figure 1.1 on the facing page for a block diagram of how the NTP800 operates.

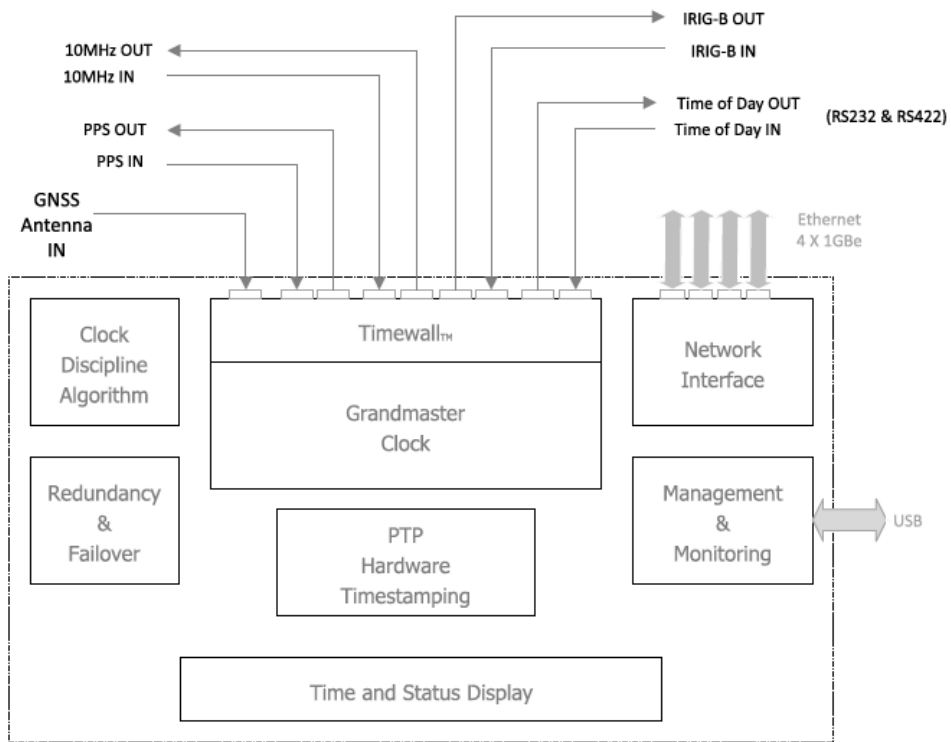


Figure 1.1: NTP800 Block Diagram

## 1.3 Specification (Basic Unit)

### 1.3.1 Reference Inputs

#### 1.3.1.1 Commercial GNSS

- GNSS, Active or Long Distance Antenna
- 1 PPS with Serial Time of Day
- IRIG B, AC or DC
- NTP Client
- 10 MHz

#### 1.3.1.2 Outputs

- IRIG-B, AC or DC
- 1 PPS
- Serial Time of Day
- 10 MHz

#### 1.3.1.3 Connections

- Four combo RJ45/SFP connectors for 10/100/1000 BASE-T networks
- GNSS antenna either with 50  $\Omega$  BNC socket or RJ45
- IRIG-B input/output with 50  $\Omega$  BNC sockets. Independently supports IRIG-B000 to 0007, or B120 to B127
- 1PPS input/output (rising edge) with BNC sockets at 5 V 10 MHz sine wave input/output with BNC sockets at 5 V<sub>RMS</sub> micro USB-B port for support



#### 1.3.1.4 Interface Standards

- NTP V3 [RFC 1305], V4 [RFC5905], SNTP V4[RFC 4330]
- SNMPV1[RFC1155/7], V2c[RFC1901/8], V3 [RFC 3411/8]
- Ethernet/ IEEE802.3
- IPv4 [RFC 791], IPv6[RFC2460, 8200]
- ICMP ping [RFC 792]
- SSH [RFC 4250-4254]
- HTTP [RFC 7540]
- DNS [RFC 1034/5]
- FTP [RFC 765]

#### 1.3.1.5 Configuration and Status

Secure web browser configuration of all Network, Protocol, Input and Output options. Stored in non-volatile memory.

“Restore Defaults” button for factory reset.

Web browser indicates status and system log.

Status available through SNMP.

9 Digit LED panel displaying Day and Time. Status LEDs to show synchronization status and power.

User specific network parameters can be factory-configured upon request.

All Ethernet ports available for upgrade of flash code for newer versions or additional options.

**1.3.1.6 Physical (Stand Alone Unit)**

Size	:	19-inch rack mounting 1U high 200 mm deep
Weight	:	4.5 kg
Power	:	Dual redundant option, hot swappable
AC Power	:	90 V to 264 V AC 50-60 Hz Load 20 W (typical), subject to oscillator. Connection via 3 pin IEC plug
DC Power	:	18 V to 36 V DC 36 V to 72 V DC
Isolation	:	2250 V DC Input-Output
Display	:	9 digit display + 6 status LEDs

**1.3.1.7 Environment (Operation & Storage)**

Temperature	:	-5 °C to + 50 °C
Humidity	:	Up to 95% RH (non-condensing)
EMC	:	CE compliant
Safety	:	IEC 60950-1, CSA 22-2

**1.3.1.8 Input Synchronization Accuracy (Rb and OCXO Options)<sup>1</sup>**

GNSS	:	±100 ns from UTC
IRIG-B AC	:	±500 ns
IRIG-B DC	:	±2 µs
PPS with Time of Day	:	±100 ns
NTP Client	:	±50 µs from UTC, dependent on network.
10 MHz	:	Unit will track the input signal if it has time

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<sup>1</sup>TCXO option – accuracies up to 10 times degraded

### 1.3.1.9 Frequency Stability

Table 1.1 below shows the frequency stability of the various oscillator options for the NTP800.

Table 1.1: Oscillator Frequency Stability

Oscillator		Stability per °C	Performance while disciplined						Holdover accuracy at constant temperature after loss of reference.		
Option	Description		Averaging Time						Time	Frequency	
			1s	10s	100s	1000s	10000s	1 day	1 day	1 day	3 days
1 <sup>2</sup>	TCXO	$1.5 \times 10^{-8}$	$2 \times 10^{-9}$	$5 \times 10^{-10}$	$5 \times 10^{-10}$	$5 \times 10^{-10}$	$6 \times 10^{-11}$	$1 \times 10^{-12}$	< 2 ms	$< 2 \times 10^{-8}$	$< 3 \times 10^{-8}$
2	OCXO	$1.2 \times 10^{-10}$	$3 \times 10^{-10}$	$3 \times 10^{-10}$	$4 \times 10^{-10}$	$4 \times 10^{-10}$	$5 \times 10^{-11}$	$1 \times 10^{-12}$	< 60 $\mu$ s	$< 2 \times 10^{-9}$	$< 4 \times 10^{-9}$
3	Rubidium	$7 \times 10^{-12}$	$3 \times 10^{-11}$	$8 \times 10^{-12}$	$3 \times 10^{-12}$	$3 \times 10^{-12}$	$2 \times 10^{-12}$	$8 \times 10^{-13}$	< 1 $\mu$ s	$< 1.0 \times 10^{-11}$	$< 1.5 \times 10^{-11}$

*As we are always seeking to improve our products, the information in this document only provides general indications of product capability, suitability and performance, none of which shall form any part of any contract.*

<sup>2</sup>N.B. Option 1 TCXO supplied as standard unless otherwise specified



## Chapter 2

# Quick Start Guide

Remove the NTP800 from the shipping carton shown in Figure 2.1 below. The following items should be included in the shipment:

- 1 × NTP800
- 2 × Power supply cables
- 1 × CD-ROM containing User Manual and Utility Software

Figure 2.1: NTP800 Quick Setup Guide



# Chapter 3

## Installation

### 3.1 Site Preparation

#### 3.1.1 Antenna

To prepare the site for the NTP800 installation, a suitable antenna location has to be found.

The antenna is a sealed unit. It should be located outside where there is good sky-coverage (e.g. on a roof) and away from high frequency electrical interference sources. It is highly recommended to use the mounting points provided and not to make any additional holes for mounting since may compromise the IP65 rating of the antenna.

The antenna is supplied with 30 m/100 ft. of RG58 cable. If longer cable runs are required, it is possible to use a higher quality cable such as RG213 or LMR-500, or the long reach GPS antenna option P/N 100DG000C. The long reach antenna allows the antenna to be connected via low cost CAT5 cable, at distances of up to 1800 m/2000 ft.

Type of Cable	Maximum Length of Cable	Cable P/N
RG58	34 m/120 ft.	002-037 (included)
LMR-500	100 m/330 ft.	002-0108

### 3.1.1.1 Power

The NTP800 requires between 90 V to 240 VAC @ 50/60 Hz for power. Power Consumption is <30 W.

### 3.1.1.2 Network

The NTP800 has four RJ45/SFP network connections. If an SFP module is fitted for a port, the associated RJ45 port is disabled.

### 3.1.1.3 Reference Sources

The NTP800 requires a source of time in order to provide a traceable reference to NTP clients. The unit's time at power on is from a battery backed Real Time Clock. The available references are:

- GNSS (GPS/Glonass/Beidou) from the included GNSS receiver. This requires an antenna to be installed with appropriate view of the sky.
- Serial Time Code. The time code supported is IRIG B. Either the 1kHz modulated code (IRIG B127) or the DC Level Shift variant is supported (IRIG B007) depending on model and jumper settings.
- ASCII Serial time of day message (both RS422 or RS232 levels) with the support for the following protocols
  - NMEA0183 protocol \$GPZDA
  - TFS message 1 and 1 PPS.



#### 3.1.1.4 Power

Insert the power cord of the NTP800 into an electrical socket to apply power to the unit.

If dual redundant power is required, connect both power supplies to independent power sources

#### 3.1.1.5 Antenna

Connect the antenna to the BNC connector J17 labelled “GPS Antenna” on the rear of the unit.

#### 3.1.1.6 Ethernet

Connect one end of an Ethernet patch cable to one of the Ethernet ports located on the rear of the unit (J1 – J8) . Connect the other end of the Ethernet cable to the network with an Ethernet hub or switch.

The network ports are supplied with default IP addresses of:

ETH1	192.168.102.92	J1/J2
ETH2	192.168.103.92	J3/J4
ETH3	192.168.104.92	J5/J6
ETH4	192.168.105.92	J7/J8



# Chapter 4

## Setup

Power on the NTP800 by switching the rear Power Supply Module to the upwards “On” position.

To view the IP address depress the reset button on the rear of the unit for a maximum of 5 seconds and release. The 4 IP addresses are then rolled across the front panel display shown in Figure 4.1 for 10s each in sequence, expressed in the standard dot decimal format, with the left most digit indicating the port number 1 to 4.

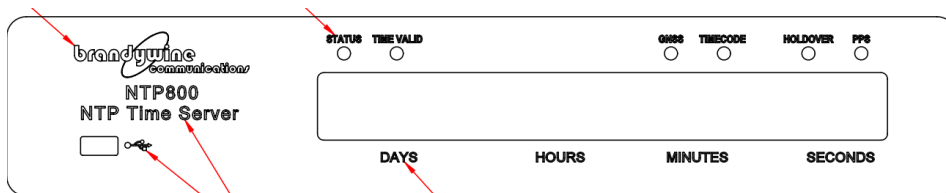


Figure 4.1: NTP800 Front Panel

## 4.1 Accessing the NTP800

### NOTE

The NTP800’s factory settings have no default username and password for the system. Ensure you configure appropriate security settings for your environment after setting it up.

Once the NTP800 is powered on and connected to the network, open up a web browser on a device connected to the same network as the NTP800 and type the IP Address of the NTP800 into the address bar to access the web page user interface (Web UI) shown in Figure 4.2 below. If prompted, enter the username and password for the device.

The first screen shown upon connecting to the NTP800 will be the NTP800 Status web page, which gives a general overview of the status and overall health of the unit.

