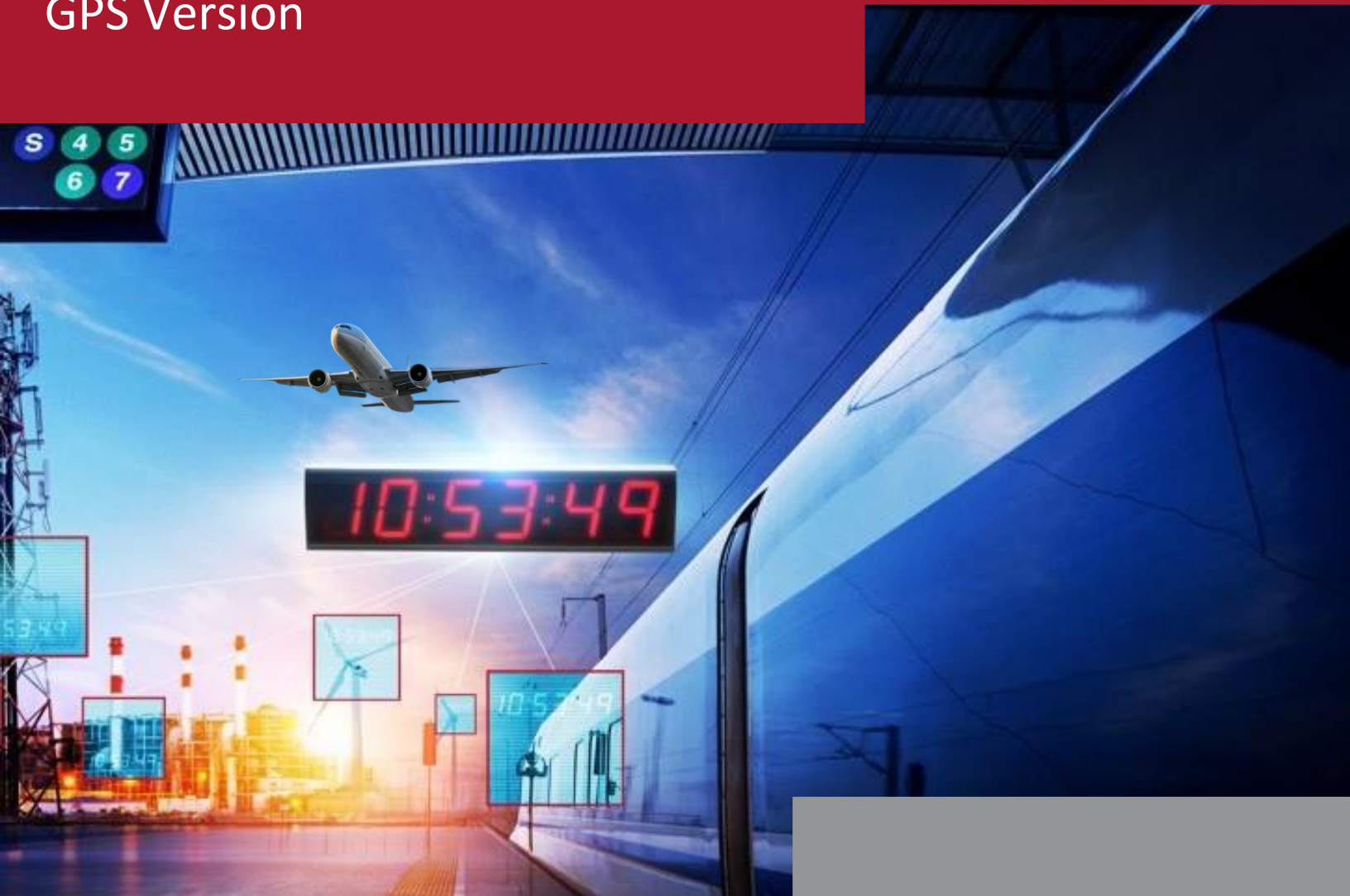# tfs

## Time & Frequency Solutions

NTP80plus Multiport Time Server
Reference Manual
GPS Version

Time & Frequency Solutions Ltd © 2024

P/N 900000165 REV I

# Read First:     Safety Information



Warnings and Cautions

Warnings ...

(1)     Dangerous voltages exist in this equipment. Do not attempt any repair without first switching off power to the system, at the front panel switch, and removing the power input connector.

(2)     Nickel, cadmium and lithium are toxic substances. The nickel cadmium battery or lithium battery is dangerous if broken or dismantled. If any battery chemicals come into contact with skin, wash with copious amount of water, and seek medical attention as required. If the battery is swallowed seek immediate medical attention. Return any faulty batteries to the manufacturer, properly packaged, for disposal.

(3)     Most board assemblies contain tantalum capacitors or electrolytic capacitors. Both types can explode under fault conditions. Take appropriate precautions when servicing the unit with the lid removed.

Caution ...

a)     This unit should only be serviced by qualified personnel, no user serviceable parts inside.

b)     Several Board Assemblies contain static sensitive devices. Appropriate procedures must be used when handling these items.

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## Revision History

| Revisions | Date | Revision History |
|---|---|---|
| A | July 12 2011 | Initial Release |
| B | October 13 2011 | Specification Update, Product Pictures, Login |
| C | November 28 2011 | Correct LED indicator table. Add Appendix A for firmware upload and Factory Defaults. |
| D | December 22 2012 | Update to include all improvements to NTP80plus. NTP80plus additional. |
| E | August 11 2016 | Update to include new UI screenshots |
| F | May 4 2017 | Reformatted to meet Brandywine Document Style. |
| G | November 2017 | Updated to reflect latest firmware changes |
| H | March 2018 | Updated temperature specifications |
| J | July 2024 ECO 13227 | Reformatted to meet Time & Frequency Document style. |

# Table of Contents

MANUAL P/N 900000165 REV I

# 1  Introduction

## 1.1  Introduction to the NTP80plus Multiport Time Server

Congratulations on the purchase of your Time & Frequency Solutions NTP-Multiport Time Server, Model Number NTP80plus.

This manual shows you how to install, configure and operate your NTP80plus to provide an NTP time server for your network. Once up and running the NTP80plus will provide accurate time synchronisation for your computer clients to within milliseconds on a LAN and tens of milliseconds over a WAN,

Prior to installing the NTP80plus please read the site preparation section first to ensure the smooth operation of your NTP80plus when it is installed. Then follow the quick setup guide to get your NTP80plus up and running. The remaining sections give more details on the configuration and operation of the NTP80plus.

**Feedback**

At Time & Frequency Solutions we pride ourselves on a quality product and our superior service. If you wish to comment on this, or provide improved feedback on this manual then please feel free to contact us. You may email us at *sales@timefreq.com* or contact as at the following -

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## 1.2 Packaging

The NTP80plus Time Server is supplied as a package, and will contain the following items. Before you start please check that you have been supplied all of the components.

| Component | Notes |
|---|---|
| ☐ NTP80plus Network Time Server. | |
| ☐ GPS Antenna | *GPS Version Only* |
| ☐ 30m RG58 cable | *GPS Version Only* |
| ☐ Factory Configuration Sheet | |

If your packaging is short of any item please contact us immediately. Your component list may differ from the above if specific accessories or optional extras were order.