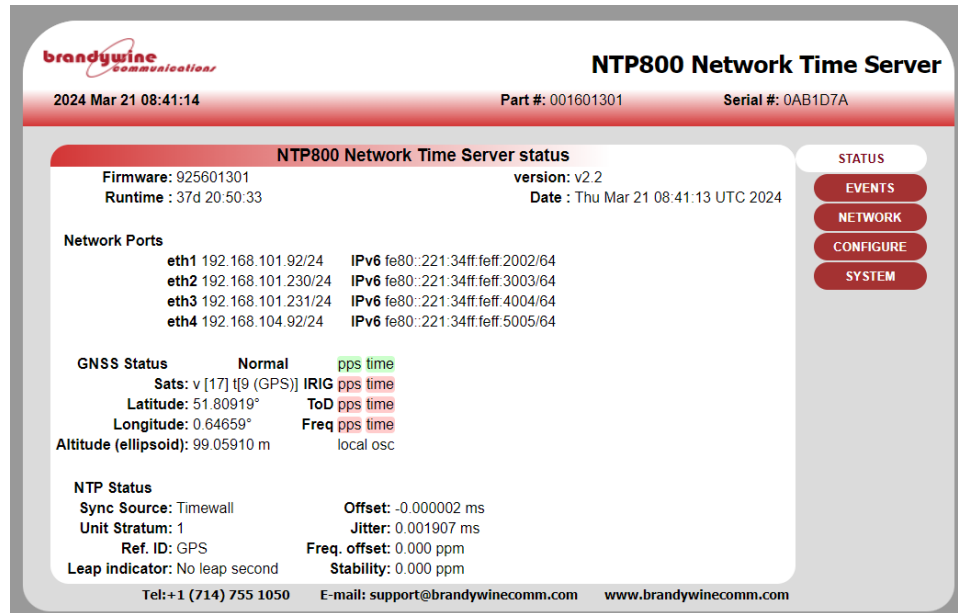


Figure 4.2: Status Web Page

Table 4.1 on the next page describes the various status fields shown in Figure 4.2 above.

Table 4.1: Status Web Page

<b>Field</b>	<b>Description</b>
Firmware	Displays the name of the NTP800's firmware.
Runtime	The length of time that the NTP800 has been powered on.
Version	Displays the current version of the NTP800's firmware.
Date	Displays the current date and time of day. This can either be the local time in the current time zone or UTC, depending on user settings.
GNSS Status	Displays the current status of the GNSS receiver.
Sats	Displays the current number of satellites tracked and satellites in view.
Latitude	Displays the current latitude of the GNSS receiver.
Longitude	Displays the current longitude of the GNSS receiver.
Altitude (ellipsoid)	Displays the current Altitude of the GNSS receiver.

Once connected, the NTP800 web page interface will show the status of the system.

## 4.2 Network Configuration Web Page

Use the [NETWORK] button on the right to select the network configuration page shown in Figure 4.3 below. This provides configuration for all the network settings, IP addresses, SNMP and service selection for the network ports.

Figure 4.3: Network Setting Web Page

Configure each port as required. Note that **submit** must be pressed for each port modified. Changing ports without submitting will lose any changes. If no ports are enabled for HTTP then the unit will default to having HTTP on Eth1.

Select the services required for the port, SUPPORT provides SSH access and is used for factory support and firmware update when using SCP.

Once the settings have been made, press the **submit** button.

Depending on whether the IP address of the port being accessed is being changed the page will show either some reconfiguration information or a link to the new address. Click this link to return to the status page otherwise use the STATUS button. These steps are shown in more detail in Section 6.2 on page 40.

### 4.3 Sources and NTP Configuration

Use the [CONFIGURE→NTP] buttons to open the Time Source Settings Configuration page shown in Figure 4.4 below to configure the unit references and NTP service. The timesources and priority boxes allow for selection and ordering of timesources for synchronization. Use the RIGHT and LEFT arrow buttons to move timesources between the boxes. Use the UP and DOWN arrow button to arrange the timesource ordering in the priority box. In Figure 4.4 below GNSS, TOD, and IRIG are selected as potential timesources, with GNSS highest and IRIG lowest priority. That is, IRIG will be used for time only if TOD and GNSS are not valid. With these initial settings and a GNSS antenna fitted the NTP800 will synchronize with GNSS and provide accurate time.

IRIG year allows for the year to be supplied for when the IRIG code does not include year data. The local time selec boxes cause the NTP800 to consider the incoming time to be the local time, as set up in Fig 4.5 on the next page.

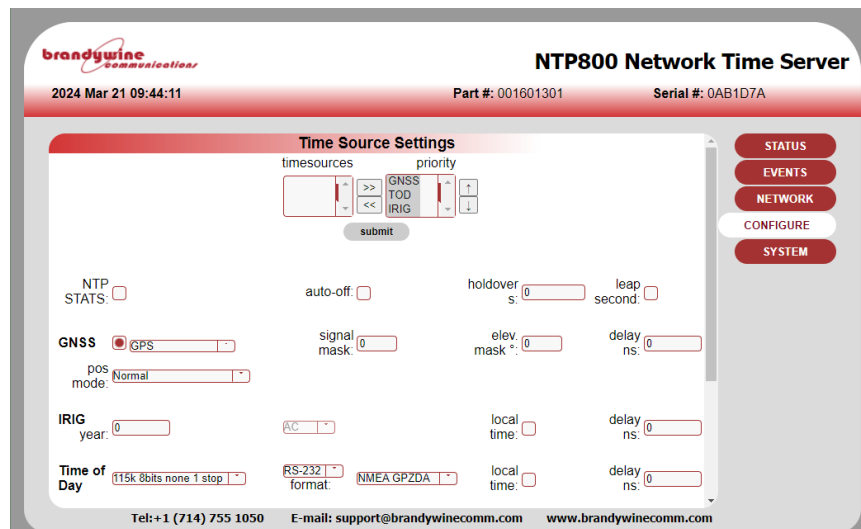


Figure 4.4: NTP Configuration Web Page

The screenshot displays the configuration interface for an NTP800 Network Time Server. At the top, the Brandywine Communications logo is on the left, and the title 'NTP800 Network Time Server' is on the right. Below the title, the current date and time are shown as '2024 Mar 21 08:48:54', along with the device's 'Part #: 001601301' and 'Serial #: 0AB1D7A'.

The main configuration area is titled 'NTP' and contains a table with the following columns: 'peer addresses', 'prefer', 'min poll', and 'max poll'. There are four rows, numbered 1 through 4, each with an input field for the peer address, a checkbox for preference, and two dropdown menus for the minimum and maximum polling intervals. Below this table are 'submit' and 'restart' buttons.

Below the table, there is a 'Select local timezone:' dropdown menu currently set to '(UTC+00:00) Casablanca, Monrovia, Reykjavik', with a 'submit' button underneath it.

On the right side of the page, there is a vertical stack of navigation buttons: 'STATUS', 'EVENTS', 'NETWORK', 'CONFIGURE', and 'SYSTEM'. At the bottom of the page, contact information is provided: 'Tel: +1 (714) 755 1050', 'E-mail: support@brandywinecomm.com', and 'www.brandywinecomm.com'.

Figure 4.5: NTP Configuration Web Page, continued

When using peer to peer mode, add the IP addresses for the NTP peers, along with their associated polling interval range values. For the NTP standard, this range value should be from 64s. Select [**submit**].

Reconfiguration information is displayed. The **STATUS** button can be used to return to the status page.

Further details on the NTP configuration can be found in Chapter 6 on page 33.



# Chapter 5

# Connections

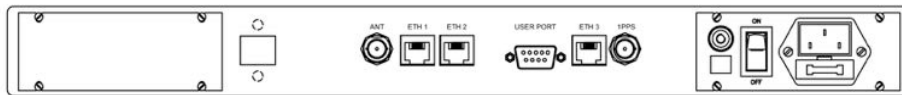


Figure 5.1: Rear Panel Drawing

Figure 5.1 above shows the rear of the NTP800. The following sections of this chapter detail the signal formats that the NTP800 is capable of receiving or sending.

## 5.1 Input Signal Connections

### 5.1.1 GNSS Antenna Connections (GNSS Version)

#### 5.1.1.1 Standard GPS Antenna for NTP800 P/N 040002XX

The antenna is connected to the BNC port marked J17 GPS Antenna on the rear of the NTP800. The antenna connector is a BNC Socket ( $50\ \Omega$ ) and its connections are:

Centre Pin : GPS Signal 1.6 GHz (& +5 V antenna amplifier power)  
 Shield : GPS Return.

#### 5.1.1.2 Long Reach GNSS Antenna for NTP800 P/N 040003XX

The Long Reach Antenna P/N 100DG000C is connected to the RJ-45 connector labelled J16 Remote GPS.

Table 5.1 below shows the pinout for the J16 connector.

Table 5.1: Long Reach Antenna Connections J16

Pin	Signal
1	+15 V/200 mA max power
2	GND
3	1 PPS –
4	Data In –
5	Data In +
6	1 PPS +
7	Data Out –
8	Data Out +

### 5.1.2 IRIG B Time Code Input

The IRIG B time code input is connected to BNC connector J15.

The pin connections are as follows:

Centre Pin : Time Code Input

Shield : Time Code Return

This is internally configured for either Modulated (IRIG B12X) or IRIG DCLS (IRIG B00X). The unit is factory-set to meet customer requirements.

### 5.1.3 ASCII Serial Time Of Day Input

Time of day input is available on RJ45 connector J9 using the pin out shown in Table 5.2 below. Either RS422 or RS232 electrical connections can be used and must be selected from the CONFIGURE→NTP webpage.

Table 5.2: J9 Pin Connections

Pin	Signal
1	No Connection
2	No Connection
3	RS422 RX -
4	GND
5	RS232 RX
6	RS422 RX +
7	No Connection
8	No Connection

### 5.1.4 1PPS Input

This 1 PPS input is used to provide the on-time mark for the time of day. Time of day message will follow the PPS to which it is associated. The 1 PPS input is connected to BNC connector J13.

The pin connections are as follows:

Centre Pin : 1 PPS input, rising edge

Shield : 1 PPS Return

Impedance : 50  $\Omega$

Voltage : 2.5 V to 5.5 V max

### 5.1.5 10 MHz Input

The NTP800 can accept a 10 MHz sine wave output on BNC connector J11. The 10 MHz input can be used as a frequency reference input, and selected to provide holdover capability in the event that other references are lost.

The pin connections are as follows:

Centre Pin : 10 MHz Input

Shield : 10 MHz Return

Impedance : 50  $\Omega$

Amplitude : 8 dBm to 15 dBm

## 5.2 Output Connections

### 5.2.1 1PPS Output

#### NOTE

If enabled, the 1 PPS output will be available from initial power on. It should be noted, however, that the 1 PPS will not be within the quoted accuracy specifications until the NTP800 has synchronized. Upon synchronization of the NTP800 to the selected reference, the 1 PPS will be accurate to the quoted specifications.

The One Pulse Per Second (1 PPS) output is directly generated from the NTP800 internal oscillator by means of the 1 PPS Output radio button, on the [CONFIGURE → OUTPUTS] webpage. This 1PPS output is the on-time mark for the NTP800 and can be used to measure the accuracy of the NTP800. The 1 PPS output is connected to BNC connector J14. The 1 PPS output may be enabled or disabled by means of the selection button, as shown in Figure 5.2 below.

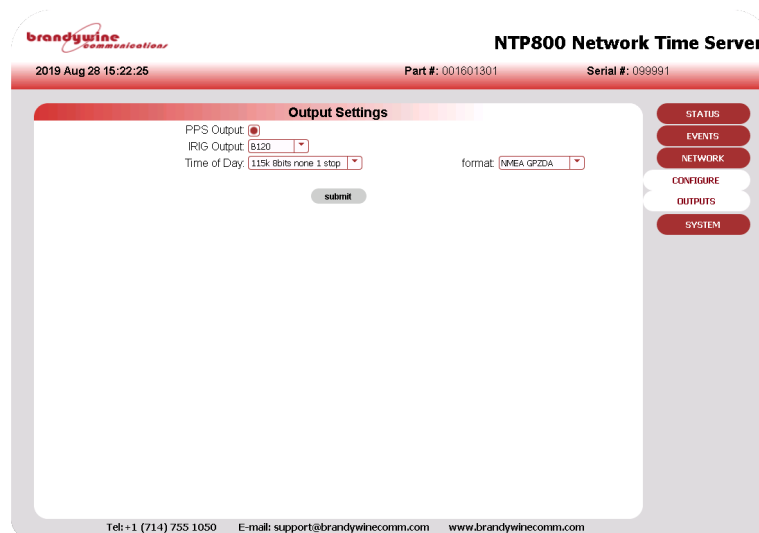


Figure 5.2: 1PPS Output

The pin connections are as follows:

Centre Pin : 1 PPS Output, rising edge

Shield : 1 PPS Return

Voltage : >2.5 V into 50  $\Omega$

## 5.2.2 IRIG Time Code Output

### NOTE

The available options for IRIG-B output type are dependent upon the factory settings, as configured for customer requirements.

The NTP800 generates IRIG B serial time code in either carrier modulated (AC) or Unmodulated (DCLS) format by means of the IRIG Output radio button, on the [CONFIGURE → OUTPUTS] webpage. The code format is selected on the Output Setting webpage shown in Figure 5.3 and output on connector J16.