## 1.3 Getting to know your NTP80plus

### 1.3.1 NTP80plus Time Server
This is the base product / unit and is the main integral part of the NTP80plus system.
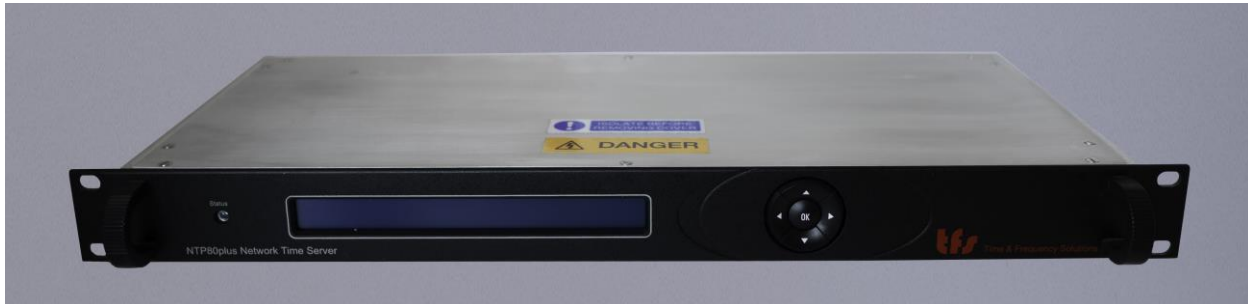


### 1.3.2 GPS Antenna
The NTP80plus requires an antenna for it to synchronise with GNSS satellites. The NTP80plus is supplied with a GPS antenna, and 30 metres of RG58 cable.

**What other equipment is required.**
The NTP80plus will require an RJ45 Patch Cable for connection to function correctly as a Network Time Server.

Initial or re-configuration will require a PC and Web Browser.

# 2 Site Preparation

## 2.1 Overview



The NTP80 GPS version is supplied with

The NTP80 unit
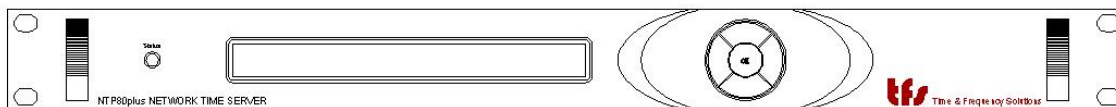GPS/GNSS Antenna
30m RG58 cable
Serial breakout cable (15pin D only)

## 2.2 Antenna

To prepare the site for the NTP80 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 fixings supplied and not to make any additional holes for fixing since this compromises the IP65 rating of the antenna.

The antenna is supplied with 30m of RG58 cable. If longer cable runs are required, it is possible to use a higher quality cable such as RG213 or RG218.

| Type of Cable | Maximum Length of Cable |
|---|---|
| RG58 | 34m |
| RG213 | 72m |
| RG217 | 95m |
| RG218 | 141m |

## 2.3 Power and Network

The NTP80 requires 90-240V AC @ 50-60Hz for power and has three RJ45 network connections.

# 3   Quick Setup Guide

## 3.1   Installation

Ensure the power, network and antenna connections have been provided as described in section 2.

Connect the antenna to the BNC connector labelled antenna on the rear of the unit along with power and a network connection. The network ports are supplied with default IP addresses of:

    ETH1    192.168.101.10
    ETH2    192.168.102.10
    ETH3    192.168.103.10

## 3.2   Initial Configuration

The NTP80 is configured using a web browser. There are two options in order to access the web configuration

a/ use the front panel to set an IP address to your local subnet. See section 6 on how to do this.

b/ use the default IP address of 192.168.101.10 on ETH1 with a PC or laptop that is configured for this network subnet.

Then in either case the web configuration below can followed.

## 3.3   Main Configuration

The default username and password to access the web interface is

    admin
    ThePassword

### 3.3.1   *Security*

If you wish to change these settings then use the SYSTEM button on the right. Refer to section 5.1 on how to change the settings.

### 3.3.2  Network Configuration

Use the network button on the right to select the network configuration page. This provides configuration for all the network settings, IP addresses, SNMP and service selection for the network ports.



Configure each port as required. Note that **submit** must be pressed for each port modified. Changing ports without submitting will lose any changes.

Select the services required for the port, SUPPORT provides telnet access and is used for factory support only. FTP is only used for new firmware updates.
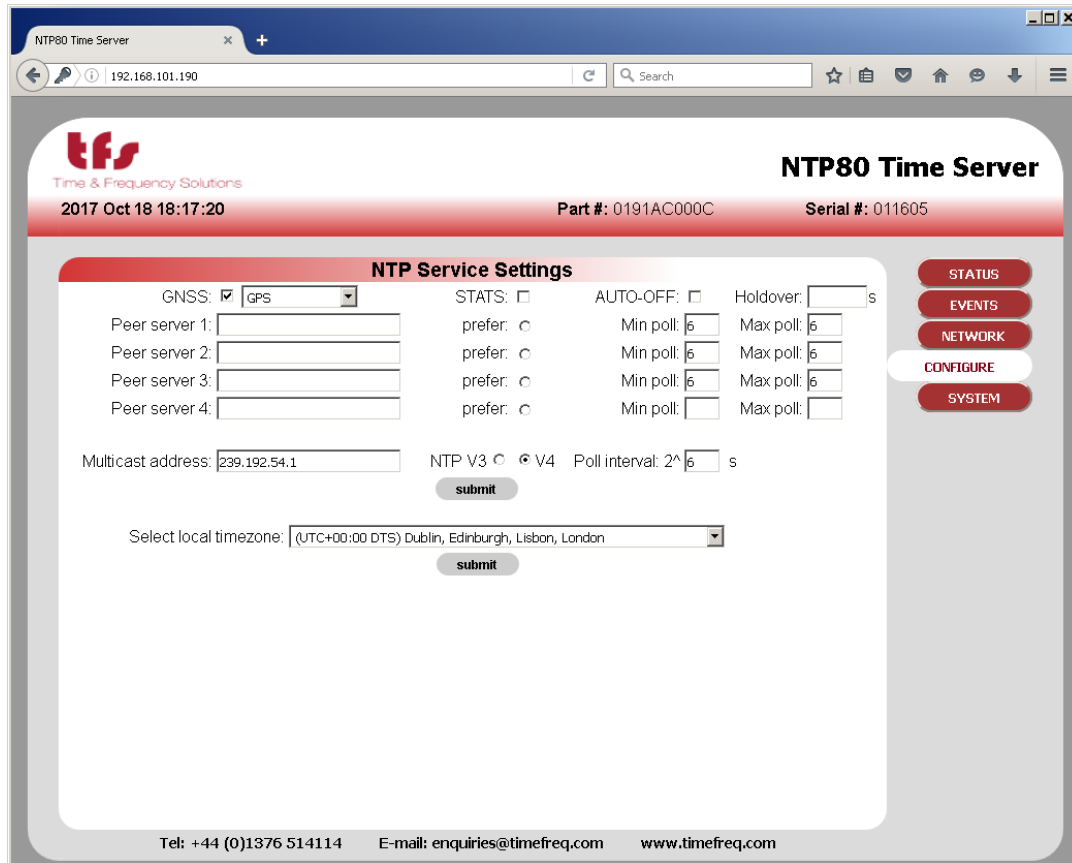
Once the settings have been made press **submit**.

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 5.2

### 3.3.3  *NTP Configuration*

If the unit is a peer to peer only, i.e. it does not have a GNSS receiver, then the CONFIGURE button will need to selected. For GNSS units the default settings will allow the NTP80 to synchronise with GPS and provide accurate time.



When in peer to peer only mode, ensure the GNSS checkbox is unchecked, then add the NTP peers to be configured as peers for this server. The poll intervals are given as power of 2 and can be from 6 (64s) to 9 (512s).

Press **submit** to make the changes. 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 section 5.3

The NTP80 will now be configured and able to serve time on your network.

The following sections give further and more detailed descriptions on configuring and running the NTP80.

# 4  NTP80plus Connections
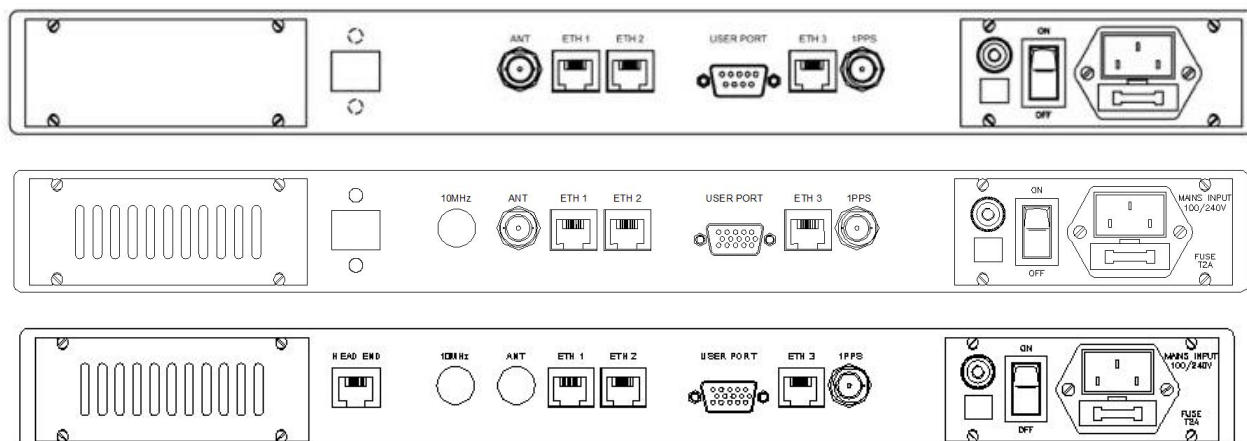


## 4.1  GPS Antenna Connections (GPS Version)

The antenna is connected to the BNC port marked Antenna on the rear of the NTP80. The antenna connector is a BNC Socket (50 ohm) and its connections are;-

> Inner: GPS Signal 1.6GHz (& +5v antenna amplifier power)
> Outer: GPS Return.

## 4.2  GPS Head-End

A remote GPS head-end option is available where the GPS receiver and antenna are combined at the antenna location. The NTP80plus is fed with a CAT 5 cable connection from the head-end.

## 4.3  1 PPS

The 1 Pulse per second (1PPS) output is derived from the NTP80 internal clock. If you have a requirement for a 1 PPS you may connect your equipment to this port.
The 1PPS has a positive going on-time edge, at a TTL level.

*Note* The 1PPS output will be available from initial power on, although it should be noted until the NTP80 has synchronised the 1 PPS will not be within the quoted accuracy specifications. Upon synchronisation of the NTP80, the 1PPS will be accurate to the quoted specifications.

The 1 PPS connector is a BNC Socket (50 ohm) and its connections are:
> Inner: 1 PPS, Positive going, on time edge, TTL level. (0v to +5v)
> Outer: 1 PPS Return.

## 4.4  User port

The user port is used for system recovery (see Appendix A) and diagnostics. It can also be factory configured for serial time of day message output. Contact sales for details.

The user port is either a 9 Way D type Socket. Its Pin assignments are shown below:

**Serial port 1**

| | |
|---|---|
| Pin 2 | Data Out (RS232) |
| Pin 3 | Data In (RS232) |
| Pin 5 | Signal Ground |

All other Pins have no function and are open circuit.

Or a 15 way D-sub, In this case dry-contact alarms and an additional RS422 serial timecode output are provided. The pin connections are as follows:

| | Alarms | Serial port 1 | Serial Port 2 |
|---|---|---|---|
| pin 1 | Power common | | |
| pin 2 | Power  normally closed | | |
| pin 3 | | Data in (RS232) | |
| pin 4 | | | Data out + RS422 |
| pin 5 | | Signal Ground | |
| pin 6 | Status common | | |
| pin 7 | Status normally closed | | |
| pin 8 | | Data out (RS232) | |
| pin 9 | | | Data out - RS422 |
| pin 10 | | | Data in + RS422 |
| pin 11 | Sync common | | |
| pin 12 | Sync normally closed | | |
| pin 13 | Signal Ground | | |
| pin 14 | | | Data in - RS422 |
| pin 15 | | | Signal Ground |

Serial port 1 has a configuration depending upon any factory configured serial time-of-day message. Without this serial message the port configuration is
   115.2baud, 8 bits/char, no parity, one stop bit,

Serial port 2 when enabled has a fixed configuration of
   4800 baud, 8 bits/char, no parity, one stop bit.

The message can be one of the following and the same on both ports:
   GPRMC
   TFS Message 1, byte sequence:
   centiseconds sec min hour weekday day month year 0 0 0x3f 0xff

all time/date values are in BCD.

**Alarm connections**

| Label | Activity | Remarks |
|---|---|---|
| power | closed | Power is supplied to the NTP80 |
| | open | Power is off |
| | | |
| status | closed | System is operating normally |
| | open | System is not operating normally |
| | | |
| sync | closed | Unit has loaded and serving time |
| | open | Unit has not loaded |

## 4.5   100 BASE T Ports

Three independent Ethernet ports are available for interfacing into your network and use standard Ethernet RJ45 connections. The unit is also configured and monitored via a web GUI through a network connection.

## 4.6   Power Connection

The AC mains connector is suitable for 90-240V AC at 50/60Hz.

# 5  Web-based configuration

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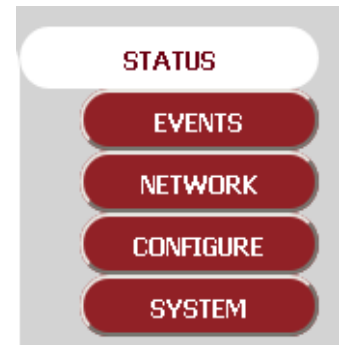


The three pages that configure the unit are

Network      Set the network configuration for each of the three Ethernet ports and also the SNMP parameters.

Configure    Set up the NTP operating parameters along with the local time zone.

System       Set up the web security to access the NTP80plus.

The NTP80plus is delivered with the web security enabled so access the unit for the first time requires entry of the default username and password.
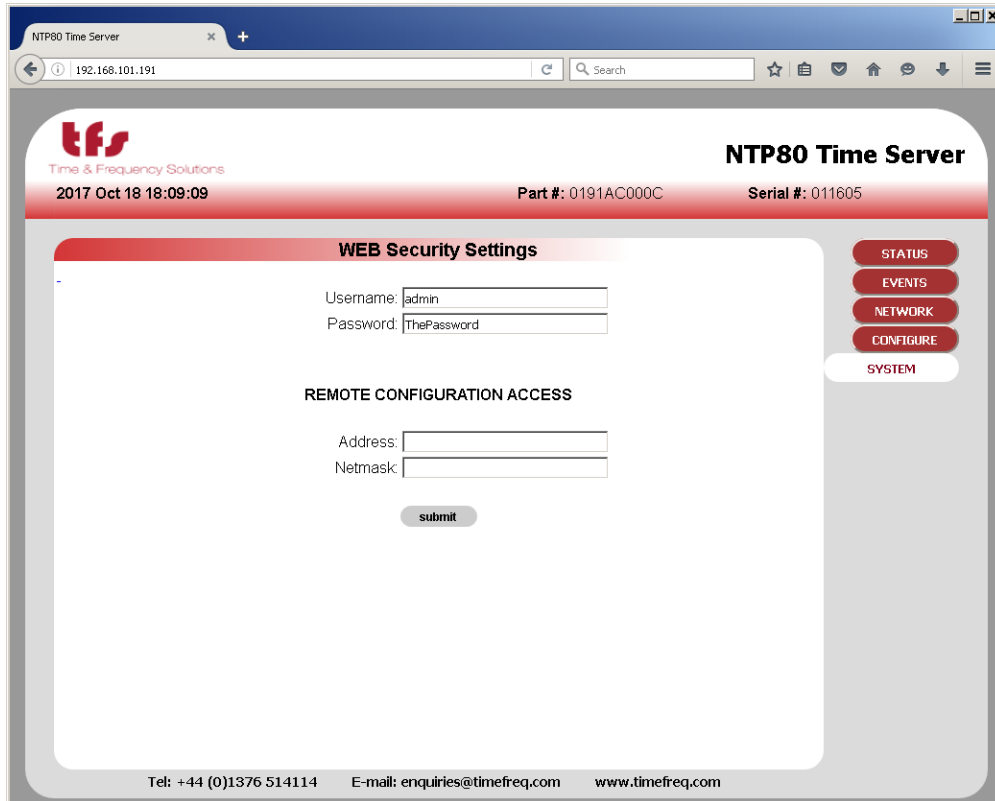
Default username     admin
Default password     ThePassword

These are case sensitive.