The screenshot displays the 'Output Settings' page for the NTP800 Network Time Server. The interface includes a header with the Brandywine Communications logo, the server name 'NTP800 Network Time Server', and the date '2019 Aug 28 15:13:04'. Below the header, there are fields for 'PPS Output' (checked), 'IRIG Output' (set to B120), and 'Time of Day' (set to B120 with a '1 stop' dropdown). A 'format' dropdown is set to 'NMEA GPZDA'. A 'submit' button is visible. On the right side, there is a vertical menu with buttons for 'STATUS', 'EVENTS', 'NETWORK', 'CONFIGURE', 'OUTPUTS', and 'SYSTEM'. At the bottom, contact information is provided: 'Tel: +1 (714) 755 1050', 'E-mail: support@brandywinecomm.com', and 'www.bandywinecomm.com'.

Figure 5.3: Configuring IRIG B Output Format

### 5.2.3 Time of Day Output

Port J10 provides time of day output through an RJ45 connection with the pinout shown in Table 5.3. RS422 is available from pins 1 & 2, and RS232 from pins 3 & 4.

Pin	Signal
1	RS422 TX +
2	RS422 TX -
3	No Connection
4	GND
5	RS232 RX
6	RS232 TX
7	No Connection
8	No Connection

The output format is defined via the Output radio button, on the [CONFIGURE → OUTPUTS] webpage. The Baud Rate may be set with the selections shown in Figure 5.4.

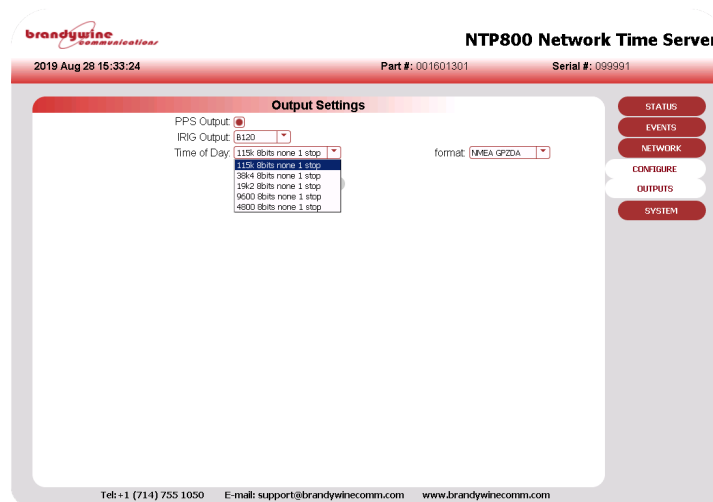


Figure 5.4: Baud Rate Selection for Time of Day Output

Currently the NTP800 supports two different message formats, GPZDA and TFS Message1

### 5.2.3.1 NMEA0183 Message format GPZDA

The NMEA0183 message format provides UTC day, month, and year, and local time zone offset. Table 5.4 below shows a more detailed breakdown of the ZDA message format.

An example of the ZDA message string is:

\$GPZDA,172809.456,12,07,1996,00,00\*45

Table 5.4: ZDA Message Fields

Field	Meaning
0	Message ID \$GPZDA
1	UTC
2	Day, ranging between 01 and 31
3	Month, ranging between 01 and 12
4	Year
5 <sup>1</sup>	Local time zone offset from GMT, ranging from 00 through $\pm$ 13 hours
6	Local time zone offset from GMT, ranging from 00 through 59 minutes
7	The checksum data, always begins with *

---

<sup>1</sup>Fields 5 and 6 together yield the total offset. For example, if field 5 is -5 and field 6 is +15, local time is 5 hours and 15 minutes earlier than GMT.



### 5.2.3.2 TFS Message1

Table 5.5 below shows the fields for the TFS Message1 output from the NTP800.

Field	Meaning
1	BCD centiseconds
2	BCD seconds
3	BCD minutes
4	BCD hours
5	BCD Day of Week (00 = Sunday)
6	BCD Day of Month
7	BCD Month
8	BCD Year
9	0x00 = not leap year or 0x0F = leap year
10	0x00 = not Daylight Saving or 0x03 = Daylight Saving
11	0x00 = not synchronized or 0x3F = synchronized
12	0xFF

### 5.2.4 10 MHz Output

The NTP800 provides a 10 MHz sinewave output on BNC connector J12.

The pin connections are as follows:

Centre Pin : 10 MHz Output  
 Shield : 10 MHz Return  
 Output Signal Level :  $13 \pm 2$  dBm into  $50 \Omega$   
 Harmonics :  $< -35$  dBc  
 Non Harmonic :  $< -70$  dBc

The phase noise and stability of the 10 MHz output are dependent upon the type of oscillator installed and also the stability of the reference being used.

## 5.3 Network Ports

Four independent Ethernet ports are available for interfacing to your network(s) and can use either the standard Ethernet RJ45 connections or and SFP module. If an SFP module is fitted the associated RJ45 connection port is disabled. The unit is also configured and monitored via a web GUI through a network connection.

The Network ports are labelled ETH1 ETH2 ETH3 ETH4.

Port characteristics are:

Speed : 10/100/1000BaseT

Electrical : RJ45 connection

SFP : 1 Gbps

## 5.4 Power Connection

The AC power connector is suitable for 90 V to 240 V AC at 50/60 Hz.

Use Table 5.6 below to find the power cord appropriate to the country of use. A locking cord is available for applications where the power cord must remain securely attached when the power cord may experience tension – typical examples are in integrated rack systems where the NTP800 is mounted on slide rails.

Table 5.6: Power Cord Ordering Information

<b>Country</b>	<b>Power Cord Part Number</b>
USA	415000044
UK	415000110
Europe	415000111
Australia	415000112
India/S Africa	415000113
Locking Cord (US)	415000073

## 5.5 Default Setting / IP Address Button

Pressing this button for less than 5 seconds and releasing it causes the unit to display its four IP address in sequence for 10 seconds each. The 4 IP addresses are then given for 10s each in sequence, expressed in dot-decimal notation. For example, Ethernet Port 1 might be displayed as as “192.168.103.92.” The actual IP addresses shown may vary based on the unit configuration.

Pressing this button for more than 5 seconds and releasing it causes the unit to restore its default settings either at the next power cycle (V2.1 software or lower), or at the automatic reset following on from the button push (v2.2 software onwards).

## Chapter 6

# Web Configuration

The main configuration method is via the web interface. There are five main pages, two for status information and three for configuration. Access to any of these is via the navigation bar shown in Figure 6.1.

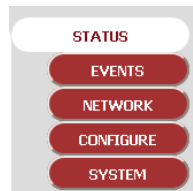


Figure 6.1: NTP800 Navigation Menu

The three pages that configure the unit are:

- Network: Set the network configuration for each of the four Ethernet ports and also the SNMP parameters.
- Configure: Set up the operating parameters. There are three subpages: (1) NTP for both the input parameters and NTP parameters, as well as the local time zone, (2) PTP for PTP parameters and (3) OUTPUTS to configure the unit output signals.
- System: Set up all the unit's security credentials; web security to access the NTP800, SNMP v3 credentials and the NTP authentication keys.

The NTP800 is delivered with all the web security disabled so access to the unit for the first time does not require login details. *It is highly recommended that these are set on first use to avoid unauthorised access.*

**NOTE**

All security credentials are case sensitive.

Login is not required for the STATUS and EVENT pages of the web interface.

Accessing the NTP800 can be achieved with any browser. The NTP800 uses a secure HTTPS protocol. There is an automatic redirection from the standard HTTP port to HTTPS.

It is important to note that the security certificates used by the NTP800 are self-signed and created for each port. The certificates are not signed by a root CA and initial connection may show an alert. Upon inspection of the certificate, the browser alert should only refer to self-signature and verification. Nevertheless, the unit can be used without issue over the secure connection once the exception has been approved.

## 6.1 System Security

System security is managed using the System Setup Screen, shown in Figure 6.2. NTP800 offers user-defined security configuration for the following areas:

1. Login credentials
2. Simple Network Management Protocol (SNMP)
3. Network Time Protocol

Correct configuration of these protocols is critical to the secure operation of the NTP800. It is strongly recommended that the user reads this section of the manual prior to making setup changes, since incorrect configuration will likely result in a loss of system access.

The screenshot displays the NTP800 Network Time Server's system setup interface. At the top, the Brandywine Communications logo is on the left, and the title 'NTP800 Network Time Server' is on the right. Below the title, system information is shown: '2019 Jul 15 11:00:48', 'Part #: 001601301', and 'Serial #: 0A81D7A'. The main configuration area is titled 'WEB Security Settings' and is divided into four sections: 1. 'WEB Security Settings' with 'Username:' and 'Password:' input fields and a 'view passwords' checkbox. 2. 'REMOTE CONFIGURATION ACCESS' with 'Address:' and 'Netmask:' input fields and a 'submit' button. 3. 'SNMP v3 KEYS' with 'authentication key:' and 'privacy key:' input fields and a 'submit' button. 4. 'NTP AUTHENTICATION' with an 'auth. enable:' radio button, a 'Trusted key ids:' input field, an 'NTP Key File:' field with a 'Choose File' button and 'No file chosen' text, and a 'submit' button. On the right side, there is a vertical sidebar with buttons for 'STATUS', 'EVENTS', 'NETWORK', 'CONFIGURE', and 'SYSTEM'. The footer contains contact details: 'Tel: +1 (714) 755 1050', 'E-mail: support@brandywinecomm.com', and 'www.brandywinecomm.com'.

Figure 6.2: NTP800 System Screen

This page sets security configuration for the following items:

- Login Credentials
- Remote Configuration Access
- SNMPv3 Credentials
- NTP Authentication

### 6.1.1 Login Credentials

**NOTE**

Do not lose the details of the user name and password. If they are lost then the unit will have to be restarted and the factory defaults restored.

Use the fields shown in Figure 6.3 below to set a username and password, and to control access to the NTP800.

**WEB Security Settings**

Username:

Password:   view passwords

**REMOTE CONFIGURATION ACCESS**

Address:

Netmask:

Figure 6.3: Web Security Settings

Enter the desired User name and Password and click on [Submit]

If the [view passwords] box is checked, then the typed password is visible.

If the user name and password are left blank, then the login security is disabled (supplied default).



## 6.1.2 Remote Configuration Access

### NOTE

It is important that discrepancies are avoided between the subnet mask and IP address; for example if 192.168.101.1 had been entered with a subnet mask of 255.255.255.0 then all access would be denied as there are no addresses that can meet this configuration. To recover from lock-out the NTP800 will have to be restarted and the factory defaults restored.

The remote configuration access limits access to the web interface to a single IP address or a range of IP addresses. Be extremely careful when setting these values since it is possible to lock out all access. The *address* and the *subnet* mask *MUST* agree.

To restrict access to a *subnet*, make sure the address and netmask are set accordingly; for example, to restrict access to a *subnet* 192.168.102.x:

**Address** : 192.168.102.0

**Netmask** : 255.255.255.0

For the default factory network settings this would mean that only users on port ETH1 could access the web interface.

To restrict access to a *single host*, for example 192.168.101.1:

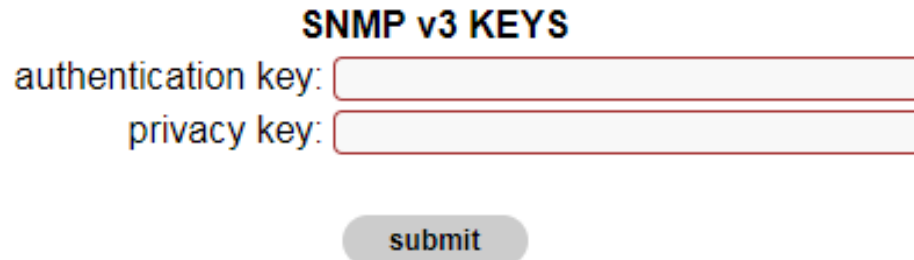
**Address** : 192.168.102.1

**Netmask** : 255.255.255.255

Only this host can use the web interface.

### 6.1.3 SNMP v3 Credentials

Use the section of the webpage shown in Figure 6.4 below to configure SNMP V3 with the authentication and privacy keys.



The form titled "SNMP v3 KEYS" contains two text input fields. The first is labeled "authentication key:" and the second is labeled "privacy key:". Below these fields is a rounded rectangular button labeled "submit".