Access the NTP80plus with any browser, providing the above credentials and select the SYSTEM page from the navigation menu.

## 5.1  System Security

The login credentials, username and password, are set here. If they are removed then the security is disabled. Do not lose these details. If they are lost then the unit will have to be restarted and the factory defaults restored using the user interface port.



The remote configuration access limits access of the web interface to an 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**, for example 192.168.101.x then **192.168.101.0/255.255.255.0** can be entered for the address and netmask. 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 then 192.168.101.1/**255.255.255.255** can be entered for the address and netmask. Then only this host can use the web interface.
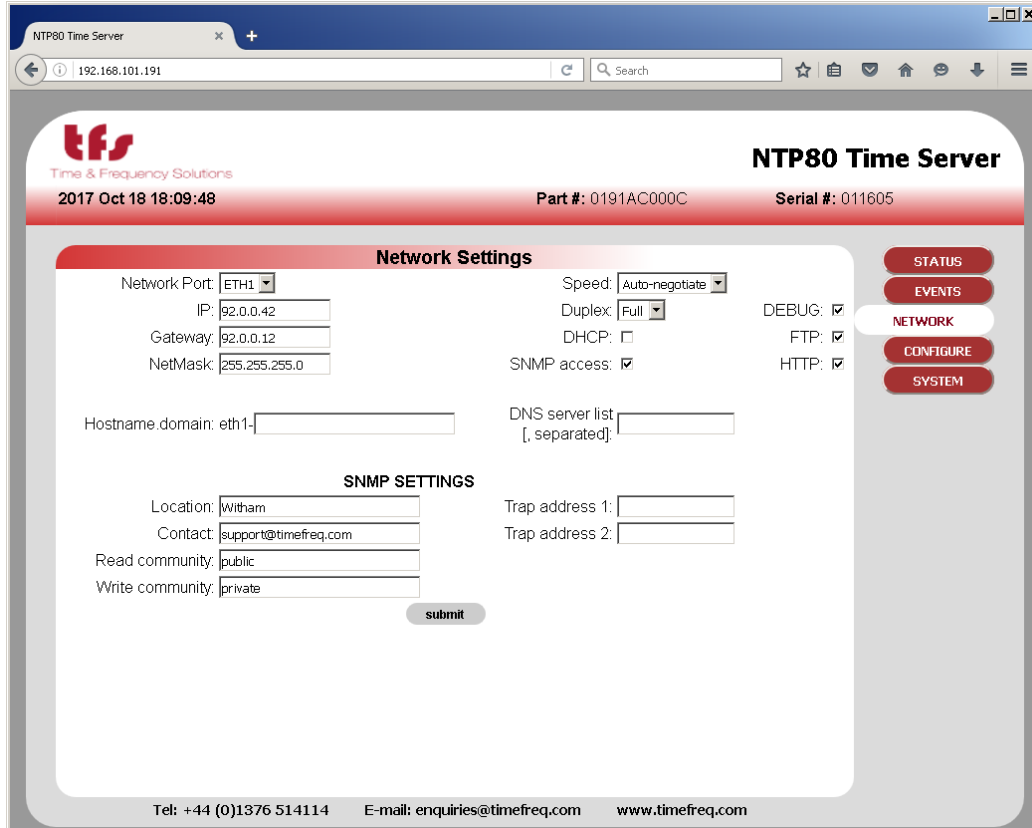
**CAUTION**

There must not be any discrepancy with subnet mask and IP address, for example if 192.168.101.1 had been entered with a subnet mask of 255.255.255.0 all access would be denied as there are no addresses that can meet this configuration. To recover from lock-out the unit will have to be restarted and the factory defaults restored using the user interface port.

## 5.2   Network Configuration

This page 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 following settings are port specific:

**IP** , **Gateway**, **Netmask**, **Speed**, **Duplex**

**DHCP**            - Permit port to acquire its address via DHCP. This will be shown on the status page.

**Hostname**       - The unit can be provided with a hostname for DHCP enabled ports. If changed or set independently of the DHCP flag, it must be submitted for each of the ports that DHCP has been enabled for.

**SNMP Access**  - Allows SNMP queries and traps to be generated.

**HTTP**            - Enable the web service on this interface. Note that it is not possible to disable the web interface from all ports with this setting.

**FTP**             - Allow firmware updates

**Support**        - Allow remote access for factory support if there are any problems. This is not a user accessible interface

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 are not port specific:

**DNS server list** - comma separated list of DNS server IP addresses.

**SNMP parameters** - These are effective on the ports that have SNMP access enabled.

The NTP80 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.

The NTP80 routing is such that all ports are isolated from each other.

Pressing **Submit** will apply the changes.

Note that if you change the IP address of the port through which the web page is being accessed the following will be shown, the link 'Click here to redirect to STATUS PAGE' is created to connect to the new address. The navigation panel at this point will not work as it has links to the old address.
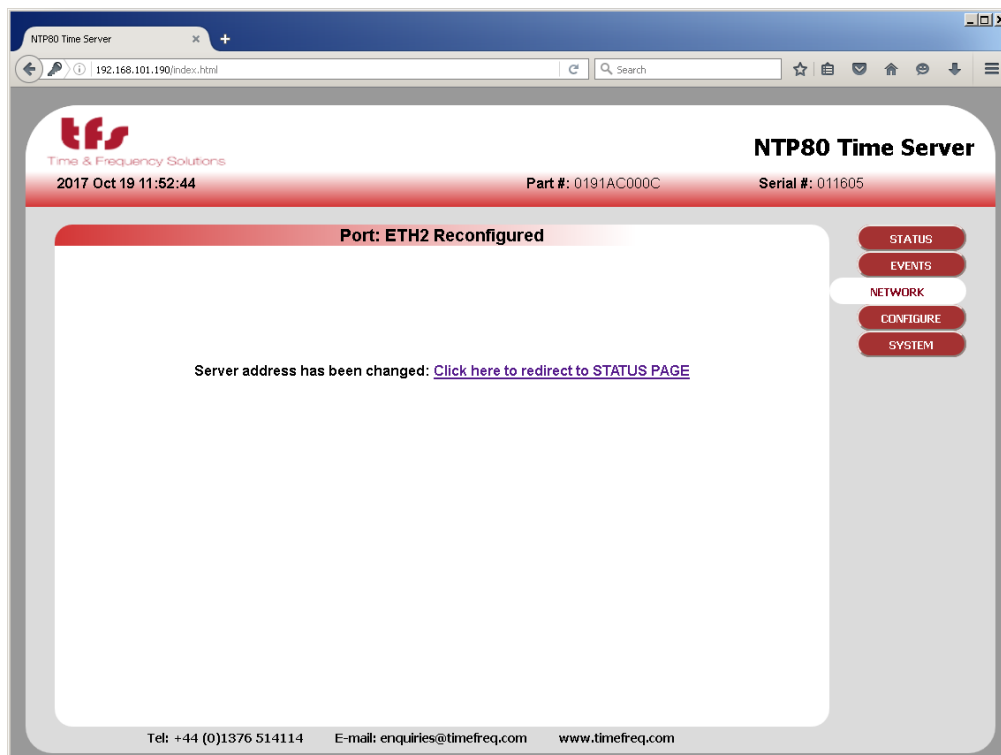
## 5.3   Configure, NTP Configuration

This page sets up the NTP service.



For the NTP80 with a GNSS receiver the **GNSS** checkbox must be ticked. The drop down list selects the GNSS constellation used for resolving time. This is after position is resolved in which 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.

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

**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 NTP80 servicing NTP requests after a period specified, in seconds, from the time that synchronisation is lost. Initially when this is enabled the holdover time will be set to 86400s, 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 NTP80. 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 1ms after 1 day of holdover assuming good GPS reception for a significant period of time prior to loss of synchronisation.