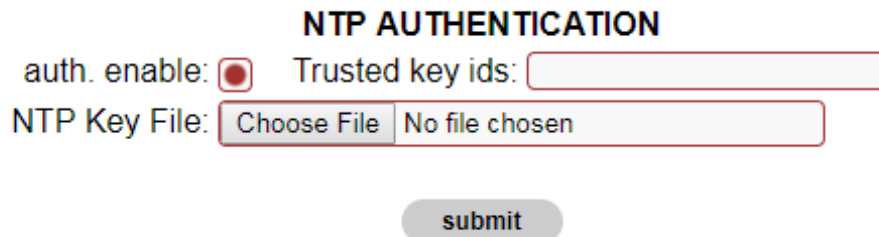
Figure 6.4: SNMP v3 Credentials Input Area

Enter the desired keys and click on [Submit].

### 6.1.4 NTP Authentication

The section of the webpage shown in Figure 6.5 below allows the three following items to be configured

- Enable/disable NTP authentication
- The keys to be trusted
- Upload of NTP ntp.keys file



The form titled "NTP AUTHENTICATION" contains three elements: a radio button labeled "auth. enable:" which is currently selected, a text input field labeled "Trusted key ids:", and a file upload control labeled "NTP Key File:" with a "Choose File" button and the text "No file chosen". Below these elements is a rounded rectangular button labeled "submit".

Figure 6.5: NTP Authentication Key Input

Provision is made to enable and disable authentication in NTP packets and affects the NTP configuration page. The unit accepts a standard NTP-ntp.keys file specifying

keys and the authentication type. This file is uploaded in its entirety. It is up to the user to manage this file and maintain appropriate secure copies. Once uploaded the file cannot be directly accessed in any way. If a change to it is required it must be done to the file externally and reloaded. It will then replace the existing file. The file is not used if NTP authentication is disabled. It will be removed if factory defaults are applied.

## 6.2 Network Configuration

This page, shown in Figure 6.6, allows the configuration of each of the Ethernet ports. Select the port to configure from the drop down list box. The current settings for that port will be shown.

The screenshot displays the web configuration interface for an NTP800 Network Time Server. The header includes the Brandywine Communications logo, the device name 'NTP800 Network Time Server', and identification numbers: Part # 001601301 and Serial # 0AB1D7A. The date and time are 2024 Mar 21 08:43:43. The main content area is titled 'Network Settings' and contains several sections:

- General Settings:** Network Port (dropdown menu showing 'eth1'), Speed (dropdown menu showing 'Auto-negotiate'), Duplex (dropdown menu showing 'Full'), HTTP (checkbox), SNMP access (checkbox), and support (checkbox).
- Host Information:** Hostname.domain (text input field).
- IP4 SETTINGS:** IP (192.168.101.92), NetMask (255.255.255.0), Gateway (192.168.101.4), and DNS server list (text input field with '(comma separated)' note).
- IP6 SETTINGS:** IPv6 (fe80::221:34ff:feff:2002), Prefix (64), Gateway (:1), and DNS server list (text input field with '(comma separated)' note). A note states: 'NOTE: IP6 Address Changes will not be available until after a reboot'. There is also an IP6 DHCP checkbox.
- SNMP SETTINGS:** Location (location), Contact (private), Read community (public), Write community (private), Trap Address 1, Trap Address 2, SNMP v3 user, and SNMP v3 context.

On the right side, there is a vertical menu with buttons for STATUS, EVENTS, NETWORK (highlighted), CONFIGURE, and SYSTEM. At the bottom of the form is a 'submit' button. The footer contains contact information: Tel: +1 (714) 755 1050, E-mail: support@brandywinecomm.com, and www.brandywinecomm.com.

Figure 6.6: Network Settings Screen

The following settings in Table 6.1 on the next page are port specific:  
**Speed, Duplex**  
**IP4 SETTINGS: IP, Gateway, Netmask**  
**IP6 SETTINGS, IPv6, Prefix, Gateway**

Table 6.1: Port Specific Network Settings

<b>Setting</b>	<b>Description</b>
<b>DHCP</b> (IP4 IP6)	Permit port to acquire its address via Dynamic Host Configuration Protocol (DHCP). This will be shown on the status page. This can only be applied to one port of the unit. Note a DHCP server must be present and the port must be connected to the network. If not, the configuration access for this port will be lost. The unit then either needs to be rebooted with a network connection and an available DHCP server or return the unit to factory defaults to set the port (and all the others) back to their defaults.
<b>Hostname</b>	The unit must be provided with a hostname for the DHCP enabled port. If changed or set independently of the DHCP flag, it must be submitted for the port that DHCP has been enabled for.
<b>SNMP</b> <b>Access</b>	Allows SNMP queries and traps to be generated.
<b>HTTP</b>	Enable the web service on this interface. Note that it is not possible to disable the web interface from all ports with this setting.
<b>Support</b>	Allow for firmware upload with SCP protocol and remote access for factory support in the event of system issues.

Note that any changes must be submitted prior to changing the port selection otherwise they will be lost. This includes the non-port specific settings.

The following settings in Table 6.2 on the following page are not port specific:

Table 6.2: Port Non-specific Network Settings

Setting	Description
<b>DNS server list</b> (IPv4 IPv6)	Comma separated list of DNS server IP addresses.
<b>SNMP parameters</b>	These are effective on the ports that have SNMP access enabled.

The NTP800 will send traps when a trap address is set. There are rules as to where these traps will be sent depending on the port configurations.

If the trap address is on a subnet of a particular SNMP enabled port then the trap will only be sent to that port. If the trap address is not on any subnet of the defined ports then the trap will be sent to all SNMP enabled ports that have a gateway address defined. If the network is such there are two routes to the trap address destination it will be received twice.

If an *SNMPv3 user* is set the SNMP protocol used will be SNMP v3 for both queries and traps. For SNMPv3 traps the engine ID associated with the user is defined in the user context, this takes the form of ENGINEID:user context. Currently user context is not supported. If no colon present in the user context box then the content is taken as an ENGINEID. This field must be configured to enable SNMP v3 traps to be sent and successfully received.

The NTP800 routing is such that all ports are isolated from each other.

Select [**Submit**] to apply changes, as seen in Figure 6.7 on the next page.

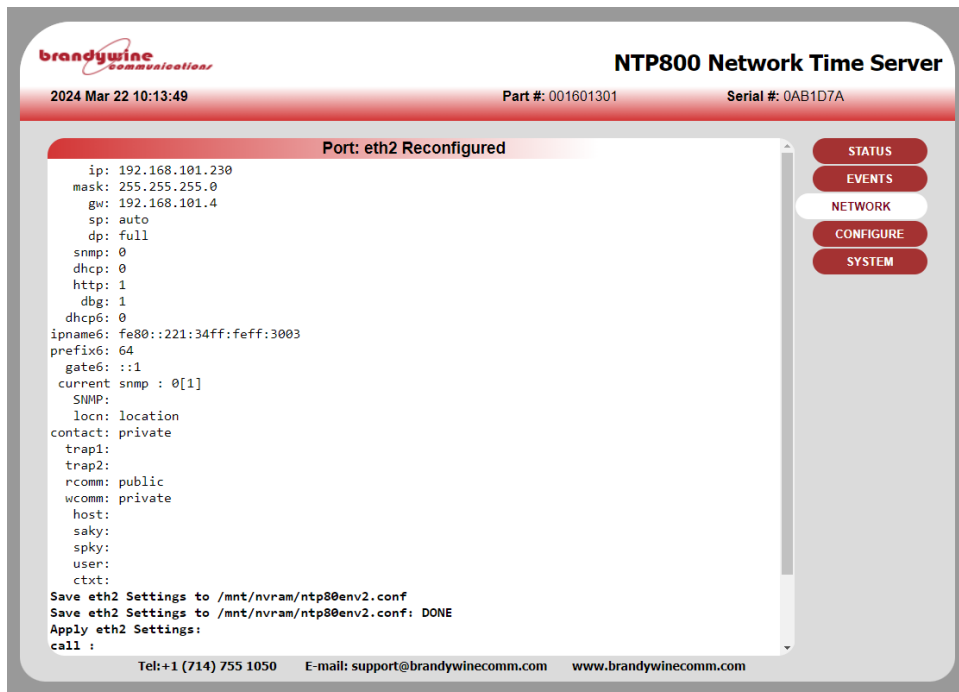


Figure 6.7: Network Screen Showing Configuration Changes

## 6.3 Configure

This page sets up the NTP service and input and output sources.

The NTP800 has three possible external reference sources, GNSS, IRIG and Time of Day (with PPS). The use of these sources can be either as manual selection or under the TimeWall™ arbitrator.

### 6.3.1 NTP

The default configuration page, shown in Figure 6.8 below, is the NTP service and input source configuration page.

The screenshot displays the NTP800 Network Time Server configuration interface. At the top, it shows the date and time (2019 Jul 18 15:44:47), the part number (001601301), and the serial number (0AB1D7A). The main configuration area is titled 'NTP Service Settings' and includes the following fields:

- Local source:** Auto-arbitrate (dropdown), top priority: GNSS (dropdown)
- GNSS:** GPS (radio button, selected), mode select: Normal (dropdown), Signal Mask: 0, Elev. Mask: 0 \* (dropdown), delay: 0 ns
- IRIG:** Year: 0, AC (dropdown), local time: (checkbox), delay: 0 ns; Time of Day: 115k 8bits none 1 stop (dropdown), RS-232 (dropdown), format: NMEA GPZDA (dropdown), local time: (checkbox), delay: 0 ns
- Peer servers:** Peer server 1-4 (input fields), prefer: (checkbox), Min poll: (dropdown), Max poll: (dropdown)
- Timezone:** Select local timezone: (UTC-08:00 DTS) Pacific Time (US & Canada) (dropdown)

Buttons for 'submit', 'restart', and 'submit' are visible. A sidebar on the right contains navigation buttons for STATUS, EVENTS, NETWORK, CONFIGURE (highlighted), and SYSTEM. The footer includes contact information: Tel: +1 (714) 755 1050, E-mail: support@brandywinecomm.com, and www.brandywinecomm.com.

Figure 6.8: NTP800 NTP Configuration Screen

TimeWall™ (timesource and priority list) is used to control the action of the external reference sources. The user can either select any of the individual references or auto-arbitrate for TimeWall™ to decide which to use. TimeWall™ can be adjusted to select one of those sources upon a priority basis, when it is deemed to be valid.



The default priority order is GNSS, IRIG and Time of Day. Without any available reference time, an external 10 MHz will be used to maintain the timescale established from the last available reference source.

#### 6.3.1.1 STATS

This is used for diagnostic purposes and should normally *not* be enabled.

#### 6.3.1.2 AUTO-OFF / Holdover

This provides a mechanism for non-standard NTP or SNTP clients that do not properly adhere to NTP protocols such as RFC1305—in particular where the leap indicator flags are not used or the monitoring of reference time is not taken into account. For these situations the auto-off mechanism will stop the NTP800 servicing NTP requests after a period specified, in seconds, from the time that synchronization is lost. Initially when this is enabled the holdover time will be set to 86,400s, i.e. 24 hours. This will mean that any NTP client will not be able to use this server after this time regardless of how that client is implemented. Note that the Holdover time specified should take into account the oscillator that is fitted to the NTP800. The reliability of time will be greater for longer for a Rubidium unit than one with a TCXO. All can be within the NTP Stratum 1 specification of 1 ms after 1 day of holdover assuming good GPS reception for a significant period of time prior to loss of synchronization.

#### 6.3.1.3 Leap Second

A reference source will indicate a leap second pending by setting the leap second checkbox. If there is no reference source this can be manually set if it is known that a leap second will occur at the next insertion time. These times are fixed at June 30 23:59:59 UTC and December 31 23:59:59. The unit cannot accept leap second indication beyond 3 months in advance. Note that if this is manually set and a reference source is available. The reference source will override the manual setting.

The **GNSS** checkbox will be ticked if a GNSS receiver is detected. The drop down list selects the GNSS constellation used for resolving time. After position is resolved, all satellites in all constellations will be considered.

The constellation choices are: GPS, GPS+GLONASS, GPS+BEIDOU, GLONASS, BEIDOU.

The tracked satellites on status page will show the satellites used in each constellation.

#### 6.3.1.4 Signal Mask

A signal level value below which satellites ignored for timing, this is an integer between 0 and 55. The default value is 35, reduce this if there are problems with GNSS synchronization.

#### 6.3.1.5 Elevation Mask

Elevation below which satellites will not be used for timing. The default value is 10°.

#### 6.3.1.6 Cable Delay

Enter the time delay associated with the antenna cable length.

#### 6.3.1.7 Mode

Under normal conditions and a reasonable GNSS satellite visibility this should be set to **normal**.

If there are problems with satellite reception then the **fixed position** mode can be used. This allows the position to be entered manually or the fields to be populated with the last acquired position. This will give the GNSS receiver a better chance to establish timing with fewer satellites.

In extreme cases, **fixed posn. unprotected** can be used which removes the anti-jamming protection and effectively allows time from just one satellite. This is not recommended. Prior to using the fixed position modes it is recommended that the signal and elevation masks are reduced to help improve GNSS satellite visibility.

**6.3.1.8 IRIG year**

For IRIG formats that do not contain a year, enter the current year. This will be provided by other reference sources if they are available.

**6.3.1.9 AC/DCLS**

Set to agree with the configuration of the unit for the IRIG input; either AC IRIG or DCLS. This is a jumper selection within the unit.

**6.3.1.10 Local Time**

Check this box if the time in the reference source message is in local time and not UTC. If it is in local time the NTP800 must be configured for that same time zone.

**6.3.1.11 Cable Delay**

Enter the time delay associated with the cable length between the reference source output and the NTP800 input.

#### 6.3.1.12 Time of Day

Select the serial port parameters from the list, either RS232 or RS422.

Select the message protocol to be expected either GPZDA standard NMEA message or TFS message 4, defined in Appendix D on page 101.

#### 6.3.1.13 Local time

Check this box if the time in the reference source message is in local time and not UTC. If it is in local time the NTP800 must be configured for that same timezone.

#### 6.3.1.14 Peer Servers 1-4

This configuration allows for the synchronization of up to four NTP servers. These are specified in peer server 1 to 4. They can either be a DNS name (if DNS server is set on the NETWORK page) or an IP address. The min and max poll indicate the minimum and maximum rate of NTP requests. The NTP standard for min poll rate is 64s, recommended settings for this and max poll are 64s.

The NTP server follows the standard NTP protocol to determine the best of the specified clocks to synchronize to. One may be selected as preferential by setting the **prefer** option radio button for that server.

When the peer NTP servers are set up alongside external reference sources they can take over following the loss of all the synchronization sources. Note that depending on the oscillator fitted and the period for which synchronization is lost, the performance when synchronizing to another NTP server will not be as good as running in holdover. If peer NTP servers are available in this configuration AUTO-OFF will not function until all possible synchronization sources have failed.

### 6.3.1.15 Multicast (or Broadcast) Address

The NTP800 can be used as a broadcast NTP server. A broadcast address or multicast address can be specified in the multicast address box along with the poll interval. The unit will then transmit NTP messages at this interval to the multicast or broadcast address.

For network-wide broadcast, address 255.255.255.255 is used. For a subnet address, set the host part of the address to the last host address.

For example: for network 192.168.102.0, use 192.168.102.255

Select [**submit**], then select [**Restart**].

Press submit to save all the changes. If these are deemed to change the NTP settings then the NTP service will be restarted. The NTP service can be restarted manually by pressing restart. This is required if the NTP authentication mode is changed on the security page.

### 6.3.1.16 Local Time Zone

The local time zone allows the front status page and the front panel display to show local time rather than UTC. Note that all NTP operations are performed with UTC. Setting this parameter has no effect on NTP operation. The factory configured GPRMC serial output options of the NTP800 provide a local-time message, that local time is also defined by this parameter.

Press **submit** to change this value.

The NTP800 is now configured.

### 6.3.2 Outputs

Table 6.3 below shows the various output configuration options.

<b>Output</b>	<b>Description</b>
<b>PPS</b>	Enable/disable PPS output
<b>IRIG format</b>	Select the required IRIG output format. DCLS or AC IRIG output is dependent on the hardware jumper configuration.
<b>Time of day</b>	Select the serial port parameters and the output message format as required.

## 6.4 Status

The status of the NTP800 is shown across two status pages.

### 6.4.1 Status

Selecting [STATUS] will bring up the NTP800 Network Time Server status screen, shown in Figure 6.9 shows the current running state of the NTP800. The top section shows the system state including how long it has been running and the currently loaded date and time.

The screenshot shows the NTP800 Network Time Server status screen. At the top, it displays the Brandywine Communications logo, the date and time (2024 Mar 21 08:41:14), the Part # (001601301), and the Serial # (0AB1D7A). The main content area is titled "NTP800 Network Time Server status" and is divided into several sections:

- System Information:** Firmware: 925601301, Runtime: 37d 20:50:33, version: v2.2, Date: Thu Mar 21 08:41:13 UTC 2024.
- Network Ports:**

Port	IPv4	IPv6
eth1	192.168.101.92/24	fe80::221:34ff:feff:2002/64
eth2	192.168.101.230/24	fe80::221:34ff:feff:3003/64
eth3	192.168.101.231/24	fe80::221:34ff:feff:4004/64
eth4	192.168.104.92/24	fe80::221:34ff:feff:5005/64
- GNSS Status:** Normal (green background). Sats: v [17] {9 (GPS)} (green background). IRIG (red background). ToD (red background). Freq (red background). pps time (green background). Altitude (ellipsoid): 99.05910 m. local osc (red background).
- NTP Status:** Sync Source: Timewall, Unit Stratum: 1, Ref. ID: GPS, Leap indicator: No leap second, Offset: -0.000002 ms, Jitter: 0.001907 ms, Freq. offset: 0.000 ppm, Stability: 0.000 ppm.

At the bottom, it provides contact information: Tel: +1 (714) 755 1050, E-mail: support@brandywinecomm.com, and www.brandywinecomm.com. On the right side, there are navigation buttons for STATUS, EVENTS, NETWORK, CONFIGURE, and SYSTEM.

Figure 6.9: NTP800 Status Screen

The GNSS status shows position and the satellite status. The status will reflect the condition of the GNSS receiver with its pps and time. The status of the other reference sources, IRIG, Time of day and the frequency input are shown, with green or red background to show valid or not. If all sources become unavailable but Freq is valid the unit will advance at the rate of the frequency input. If Freq is not valid along with no other source, then the unit is in holdover. The exception to this is if any NTP peer is valid, in which case the unit tracks NTP. See *Events* for details of entries in the event log.

Where multi-constellation mode has been selected then the satellites tracked from each constellation are identified.

PTP slave status provides an indication of the NTP800 operational state, with regard to the PTP network clock hierarchy.

The NTP status indicates the current NTP service synchronization source and the stratum level. Normally these will show TimeWall™ and stratum 1. For a peer-to-peer server, the Sync Source will show the IP address of the synchronization source and the stratum of the NTP service will be dependent on the stratum of that source. Sync source will also show the status of the NTP service when not synchronized. These events are recorded in the event log. If the unit is in holdover the status will state **No System Peers**. See Section 6.5 on the facing page, for further details.

The REFID determines the reference ID in use within the NTP packets when the sync source is TimeWall™. This will also reflect the current reference source in use—GPS, IRIG, ToD. If the source is an NTP peer, REFID reflects the **peer's** reference source.

Offset, jitter, frequency offset and stability indicate the performance of the NTP service. The closer to zero these values, the better the performance. Further details can be found through online searches on ntpd's operation.

The page updates automatically every second.

The events shown in the status page are recorded in the event log and can be seen by selecting EVENTS from the navigation panel.



## 6.5 Events

Figure 6.10 below shows the Event Log Screen.

Event Table			
282	2019-07-15 17:59:57.952	NTP SERVER	Sync.
281	2019-07-15 17:59:57.952	NTP SERVER	Source changed GPS
280	2019-07-15 17:59:57.952	NTP SERVER	Acquiring sync
279	2019-07-15 17:39:09.295	NTP SERVER	Sync.
278	2019-07-15 17:39:09.295	NTP SERVER	Source changed GPS
277	2019-07-15 17:39:09.295	NTP SERVER	Acquiring sync
276	2019-07-15 17:33:45.753	NTP SERVER	Sync.
275	2019-07-15 17:33:45.753	NTP SERVER	Source changed GPS
274	2019-07-15 17:33:45.752	NTP SERVER	Acquiring sync
273	2019-07-15 17:30:58.239	NTP SERVER	Sync.
272	2019-07-15 17:30:58.239	NTP SERVER	Source changed GPS
271	2019-07-15 17:30:58.239	NTP SERVER	Acquiring sync
270	2019-07-15 17:27:36.512	NTP SERVER	Sync.
269	2019-07-15 17:27:36.512	NTP SERVER	Source changed GPS
268	2019-07-15 17:27:36.512	NTP SERVER	Acquiring sync
267	2019-07-15 17:23:39.092	NTP SERVER	Sync.
266	2019-07-15 17:23:39.091	NTP SERVER	Source changed GPS
265	2019-07-15 17:23:39.091	NTP SERVER	Acquiring sync
264	2019-07-15 16:38:00.440	NTP SERVER	Sync.
263	2019-07-15 16:38:00.440	NTP SERVER	Source changed GPS
262	2019-07-15 16:38:00.440	NTP SERVER	Acquiring sync
261	2019-07-10 23:03:17.198	NTP SERVER	Sync.
260	2019-07-10 23:03:17.198	NTP SERVER	Source changed GPS

Figure 6.10: Event Log Screen

The following lists all the events and their causes that can appear in the event log. They will cause an SNMP v1 trap to be sent to SNMP enabled ports. Global Positioning System (GPS) events are also shown on the front panel of the NTP800, and these events will be shown in the relevant status field on the web status page.

The events are divided into three sections. SYSTEM, GPS and NTP.

### 6.5.1 System Events

Table 6.4 below shows the possible System Events for the NTP800.

Table 6.4: System Events	
Event	Description
System startup.	Initialization of event log. Not visible after first 800 events.
Manual restart	Remote reboot has been applied.

### 6.5.2 GPS Events

Table 6.5 below shows the possible GPS Events for the NTP800.

Table 6.5: GPS Events	
Event	Description
Normal	GPS operating normally.
No PPS - in holdover	GPS not tracking – NTP800 in holdover.
PDOP too high	Tracked satellite constellation is insufficient for good position resolution. NTP800 in holdover.
Only 3 usable sats	Satellites tracked, requires at least 4 for time to load initially.
Only 2 usable sats	
Only 1 usable sat	
No useable sats	
No time yet	GPS start up.
Antenna shorted	A fault has been detected with the antenna connection.
No antenna present	No antenna is connected. Check antenna is connected.
Not detected	Initial start-up condition.

All the above are decoded from the status value. They are visible on the web page and relate to the GPS operating status. If no issues are detected, then the last event will be 'Normal'. Any single event will be cleared by returning to Normal; for example, if the antenna is disconnected then the minimum event sequence will change from 'No antenna present' to 'Normal' after the antenna is reconnected. In reality

some intermediate messages will occur as the number of satellites tracked increases. In most cases, if any state other than normal is seen persistently then the likelihood is that there is an issue with the GPS reception either due to antenna placement, operation or cable length.

### 6.5.3 NTP Server Events

Table 6.6 below shows the possible NTP Server Events for the NTP800.

Event	Description
Sync.	Synchronized to source & serving time.
System peer <ip address>	Synchronization source found. When this is the GPS engine the IP address will be shown as 127.127.46.0
Acquiring sync	Locking to time source
No system peers	No valid synchronization sources. Unit in holdover.
NTP suspend	NTP service suspended & will no longer answer NTP requests. Part of the AUTO-OFF process.
NTP resume	NTP service resumed. Part of the AUTO-OFF process.
Initialising	Indicated on web status webpage only at startup before initial time is loaded. This status is not logged and does not cause a trap.

While a system peer is present the NTP service should function without problem. If “no system peers” is seen with a GNSS receiver, then an event flag will be issued (see Table 6.6 above). Corresponding to the peer-to-peer model, the network connection to specified NTP servers should be checked.

There is one other trap that can be issued, the cold-start trap. This will appear to be issued from the ETH2 address.

## 6.6 Remote Restart

There is a mechanism to remotely reboot the NTP800. From the SYSTEM webpage notice the small ‘\_’ on the top left side of the webpage as shown in Figure 6.11 below.