**Signal Mask**

A signal level value below which satellites ignored for timing, 0 – 55.  The default value is 35, reduce this if there are problems with GNSS synchronisation.

**Elevation Mask**

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

**Peer Servers 1-4**

If the NTP server is a peer-to-peer model, with no GPS fitted, then the GPS checkbox must not be ticked. The configuration then allows for up to four NTP servers to synchronise with. These are specified in Peer server 1 to 4. They can either be a DNS name or an IP address. The min and max poll indicate the minimum and maximum rate of NTP requests. This number is a power of 2 and can be from 6 to 9, so the standard minimum poll interval is $2^6$ = 64s and the maximum is $2^9$ = 512s. If these fields are left blank then the NTP service will decide on the appropriate polling interval.

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

The peer NTP servers can also be set up with a GNSS unit. These can then take over following the loss of GPS synchronisation. Note that depending on the oscillator fitted and the period for which GPS is lost, the performance when synchronising to another NTP server will not be as good as running in holdover. If peer NTP servers are available in this configuration the AUTO-OFF will not function until all possible synchronisation sources have failed.

**Mulitcast (or Broadcast) Address**

The NTP80 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 the address would be 255.255.255.255, for a subnet set the host part of the address to the last host address, so for network 192.168.101.0 that would be 192.168.101.255

The above parameters are applied when submit is pressed. This will stop and re-start the NTP service.

**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 NTP80 provide a local-time message, that local time is also defined by this parameter.

Press submit to change this value.
The NTP80 is now configured.

## 5.4   Status
The status page shows the current running state of the NTP80. The top section shows the system state including how long it has been running and the currently loaded date and time.
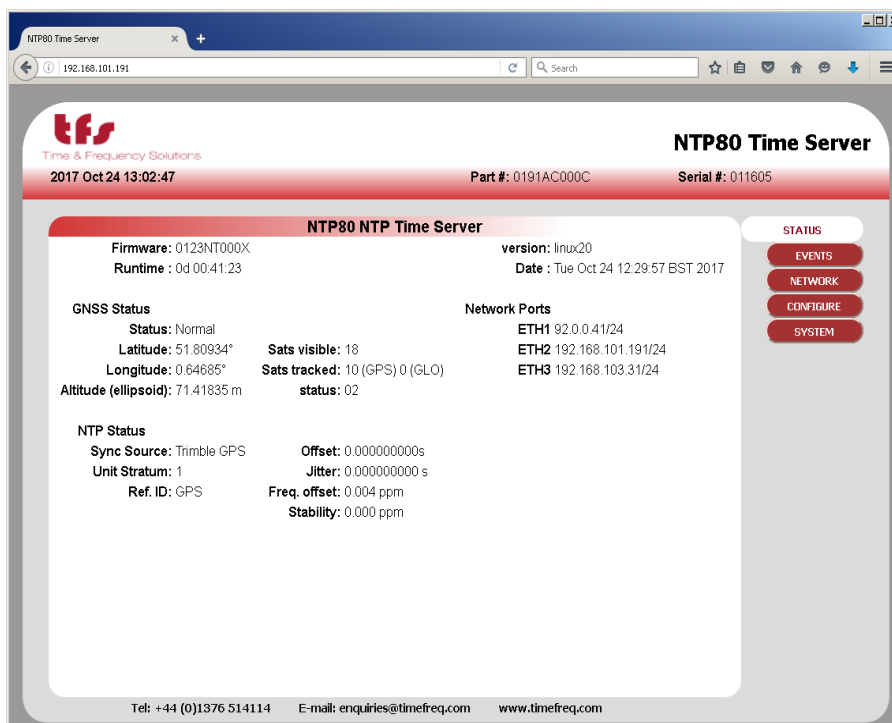


The GNSS status shows position and the satellite status. The top status will reflect the condition determined from the status number. This status is recorded in the event log. See **Events** for details.

The status number has the following meaning
00,01,02,03: These are all valid. For normal operation this will be 2
04,06:   indicates no time is set
08,0A:   indicates there is no UTC information
0C,0E:   no time and no UTC information

Where multi-constellation mode has been selected then the satellites tracked from each constellation are identified.
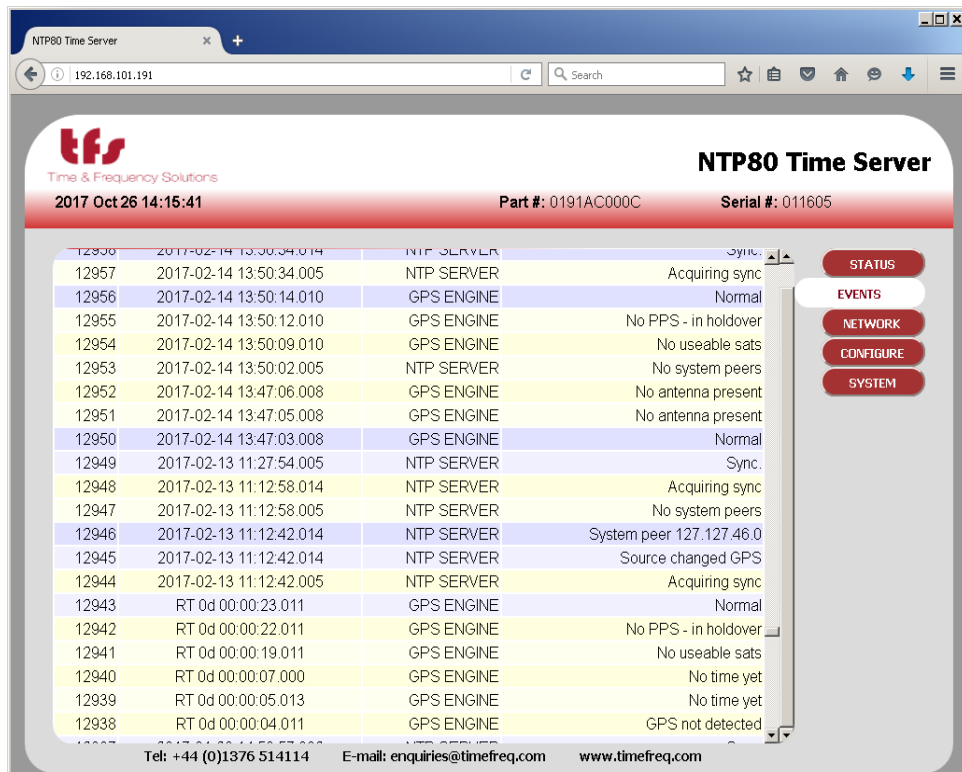
The NTP status indicates the current NTP service synchronisation source and the stratum level. For a GPS unit these would normally show GPS engine and stratum 1. For a peer-to-peer server, the Sync Source will show the IP address of the synchronisation source and the NTP80 stratum will be dependent on the stratum of that source. Sync source will also show the status of the NTP service when not synchronised. These events are recorded in the event log. If the unit is in holdover the status will state NO SYSTEM PEERS. See **Events**, below, for further details.

Offset, jitter, freq offset and stability indicate the performance of the NTP service. The closer to zero these values, the better the performance.

The page updates automatically every 10s.

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

## 5.5   Events



The event page shows all the recorded events from the GPS engine and NTP server parts of the NTP80. The example above shows a typical start up sequence from event id 12938 to 12949. The time shown is the NTP80 time, so if the local time zone has been set on the configure page then this will be NTP80 local time. RT indicates run-time, this is before the NTP80 has loaded time from a source. Following GNSS acquisition (12938 to 12943) the NTP service starts to synchronise to the GPS engine (12944 to 12948) and finally the NTP service is fully operational (12949). The event log is maintained through power fail and will record around the last 800 events.

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. GPS events are also shown on the front panel of the NTP80, 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.