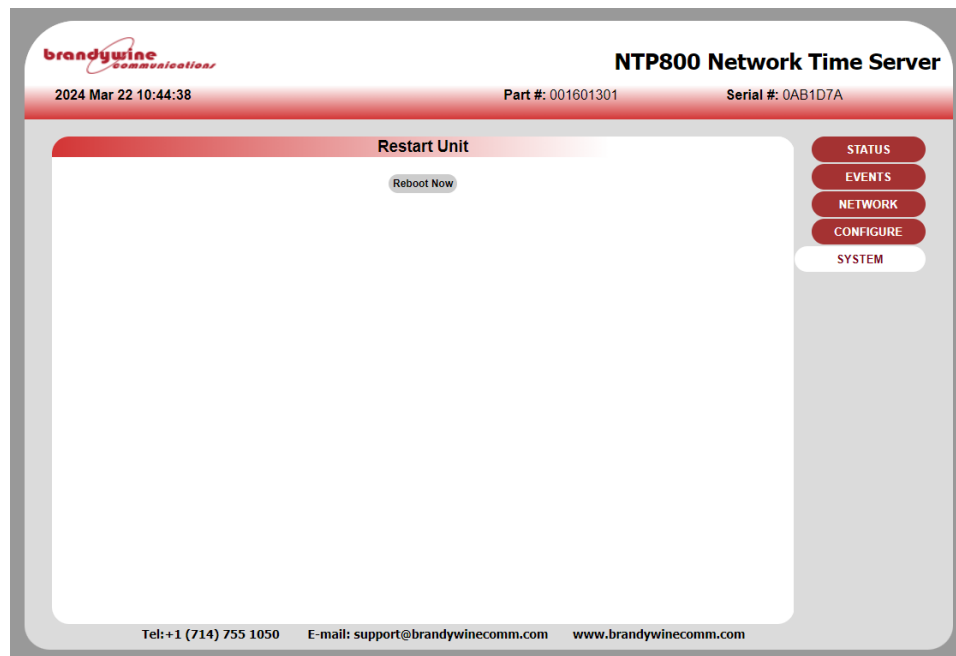


Figure 6.11: Detail View of Remote Restart Option

Selecting the [reboot now] button will cause the unit to do a complete restart. It will take approximately 1 minute to reboot.

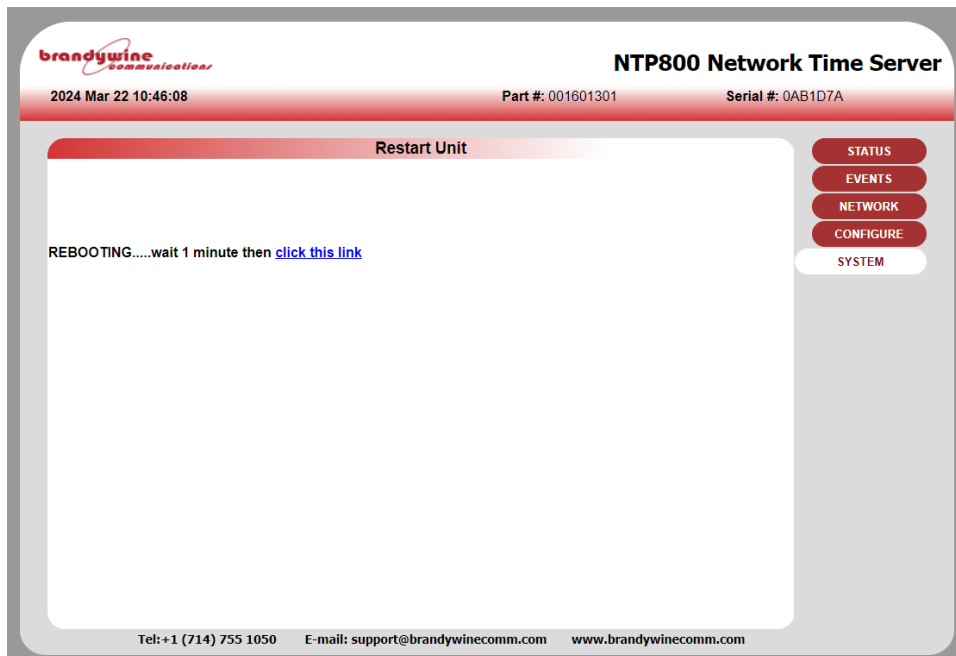


Figure 6.12: Remote Restart Complete

Clicking the link shown in Figure 6.12 above will take you back to the status webpage.



# Chapter 7

## Working with the Clock Management System

The status of the NTP800 will be shown on the status tab for the particular time server. There are five sources of possible alarm states. These relate to the status elements NTP overall state, GPS system state and the ETHx ifOperState for each port.

For the overall NTP state, Table 7.1 below will indicate a fault and turn the indicator red:

Table 7.1: NTP States

<b>NTP State</b>	<b>Description</b>
NTP <b>not loaded</b>	NTP not loaded will be the case at start up, prior to first time synchronization. After this, unless the NTP service is reconfigured this alarm will not be set.
NTP GPS <b>no GPS</b>	Not synchronizing to GPS. Check GPS status for reason. This will be permanently set with a Peer-to-peer NTP800 but will not cause an alarm.

*Continued on next page.*

Table 7.1: NTP States (Continued)

<b>NTP State</b>	<b>Description</b>
NTP Peer to Peer <b>no peer</b>	Disabled for GPS NTP800. For peer to peer NTP800 indicates that NTP service has no peers to synchronize to and will therefore cause an alarm.
NTP service <b>not present</b> .	NTP service fault. Consult Time & Frequency Solutions.

For GPS system state (applicable only to GPS NTP800), Table 7.2 below shows alarms caused by:

Table 7.2: GPS States	
<b>GPS State</b>	<b>Description</b>
Time <b>Not loaded</b>	NTP800 GPS engine has not yet loaded time. Should only occur at start-up of NTP800. After time has been set the alarm will clear. It can then never be set again without power-down.
GPS <b>Acquiring sync</b>	GPS is not currently synchronized. The likelihood is that there are not enough tracked satellites.
GPS <b>Not present</b>	Should only occur and NTP800 start-up.

Table 7.3 below shows the possible states for the ETHx interface:

Table 7.3: ETHx States	
<b>ETHx State</b>	<b>Description</b>
ifOperStatus <b>down</b>	Network connection is not active. Check connectivity.



# Chapter 8

## Maintenance

### 8.1 Preventive Maintenance

The NTP800 does not require scheduled preventative maintenance during normal operation.

## **8.2 Uploading New Firmware to the NTP800**

See Chapter 11 on page 71, “Updating Firmware and FPGA” for the instructions on how to do this.

## Chapter 9

# Frequently Asked Questions

Table 9.1 below and on page 65 is a list of commonly asked questions by our customers. If the question that you wished to be answered is not in the list please contact us. Contact details are found at the end of this manual under Chapter A.

Table 9.1: Frequently Asked Questions

- Q Can the NTP800 act as a stratum one server?*
- A Yes, Once the NTP800 has synchronized to a traceable GPS or Off-Air source it will automatically become a stratum one server. In the event of loss of synchronization this will be maintained for up to 24 hours at stability in accordance with the internal oscillator specified.*

*Continued on next page.*

Table 9.1: Frequently Asked Questions (Continued)

- Q* What packet types will the NTP800 respond to?
- A* ARP requests - to find Ethernet addresses given the TCP/IP address.  
ICMP echo requests - to allow 'pings' of the NTP server.  
UDP connections to port 123 – the defined NTP server port, SNMP V1, V2c  
TIME & DAYTIME (port 13 and 37)  
FTP for firmware update.
- No other packets are accepted.
- Q* Can a client have two sources of stratum one server so if one server loses the time or is offline the client can receive time from the second server?
- A* Yes, in most cases the client software will allow the configuration for two IP addresses; one IP address will be the “preferred” server.
- Q* How do I know if the NTP800 is free running? ie the NTP800 has synchronized to GPS at some point but has now lost synchronization?
- A* The webpage status and the NTP800 front panel will indicate that the GPS status is no longer Normal. The “STATUS” LED on the NTP800 will be off.
- Q* What causes the NTP800 – GPS Version to loose synchronization and free run?
- A* If the installation of the GPS antenna was originally correct, free running is commonly caused by the faults such as GPS cable feeder integrity or Water ingress to the antenna or feeder cable  
Satellites' visibility has been reduced through new building structures, or the new installation of other equipment above the antenna.

*Continued on next page.*

## CHAPTER 9. FREQUENTLY ASKED QUESTIONS

Table 9.1: Frequently Asked Questions (Continued)

- Q How many Clients may I connect to one NTP800 Time Server?*
- A* The NTP800 can handle up to 512 packets per second, which equates to a theoretical 512 x 64 (32,000+) clients assuming standard NTP operation. We do however recommend not exceeding 1000 clients as good practise in designing NTP networks. If more clients are used in heavy traffic then not all packets will be answered.
- Q I am not using the Time & Frequency Solutions Network Management System and using a third party software package. Where can I obtain the SNMP trap information?*
- A* See Appendix C on page 79 for the SNMP MIBS for the NTP800.



# Chapter 10

## Troubleshooting

The NTP800 is capable of alarm and status reporting. These alarms are listed in Table 10.1 on page 69 together with likely causes, and potential solutions.

## 10.1 Status LED Meanings

POWER LED on PSUs

STATUS – On

TIME VALID

On = Unit has obtained time from a time source since power on and holdover has not expired

Flashing = Unit time invalid but advancing with 10 MHz input

Off = Unit has not obtained time from a time source since power on

GNSS

On = GNSS receiver PPS and time data both present

Flashing = Only one of GNSS receiver PPS or time data present

Off = No GNSS receiver PPS or data present

TIMECODE

On = IRIG signal and derived PPS both decoded

Flashing = Either IRIG signal or derived PPS not present

Off = IRIG signal not decoded

HOLDOVER

On = Unit has had time since power on but now has no time source

Off = Unit has had no time since power on, or has valid time, or the holdover has expired

PPS



## 10.2 Faults/Troubleshooting Guide

Table 10.1: Faults/Troubleshooting Guide

<b>Fault</b>	<b>Cause</b>	<b>Solution</b>
The NTP800 does not respond via the network and no lamps are illuminated.	The NTP800 does not have power	Unsure that the NTP800 is connected to power (on both power supplies if necessary), and verify that the circuits the NTP800 are connected to have power.
The NTP800 has power but does not respond over the network	The network cable is disconnected  The network connection is incorrectly configured	Verify that the NTP800 is connected to the correct network(s) and that the LINK and ACT lamps are illuminated  Use an Ethernet cable to connect to a different Ethernet port and use the web UI to configure the non-responsive port.  Perform a factory reset



## Chapter 11

# Updating Firmware and FPGA

The file for system update and a checksum will be supplied by Brandywine.

At this point it is possible to set up an ftp-server onto which the update file is placed, and retrieve from, or secure copy (scp) the provided file to the unit under Brandywine's instruction.

Browse to `<ip-address>/update.html` and supply either the ftp-server details or the file's location on the unit, and optionally the checksum.

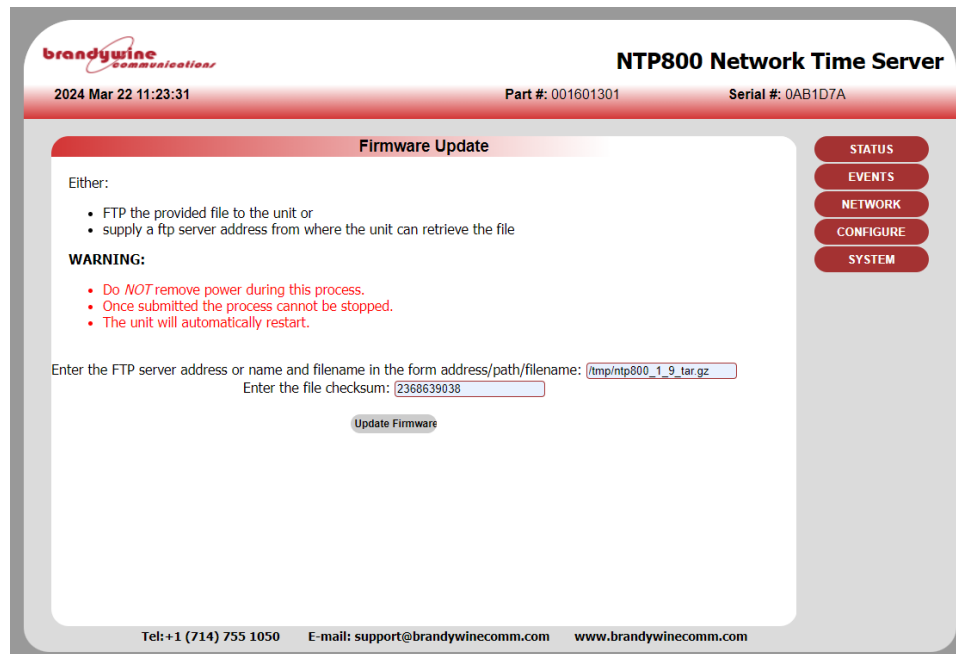


Figure 11.1: Firmware Update

Click ‘Update Firmware’ and wait, for up to 4 minutes. **DO NOT TURN THE POWER OFF DURING THIS TIME.** An outline of the actions that have taken place is given at the end of the process.