SYSTEM

| | |
|---|---|
| System startup. | Initialisation of event log. Not visible after first 800 events. |
| Manual restart | Remote reboot has been applied. |

GPS

| | |
|---|---|
| *Normal* | GPS operating normally. |
| *No PPS - in holdover* | GPS not tracking – NTP80 in holdover. |
| *PDOP too high* | Tracked satellite constellation too poor for good position resolution. NTP80 in holdover. |
| *Only 3 usable sats* | |
| *Only 2 usable sats* | Satellites tracked, requires at least 4 for time to load |
| *Only 1 usable sat* | initially. |
| *No useable sats* | |
| *No time yet* | GPS start up. |
| *Antenna shorted* | There is a fault 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 visible on the web page and relate to the GPS operating status. If all is well then the last event will be Normal. Any single event will be cleared by returning to Normal - so if the antenna is disconnected then the minimum event sequence will be 'No antenna present' and then after reconnection 'Normal'. 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.

NTP SERVER

| | |
|---|---|
| *Sync.* | Synchronised to source & serving time. |
| *System peer <ip address>* | Synchronisation 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 synchronisation 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 page only at startup before initial time is loaded. This status is not logged and does not cause a trap. |

As long as there is a system peer then there should be no problem with the NTP service. If "no system peers" is seen with a GNSS receiver then the GPS status will indicate the problem (see above) otherwise with 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.

## 5.6  Remote restart

There is a mechanism to remotely reboot the NTP80. From the SYSTEM page notice the small '_' on the top left side of the page.
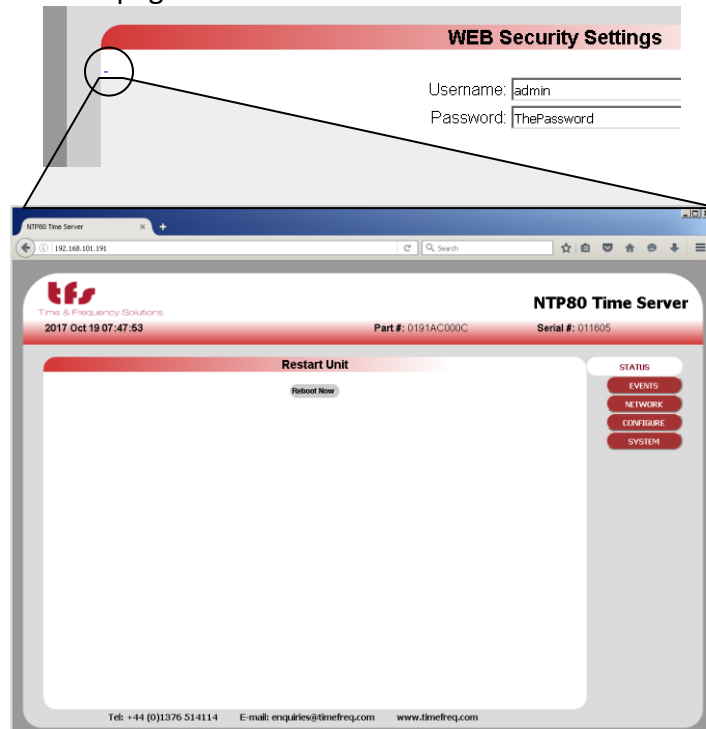
Pressing the reboot now button will cause the unit to do a complete restart. It will take approximately 1 minute to reboot.
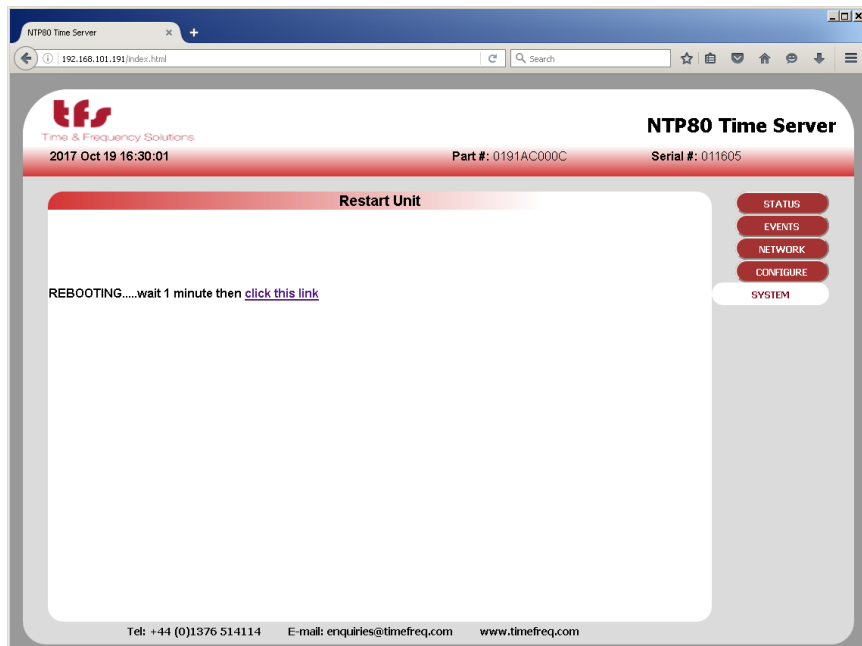


Clicking the link shown will take you back to the status page. The reboot is recorded in the event log.

# 6  Front Panel Setup & Status.

With the NTP80plus switched on and connected to a GPS signal a typical status display would show:

```
GPS              Tue Nov 27 16:29:38 2012
 9 GPS   5       ST:              Normal
```

This indicates that the unit has time from GPS and that the GPS signal is normal. The second row indicates the number of visible satellites as the first number on the left followed by the tracked satellites in the selected constellations. In this case just GPS is selected. The selection will be shown on the top line.

```
GPS+GLONASS      Tue Nov 27 16:29:38 2012
 9 GPS   5 GLO   3 ST:            Normal
```

The configuration menu structure is (left of | shows down path, right for up path)

```
        Main
        ------------OK--------------------
        |^                           |^
<  Date/Time  >               < Ethernet   >
   OK|                           OK|
Edit Date/time       ----------------------------------------------------
(if permitted)      |^                 |^                        |^
            <  ETH1  >          <  ETH2   >               <  ETH3 >
            OK|^                OK|^                       OK|^
            ETH1 display       ETH2 display               ETH3 display
              OK|OK(save)        OK|OK(save)                OK|OK(save)
              Edit ETH1          Edit ETH2                  Edit ETH3
```
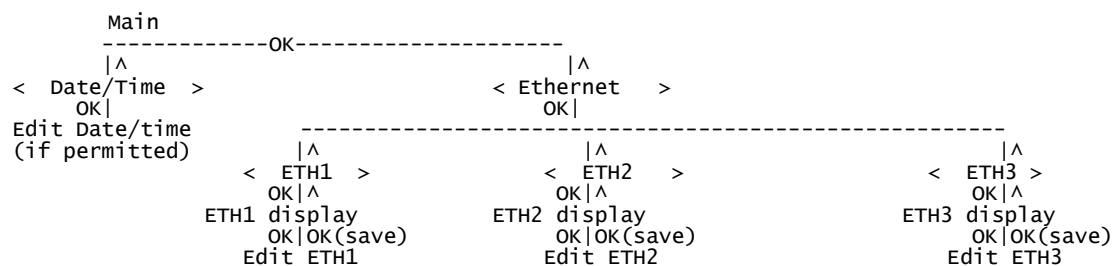
So to configure the Ethernet ports from the front panel follow the sequence below, using the keys up, down, left, right and OK.

From the main display (show above) press OK

```
Main > Date/Time
              [OK-enter]              ->
```

So to modify the ETH2 port configuration the following sequence should be followed:

Press left

```
Main > Ethernet
<-                [OK-enter]
```

Press OK

```
Main > Ethernet > ETH1
                [OK-enter]            ->
```

Press left

```
Main > Ethernet > ETH2
<-                [OK-enter]            ->
```

Press OK, this shows the current configuration for port ETH2. This shows, on line 2, port name, and the IP address. The netmask is shown as a bit count rather than in the dotted notation. In this example 24 means 255.255.255.0, i.e. 24 set bits in the mask. Finally on the line is the gateway address.

```
ETH2  Current config. [OK-edit] [^ exit]
ETH2    192.168.102.99/24  192.168.102.34
```

Press OK to modify this configuration.  The following display is shown. The Left/Right keys cycle through fields, the field selected is indicated by an underline on its first character. The up/down keys change values. OK will exit except without saving changes except when save is selected first, then changes will be applied.

```
ETH2 Edit [OK-exit/save  </>-sel  ^+/V-]
192.168.102.098/24 192.168.102.034   SAVE
```

```
ETH2 Edit [OK-exit/save  </>-sel  ^+/V-]
192.168.102.098/24 192.168.102.034   SAVE
```

Selecting SAVE then pressing OK applies the changes:

```
ETH2 Edit [OK-exit/save  </>-sel  ^+/V-]
        Updating port ETH2
```

Menu will return to Current config, showing the now updated address information.

```
ETH2  Current config. [OK-edit] [^ exit]
ETH2   192.168.102.98/24  192.168.102.34
```

Press the up key to exit this menu. If after a short period a key has not been pressed the display reverts to the main status display. Ensure that the unit is not left unattended in the port edit page.

The GPS status information that can be shown on the front panel is shown below. This is an example power up sequence following on front the NTP80plus identification message at the start.

Example GPS start-up sequence…

```
                   Run-time:   0d 00:01:00
12 GPS 0           ST:     No GPS time yet
```

```
                   Run-time:   0d 00:01:53
12 GPS 1           ST:      No usable sats
```

```
                   Run-time:   0d 00:02:10
12 GPS 1           ST:   Only 1 usable sat
```

```
                   Run-time:   0d 00:02:23
12 GPS 2           ST:  Only 2 usable sats
```

```
                   Run-time:   0d 00:02:31
12 GPS 3           ST:  Only 3 usable sats
```

There may be other messages during this sequence.

```
                   Run-time:   0d 00:05:00
12 GPS 4           ST:            Normal
```

Finally loaded time & default display.

```
GPS                     Tue Nov 27 16:29:38 2012
 9 GPS  5               ST:                Normal
```

Other possible status messages are:

Antenna not connected

```
GPS                     Tue Nov 27 16:29:38 2012
12 GPS 0                ST:   No antenna present
```

Antenna connection fault

```
GPS                     Tue Nov 27 16:29:38 2012
12 GPS  0               ST:       Antenna shorted
```

All other status messages are detailed in the **Events** section of *Web Management* above.

# 7 Working with the TFS Network Management System

The status of the NTP80plus 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 NTP overall state the following will indicate a fault and turn the indicator red:

NTP not loaded      NTP not loaded will be the case at start up, prior to first time synchronisation. After this, unless the NTP service is reconfigured this alarm will not be set.

NTP GPS no GPS      Not synchronising to GPS. Check GPS status for reason. This will be permanently set with a Peer-to-peer NTP80plus but will not cause an alarm.

NTP Peer to Peer no peer

Disabled for GPS NTP80plus. For peer to peer NTP80plus indicates that NTP service has no peers to synchronise to and will therefore cause an alarm.

NTP service not present.

NTP service fault. Consult Time & Frequency Solutions.

For GPS system state (applicable only to GPS NTP80plus) alarms caused by:

Time Not loaded    NTP80plus GPS engine has not yet loaded time. Should only occur at
                   start-up of NTP80plus. After time has been set the alarm will clear. It can
                   then never be set again without power-down.

GPS Acquiring sync

                   GPS is not currently synchronised. The likelihood is that there are not
                   enough tracked satellites.

GPS Not present    Should only occur and NTP80plus start-up.


For ETHx:

ifOperStatus down   Network connection is not active. Check connectivity.

# 8 Understanding the Network Time Protocol.

## 8.1 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.

## 8.2 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 synchronises 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.
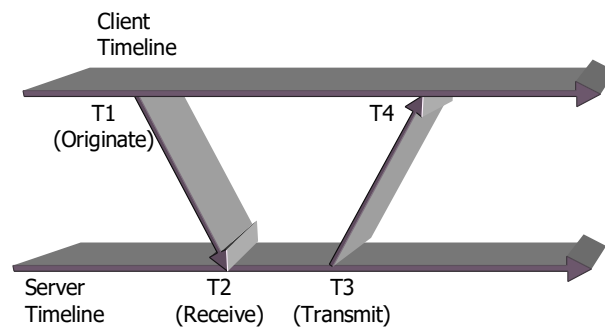


**Figure 1 – Basic Method of Delay Calculation Over a Network**

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.

All Time & Frequency Solutions supplied client software uses the NTP protocol, and therefore provides a more reliable solution than SNTP.

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## 8.3 NTP Hierarchical Structure

The NTP protocol supports a hierarchical structure 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.
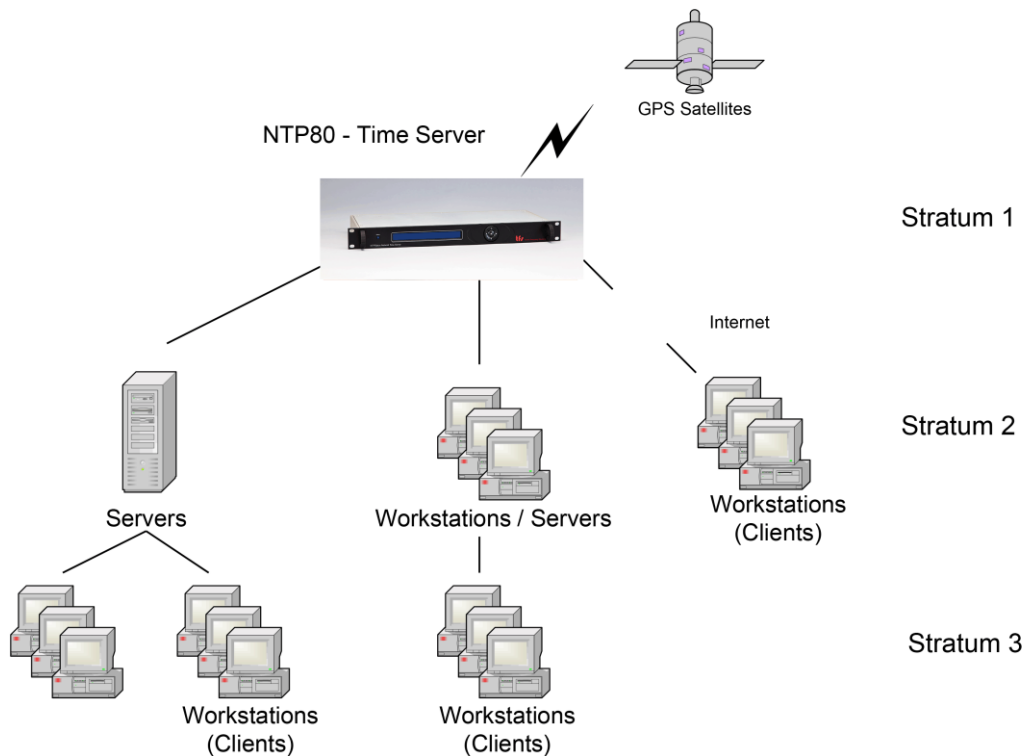


**Figure 2 – Explanation of Hierarchical Stratum Structure**

The timeserver's hierarchy is classed as Stratum, where a Stratum 1 time server that is directly synchronised to a traceable standard source such as UTC. A server synchronised to a Stratum 1 server is classed as a Stratum 2 server, and so on. This hierarchical structure allows sub partitioning of groups of networks.

Up to 512 Computers may synchronise to a single NTP80plus Time Server. We do not recommend increasing the number of clients beyond this limit, as the performance will become degraded due to non-responses.

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# 9 Frequently Asked Questions

The following 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 11.