# Appendix A

## Support Information

All Brandywine Communications and Time & Frequency Solutions products come with a three-year warranty.

If the unit is still exhibiting problems not covered by the above troubleshooting guide, contact us for technical support at [support@brandywinecomm.com](mailto:support@brandywinecomm.com) or call us at +1 (714) 755-1050.

If it becomes necessary to return the unit to the factory for repairs, call us at +1 (714) 755-1050 extension 113 to arrange an RMA.



## Appendix B

# Understanding the Network Time Protocol

### B.1 Why use the Network Time Protocol

Accurate Time has always been an important issue, especially in today's world where computer systems are required to precisely time stamp events and occurrences. However, computers are notorious for poor time keeping because they use a basic watch crystal as their internal timebase. This means that the computer's internal clock will drift significantly over time, an effect exacerbated by changes in temperature. A computer in an office environment can lose or gain up to 40 seconds in a week.

Computers are normally set manually to a known time source such as a speaking clock or broadcast time signal. Once set, most users leave the computer timebase to drift, resetting the operating system clock only on an ad-hoc basis.

Network Time Protocol (NTP) is an Internet Protocol, which propagates time throughout the network and is referenced to UTC. The NTP Time Server acquires UTC time by a direct UTC time scale source, such as GPS. Other options such as IRIG or LF receiver are available.

## B.2 Understanding NTP

The client computer obtains the NTP protocol by requesting a NTP packet from the NTP Server. The Software that requests the packet handles reception, maintenance and distribution of the time on the computers where it is installed. All Time & Frequency Solutions NTP Time Servers are supplied, with client software as standard for a range of operating systems & platforms.

Most client software compensates for the delays over the network, and synchronizes the computers with an accuracy of typically 1ms to the NTP Server. For larger networks such as WANs delays of up to 10ms can be expected.

As seen in Figure B.1 below, NTP includes a method to automatically calculate and compensate for propagation delay over the network.

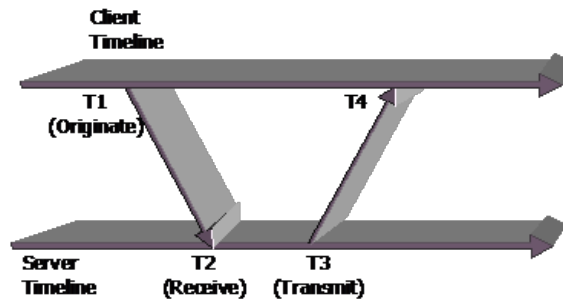


Figure B.1: Basic Method of Delay Calculation Over a Network

Another commonly used protocol is the SNTP (Simple Network Time Protocol). As the name suggest this is a simpler way of obtaining time over a network, but this method does not compensate for delays and therefore is not as accurate.



## B.3 NTP Hierarchical Structure

NTP supports a hierarchical structure as shown in Figure B.2 to ensure the availability of time, allowing the user to monitor their position in the hierarchy and thus the quality of the time service available.

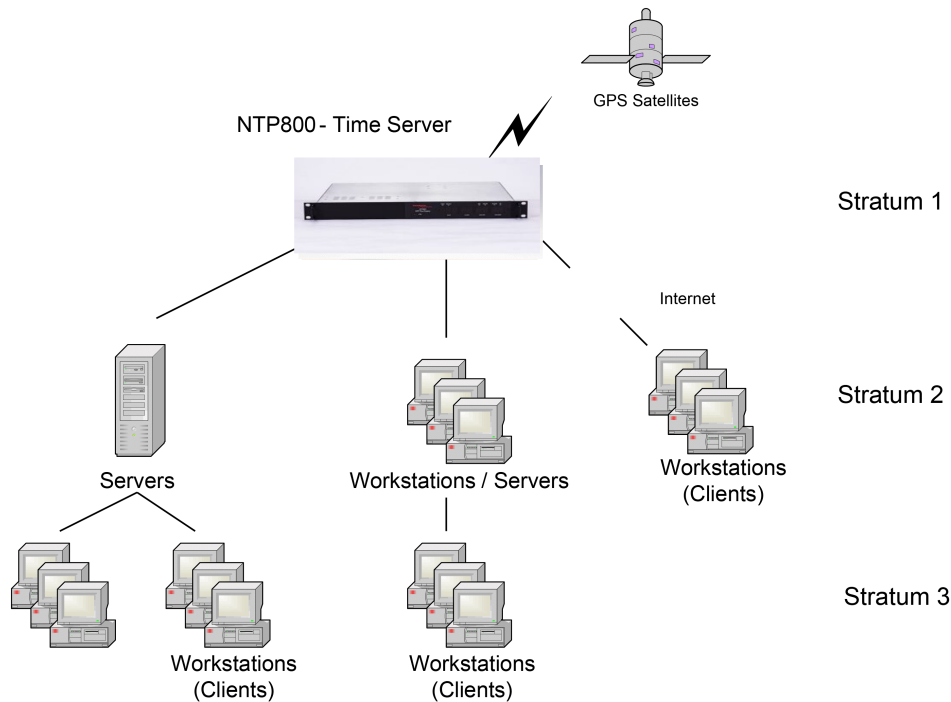


Figure B.2: Explanation of Hierarchical Stratum Structure

The time server's hierarchy is classed as Stratum, where a stratum one time server that is directly synchronized to a traceable standard source such as UTC. A server synchronized to a stratum one server is classed as a stratum two server, and so on. This hierarchical structure allows sub partitioning of groups of networks.

The NTP800 can handle up to 5000 time requests per second. We recommend spreading all the NTP client's polling activity towards the NTP800 to avoid this performance becoming degraded due to non or throttled NTP responses.



# Appendix C

## SNMP MIB Format

### C.1 Brandywine Communications Common MIB File

```
--*****--
-- BRANDYWINE COMMUNICATIONS Inc --
-- --
-- COMMON MIB 928600001 --
-- --
-- Standard MIB objects in all products. --
-- --
-- --
-- --
--*****--

BRANDYWINECOMM-COMMON-MIB DEFINITIONS ::= BEGIN
IMPORTS
    enterprises,
    OBJECT-TYPE,
    MODULE-IDENTITY,
    NOTIFICATION-TYPE
    FROM SNMPv2-SMI;

brandywineComm MODULE-IDENTITY
    LAST-UPDATED "201910210000Z"
```

C.1. BRANDYWINE COMMON MIB      APPENDIX C. SNMP MIB FORMAT

```
ORGANIZATION "Brandywine Communications Inc"
CONTACT-INFO "support@www.brandywinecomm.com"
DESCRIPTION "All objects common to Brandywine Communications products"
-- Revision History
REVISION     "201905250000Z"
DESCRIPTION  "Initial release"
REVISION     "201910020000Z"
DESCRIPTION  "v1.0 Add class/project definitions"
REVISION     "201910210000Z"
DESCRIPTION  "Add CATU product. Correct descriptions"
REVISION     "202004290000Z"
DESCRIPTION  "Extend serial number from 6 to 7 octess."
              ::= { enterprises 18954 }

--brandywineComm OBJECT IDENTIFIER ::= { enterprises 18954 }
common           OBJECT IDENTIFIER ::= { brandywineComm 500 }
  -- all product classes, separate MIB definition files
  -- in each class then each product
  -- <classname>  OBJECT IDENTIFIER ::= { class <project id> }
  -- <productname> OBJECT IDENTIFIER ::= { classname <partnumber?> }
  -- module

class OBJECT IDENTIFIER ::= { brandywineComm 501 }
products OBJECT IDENTIFIER ::= { brandywineComm 502 }

-----
-- common
-----

inventory       OBJECT IDENTIFIER ::= { common 1 }

productType OBJECT-TYPE
SYNTAX INTEGER
    { ntp8 (1),
      tfdNTP (2),
      tfdATM (3),
      tfdSCCAM (4),
      m21xETH (5),
      m21xATM (6),
      ntpDISP (7),
```

```

    ntp80 (8),
    ptp80 (9),
    ptp8 (10),
    timeacc001 (11),
    ntp800 (6002),
    catu (6033)
    }
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Indicates type of unit and hence its functionality"
::= {inventory 1}

partNo OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..16))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Unit part number"
    ::= {inventory 2}

serialnumber OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..6))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Serial number of unit"
    ::= {inventory 3}

codenumber OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..14))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Firmware part number"
    ::= {inventory 4}

codeversion OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..8))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Firmware version number"
    ::= {inventory 5}

phwnumber OBJECT-TYPE

```

```

SYNTAX OCTET STRING (SIZE(0..14))
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Programmable logic (FPGA, EPLD) part number"
::= {inventory 6}

phwversion OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..8))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Programmable logic (FPGA, EPLD) version number"
    ::= {inventory 7}

systemstatus OBJECT IDENTIFIER ::= { common 2 }

syslogTable OBJECT-TYPE
    SYNTAX SEQUENCE OF SyslogEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION "System log table"
    ::= {systemstatus 1}

syslogEntry OBJECT-TYPE
    SYNTAX SyslogEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION "System log record"
    INDEX {eventid}
    ::= {syslogTable 1}

SyslogEntry ::= SEQUENCE {
    timestamp INTEGER,
    resolver INTEGER,
    eventid INTEGER,
    severity INTEGER,
    module OCTET STRING,
    function OCTET STRING,
    description OCTET STRING
}

```

APPENDIX C. SNMP MIB FORMAT      C.1. BRANDYWINE COMMON MIB

```
timestamp OBJECT-TYPE
  SYNTAX INTEGER
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "time as number of secs since 1 January 1970"
  ::= {syslogEntry 1}

resolver OBJECT-TYPE
  SYNTAX INTEGER
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "fraction of seconds, in microseconds"
  ::= {syslogEntry 2}

eventid OBJECT-TYPE
  SYNTAX INTEGER (1..2147483647)
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Event log index"
  ::= {syslogEntry 3}

severity OBJECT-TYPE
  SYNTAX INTEGER
    { sysOK (0),
      sysFATAL (1),
      sysWARN (2),
      sysNET (3),
      sysINF (4),
      sysERR (5)
    }
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Event type"
  ::= {syslogEntry 4}

module OBJECT-TYPE
  SYNTAX OCTET STRING (SIZE(0..31))
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Module causing event"
  ::= {syslogEntry 5}
```

```
function OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..31))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Function within module causing event"
    ::= {syslogEntry 6}
```

```
description OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..128))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Description of event"
    ::= {syslogEntry 7}
```

```
lastevent OBJECT-TYPE
    SYNTAX INTEGER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Last event ID"
    ::= {systemstatus 2}
```

```
trapmask OBJECT-TYPE
    SYNTAX INTEGER (0..63)
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION "This is a bit-mask representing the severity
        levels that cause a trap. Set the equivalent
        bit 1-5 to stop that syslog severity causing
        a trap. Therefore 0 (default) is all levels
        generate trap messages."
    ::= {systemstatus 3}
```

```
sysstate OBJECT-TYPE
    SYNTAX INTEGER (0..65535)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Bit flag state of system bits TBD
        0x8000 synchronised
        "
```



::= {systemstatus 4}

restart OBJECT-TYPE  
SYNTAX INTEGER  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION "Remote reset. Set to 1 to cause reset."  
::= {systemstatus 7}

clock OBJECT IDENTIFIER ::= {common 3}

frequency OBJECT-TYPE  
SYNTAX INTEGER  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION "Frequency in Hz of the local clock oscillator as determined by PLL"  
::= {clock 1}

phaseerror OBJECT-TYPE  
SYNTAX INTEGER  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION "Phase error in ns"  
::= {clock 2}

jitter OBJECT-TYPE  
SYNTAX INTEGER  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION "clock jitter in ns"  
::= {clock 3}

dispersion OBJECT-TYPE  
SYNTAX INTEGER  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION "clock dispersion, averaged error, in ns"  
::= {clock 4}

```

freqoffset OBJECT-TYPE
    SYNTAX INTEGER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "clock offset in ppb"
    ::= {clock 5}

stability OBJECT-TYPE
    SYNTAX INTEGER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "clock stability in ppb"
    ::= {clock 6}

leapSecond OBJECT-TYPE
    SYNTAX INTEGER {   noleapsecond (0),
                       pendAddleapsecond (1),
                       pendSubleapsecond (2)
                     }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Leap second pending.
                 Flags to indicate an upcoming leap second event at the next
                 leap second adjustment time; either June 30 23:59:59 UTC or
                 Dec 31 23:59:59 UTC
                 "
    ::= {clock 7}

oscType OBJECT-TYPE
    SYNTAX OCTET STRING
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Oscillator type description"
    ::= {clock 8}

clockState OBJECT-TYPE
    SYNTAX INTEGER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Clock status bit flags:  0x01 valid pps
                 0x02 valid data
    
```

APPENDIX C. SNMP MIB FORMAT      C.1. BRANDYWINE COMMON MIB

0x04 loaded last frame (LLF)  
0x08 loaded since reset (LSR)  
0x10 LSR in the last VALIDSECONDS  
0x20 Synchronised since reset.  
0x40 Manual time entry  
0x80 Leap second pending

Note not all flags are implemented in all clocks. LLF & LSR are always implemented. "

::= {clock 9}

refsources OBJECT IDENTIFIER ::= {common 4}

syncsource OBJECT-TYPE

SYNTAX INTEGER

MAX-ACCESS read-only

STATUS current

DESCRIPTION "Index into table of sourcelist of current sync source"

::= {refsources 1}

sourcelist OBJECT-TYPE

SYNTAX SEQUENCE OF SourcelistEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION "System log table"

::= {refsources 2}

sourcelistEntry OBJECT-TYPE

SYNTAX SourcelistEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION "List of reference sources for unit"

INDEX {eventid}

::= {sourcelist 1}

SourcelistEntry ::= SEQUENCE {  
    sourcetype INTEGER,  
    status INTEGER,  
    lastlock INTEGER,  
    currenttime INTEGER,

```

        phase INTEGER
    }

sourcetype OBJECT-TYPE
    SYNTAX INTEGER
        { noClockSource (0),
          gps (1),
          timecode (2),
          msf (3),
          dcf (4),
          wwvb (5),
          ntp (6),
          ptp (7),
          havequick (8),
          irig (9)
        }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "type of synchronization source"
    ::= {sourcelistEntry 1}

status OBJECT-TYPE
    SYNTAX INTEGER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Bit flags indicating state of source
        0x01 Loaded since reset
        0x02 Loaded last frame
        0x80 synchronised
    "
    ::= {sourcelistEntry 2}

lastlock OBJECT-TYPE
    SYNTAX INTEGER
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Last lock time expressed as number of seconds since 1/1/1970"
    ::= {sourcelistEntry 3}

currenttime OBJECT-TYPE
    SYNTAX INTEGER

```

APPENDIX C. SNMP MIB FORMAT      C.1. BRANDYWINE COMMON MIB

```
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Current time expressed as number of seconds since 1/1/1970"
 ::= {sourcelistEntry 4}
```

```
phase OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
DESCRIPTION "last phase error measurement ns"
 ::= {sourcelistEntry 5}
```

```
alerts OBJECT IDENTIFIER ::= {common 10}
```

```
eventTrapV2 NOTIFICATION-TYPE
OBJECTS { timestamp,
          resolver,
          eventid,
          severity,
          module,
          function,
          description
        }
STATUS current
DESCRIPTION "System log event trap v2"
 ::= {alerts 8}
```

```
eventTrap TRAP-TYPE
ENTERPRISE brandywineComm
VARIABLES { timestamp,
            resolver,
            eventid,
            severity,
            module,
            function,
            description
          }
DESCRIPTION "System log event trap"
 ::= 8
```

*C.1. BRANDYWINE COMMON MIB      APPENDIX C. SNMP MIB FORMAT*

END

## C.2 Time & Frequency Solutions Common MIB File

```

--*****--
-- TFS Enterprise MIB --
-- --
-- v8.00 Additional clock objects. --
-- --
-- v7.00 Rationalisation of TFS mibs for all products. --
-- Initial common MIB for all products. --
-- --
--*****--

```

```
TFS DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```

enterprises
  FROM RFC1155-SMI
OBJECT-TYPE
  FROM RFC-1212
TRAP-TYPE
  FROM RFC-1215;

```

```
tfs OBJECT IDENTIFIER ::= {enterprises 10784}
```

```
common OBJECT IDENTIFIER ::= {tfs 3}
```

```
servertype OBJECT-TYPE
```

```
SYNTAX INTEGER
```

```

{ ntp8 (1),
  tfdNTP (2),
  tfdATM (3),
  tfdSCCAM (4),
  m21xETH (5),
  m21xATM (6),
  ntpDISP (7),
  ntp80 (8),

```

```
    ptp80 (9),
    ptp8 (10),
    timeacc001 (11)
    }
ACCESS read-only
STATUS mandatory
DESCRIPTION "Indicates type of unit and hence its functionality"
::= {common 1}

modelNo OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..16))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Model number"
    ::= {common 2}

serialnumber OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..5))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Internal serial number of unit"
    ::= {common 3}

codenumber OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..14))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Firmware part number"
    ::= {common 4}

codeversion OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..8))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Firmware version number"
    ::= {common 5}

systemstatus OBJECT IDENTIFIER ::= {tfs 4}
```



```
lastevent OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Last event ID"
    ::= {systemstatus 2}

trapmask OBJECT-TYPE
    SYNTAX INTEGER (0..63)
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION "This is a bit-mask representing the severity
        levels that cause a trap. Set the equivalent
        bit 1-5 to stop that syslog severity causing
        a trap. Therefore 0 (default) is all levels
        generate trap messages."
    ::= {systemstatus 3}

restart OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION "Remote reset. Set to 1 to cause reset."
    ::= {systemstatus 7}

syslogTable OBJECT-TYPE
    SYNTAX SEQUENCE OF SyslogEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION "System log table"
    ::= {systemstatus 1}

syslogEntry OBJECT-TYPE
    SYNTAX SyslogEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION "System log record"
    INDEX {eventid}
    ::= {syslogTable 1}
```

```

SyslogEntry ::= SEQUENCE {
    timestamp INTEGER,
    resolver INTEGER,
    eventid INTEGER,
    severity INTEGER,
    module OCTET STRING (SIZE(0..31)),
    function OCTET STRING (SIZE(0..31)),
    description OCTET STRING (SIZE(0..128))
}

```

timestamp OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION "time as number of secs since 1 January 1970"

::={syslogEntry 1}

resolver OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION "fractions of seconds as a count of 40ns pulses"

::={syslogEntry 2}

eventid OBJECT-TYPE

SYNTAX INTEGER (1..2147483647)

ACCESS read-only

STATUS mandatory

DESCRIPTION "Event log index"

::={syslogEntry 3}

severity OBJECT-TYPE

SYNTAX INTEGER

```

{ sysOK (0),
  sysFATAL (1),
  sysWARN (2),
  sysNET (3),
  sysINF (4),
  sysERR (5)
}

```

ACCESS read-only

STATUS mandatory

```

DESCRIPTION "Event type"
 ::= {syslogEntry 4}

module OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..31))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Module causing event"
    ::= {syslogEntry 5}

function OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..31))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Function within modules causing event"
    ::= {syslogEntry 6}

description OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(0..128))
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Description of event"
    ::= {syslogEntry 7}

typespecific OBJECT IDENTIFIER ::= {tfs 5}

clock OBJECT IDENTIFIER ::= {tfs 6}

frequency OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Frequency in Hz of the local clock oscillator as determined by PLL"
    ::= {clock 1}

phaseerror OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Phase error expressed as multiple of 1/frequency s"

```

```
 ::= {clock 2}

jitter OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "clock jitter in ns"
    ::= {clock 3}

dispersion OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "clock dispersion, averaged error, in ns"
    ::= {clock 4}

freqoffset OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "clock offset in ppb"
    ::= {clock 5}

stability OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "clock offset in ppb"
    ::= {clock 6}

leapSecond OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Leap second pending. value is since 1/1/1970"
    ::= {clock 7}

oscType OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-only
    STATUS mandatory
```

```
DESCRIPTION "Oscillator type description"
 ::= {clock 8}

clockState OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Clock status bit flags: 0x01 valid pps
        0x02 valid data
        0x04 loaded last frame (LLF)
        0x08 loaded since reset (LSR)
        0x10 LSR in the last VALIDSECONDS
        0x20 Synchronised since reset.
        0x40 Manual time entry
        0x80 Leap second pending
    Note not all flags are implemented in all clocks. LLF & LSR are always
    implemented. "

 ::= {clock 9}

source OBJECT IDENTIFIER ::= {tfs 7}

sourcetype OBJECT-TYPE
    SYNTAX INTEGER
        { noClockSource (0),
          gps (1),
          timecode (2),
          msf (3),
          dcf (4),
          wwvb (5),
          ntp (6),
          ptp (7)
        }
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "type of synchronization source"
    ::= {source 1}

lastlock OBJECT-TYPE
    SYNTAX INTEGER
```

```

ACCESS read-only
STATUS mandatory
DESCRIPTION "Last lock time expressed as number of seconds since 1/1/1970"
 ::= {source 2}

currenttime OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION "Current time expressed as number of seconds since 1/1/1970"
 ::= {source 3}

modules OBJECT IDENTIFIER ::= {tfs 8}

alerts OBJECT IDENTIFIER ::= {tfs 99}

eventTrapV2 NOTIFICATION-TYPE
OBJECTS { timestamp,
          resolver,
          eventid,
          severity,
          module,
          function,
          description
        }
STATUS current
DESCRIPTION "System log event trap v2"
 ::= {alerts 8}

eventTrap TRAP-TYPE
ENTERPRISE tfs
VARIABLES { timestamp,
            resolver,
            eventid,
            severity,
            module,
            function,
            description
          }

```

```
DESCRIPTION "System log event trap"  
 ::= 8
```

END





# Appendix D

## TFS Message4 Format Definition

Each message is 22 bytes long and the format is defined in Table D.1 below.

Table D.1: TFS Message4 Format Definition

Byte	Definition
1	ASCII 'T'
2	ASCII TENS OF HOURS
3	ASCII UNITS OF HOURS
4	ASCII ':'
5	ASCII TENS OF MINUTES
6	ASCII UNITS OF MINUTES
7	ASCII ':'
8	ASCII TENS OF SECONDS
9	ASCII UNITS OF SECONDS
10	ASCII SPACE
11	ASCII TENS OF DAY OF MONTH
12	ASCII UNITS OF DAY OF MONTH
13	ASCII '/'
14	ASCII TENS OF MONTH
15	ASCII UNITS OF MONTH
16	ASCII '/'
17	ASCII TENS OF YEAR

*Continued on next page.*

APPENDIX D. TFS MESSAGE4 FORMAT DEFINITION

Table D.1: TFS Message4 Format Definition (Continued)

Byte	Definition
18	ASCII UNITS OF YEAR
19	ASCII DAY OF WEEK('0' = SUN)
20	HEX Checksum: Longitudinal Redundancy Check bytes 1-20 ( <b>XOR data</b> )
21	HEX Status <sup>1</sup>
22	ASCII Carriage Return

<sup>1</sup>**STATUS:** 0000abcd (a-d = 0 or 1) when 1, a = Time loaded since reset, b = Time loaded last minute, c = Leap year, d = Daylight Saving time

# Front Panel Drawing

Figure D.1 below shows the front panel of the NTP800

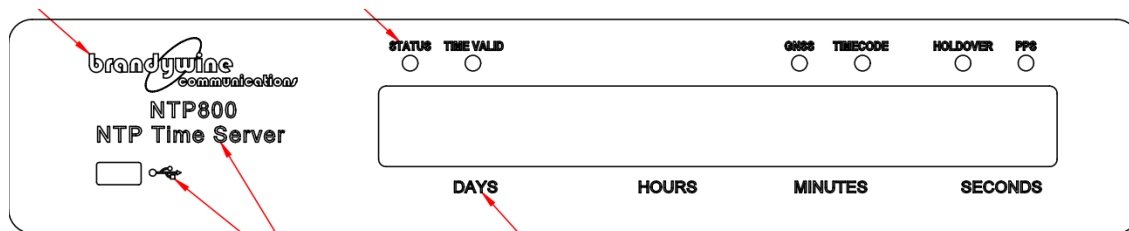


Figure D.1: Front Panel Drawing



# Rear Panel Drawing

Figure D.2 below shows the rear panel of the NTP800

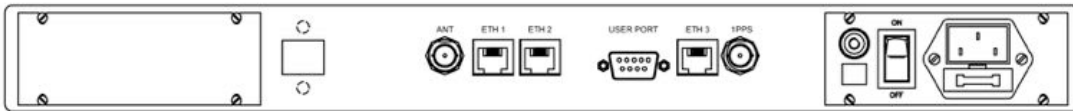


Figure D.2: Rear Panel Drawing





# Parts List