Q      *Can the NTP80plus act as a stratum 1 server?*

A      Yes, Once the NTP80plus has synchronised to a traceable GPS or Off-Air source it will automatically become a stratum 1 server. In the event of loss of synchronisation this will be maintained for up to 24 hours at stability in accordance with the internal oscillator specified.

Q      *What packet types will the NTP80plus 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 1 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 NTP80plus is free running? ie the NTP80plus has synchronised to GPS at some point but has now lost synchronisation?*

A      The webpage status and the NTP80plus front panel will indicate that the GPS status is no longer Normal. The "STATUS" LED on the NTP80plus will be off.

Q      *What causes the NTP80plus – GPS Version to loose synchronisation 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.

Q        How many Clients may I connect to one NTP80plus Time Server?

A        The NTP80plus 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 B for the SNMP MIBS for the NTP80plus.

# 10 Troubleshooting Guide

Here are a few common problems that occur with their likely causes. If these answers do not help you, then please contact us to help us resolve your problem. Contact details are found in Chapter 11.

*Q*        *Unable to obtain Time from the server?*

A        If the NTP80plus STATUS LED is blue and the display shows Normal, check that you are using the correct software. Some synchronising software looks for a NTP broadcast message, if this is the case, ensure the NTP80 broadcast address is configured correctly.

*Q*        *Unable to 'Ping' NTP Ethernet module?*

A1        If the unit fails to respond to a ping test, check that the TCP/IP address has been correctly set.  Check that the correct interface port has been attached to the network.

        Check the Ethernet connection between your NTP80 and Hub or network connection. The Link LED on your NTP80 Ethernet Port and the corresponding network connection LED should both be illuminated.

A2        If you have recently changed the NTP80's IP Address and have been communicating with the NTP80 across the network then don't forget to clear the "arp" table for the appropriate MAC address. This can be implemented by typing arp –d < IP Address > at the command prompt.

*Q*        *Module does not appear to see NTP packets but works with a ping?*

A1        An NTP80 that pings, does not necessarily mean that a client's NTP requests for NTP packets will respond. If a firewall is installed between the NTP80 and the Client, check that the Firewall settings will allow NTP packets to flow in both directions. Confirm that the Gateway address has been specified in the configuration correctly.

A2        If the unit fails to respond to an NTP packet, try using NTPDATE or a similar program to establish communication.  Check the client machine is able to send UDP packets on port 123 (the defined NTP port number).

A3      Confirm that the NTP80 has not been free running for a long period. Free running occurs when the NTP80 has gained synchronisation and then lost it again. The NTP80 must be synchronised for the NTP to function correctly. Check the web status page to ensure that GPS status is normal and NTP status indicates GPS engine as the synchronisation source. NTP software may use another NTP server after approximately 24 hours of the original NTP server losing its synchronisation.

*Q*      *Unreliable connections between the NTP80 and the LAN*

A      Confirm that you are using proper cables. With 10BASE-T connections, you may use Category 3, 4, or 5 cables. We recommend the use of CAT-5 patch cables (straight through)

# 11 Specifications

| | |
|---|---|
| **Model Number**: | NTP80Plus     (Rackmount Version) |
| Size: | 19" Rack Mounting, 1U High, 200mm Deep |
| | 1.5kg typical |
| Power: | 90-264V AC, 47-63Hz, Load 20W |

**Synchronisation**

| | |
|---|---|
| Source: | GPS , GPS+GLONASS, GPS+BEIDOU, GLONASS, BEIDOU |
| Input Level: | +11dB to +35dB |
| Synchronisation Accuracy: | ± 100 nanoseconds from UTC with Signal availability. (Assuming adequate satellite visibility) |

**1PPS Output**

| | |
|---|---|
| Connection: | 50Ω BNC socket |
| Output: | 1 pulse per second upon synchronisation. |
| Level: | TTL |
| Edge: | Positive |
| Accuracy: | ±2 microseconds from UTC with Signal availability. (Assuming adequate satellite visibility). Accuracy stated after 30 minutes from synchronisation. |

**Network Connection**

| | |
|---|---|
| Connection: | 3 x RJ45 connection to a 100B0ASE-T network. |
| Interface Standards: | NTP Version 2 (RFC 1119) |
| | NTP Version 3 [RFC 1305] |
| | NTP Version 4 (RFC5905) |
| | SNTP (RFC 2030) |
| | SNMP v1, v2 Enterprise MIB (RFC1155, RFC1157, RFC1213) |
| | Daytime Protocol (RFC867), Time Protocol (RFC 868) |
| | Ethernet/IEEE802.3 |
| | UDP/IP |
| | ICMP |
| **Configuration:** | Network parameters configured via web browser or front panel display and rocker switch |

**User Port**

| | |
|---|---|
| Connection: | 9 way D type socket |
| Characteristics: | 115.2baud, no parity, 8 bit characters and 1 stop bit |

**Environment (Operation & Storage)**

Temperature:                               0°C to +75°C
Humidity:                                  up to 95% RH (non-condensing)
EMC:                                       CE compliant


**Antenna (Standard):**

Model Number:                              012000002
Output Level:                              +40dB


**Frequency Stability:**

| Oscillator | Stability Per °C | Locked frequency stability over averaging times | | | | | | Holdover Stability for 1 Day |
|---|---|---|---|---|---|---|---|---|
| | | 1s | 10s | 100s | 1000s | 10000s | 1day | |
| TCXO | $1.5\times10^{-8}$ | $2\times10^{-9}$ | $2\times10^{-9}$ | $5\times10^{-10}$ | $5\times10^{-10}$ | $6\times10^{-11}$ | $1\times10^{-12}$ | <2 ms |
| OCXO | $1.2\times10^{-10}$ | $3\times10^{-10}$ | $3\times10^{-10}$ | $4\times10^{-10}$ | $4\times10^{-10}$ | $5\times10^{-11}$ | $1\times10^{-12}$ | <60 µs |
| Rubidium | $7\times10^{-12}$ | $3\times10^{-11}$ | $8\times10^{-12}$ | $3\times10^{-12}$ | $3\times10^{-12}$ | $2\times10^{-12}$ | $8\times10^{-13}$ | <1 µs |

TCXO supplied as standard

# 12 Appendix A

## 12.1 Resetting Factory Defaults.

Connect a terminal to the serial port, with serial parameters 115200 baud, 8 bits/char, no parity and 1 stop bit.

Power up the NTP80, the following menu will appear:

    1>  Firmware Update
    2>  Factory Def.

As soon as this menu appears press 1 to reset the NTP80 back to the following factory defaults. If the operation was successful the unit responds:

Restore to factory defaults set.

After the unit has initialised the settings will be as follows:

Network ports:

| | |
|---|---|
| ETH1 | 192.168.101.10/255.255.255.0 |
| ETH2 | 192.168.102.10/255.255.255.0 |
| ETH3 | 192.168.103.10/255.255.255.0 |

No gateways are set.

HTTP pages

| | |
|---|---|
| Username: | admin |
| Password: | ThePassword. |

There will be no network restrictions.

## 12.2 Firmware update

When a firmware update is provided it will consist of two files, a .x file and a .ck file.  The .ck will contain a line similar to the following:

2673811419 3683505 arch/powerpc/boot/cuImage.pq2fads.x

The first number in this file is the checksum, so in this case, 2673811419.

Enter  http://<IP.ADDRESS>/update.html into a browser.



There are two ways to update the firmware:

1/      if an FTP server is available then load the .x file onto the FTP server and specify the full path name in the FTP server address field box as <ftp server>/path/update-file-name.x. In the checksum field enter the checksum provided in the .ck file.

⚠ Ensure that the power supply will not be interrupted and press **submit**.

2/ The firmware update can be transferred to the NTP80 with an FTP client, such as FileZilla. In the client enter the IP address of the NTP80, there is no username or password. Then upload the .x file.  Leave the FTP server address field blank and enter the checksum provided in the .ck file in the checksum field.

⚠ Ensure that the power supply will not be interrupted and press **submit**.
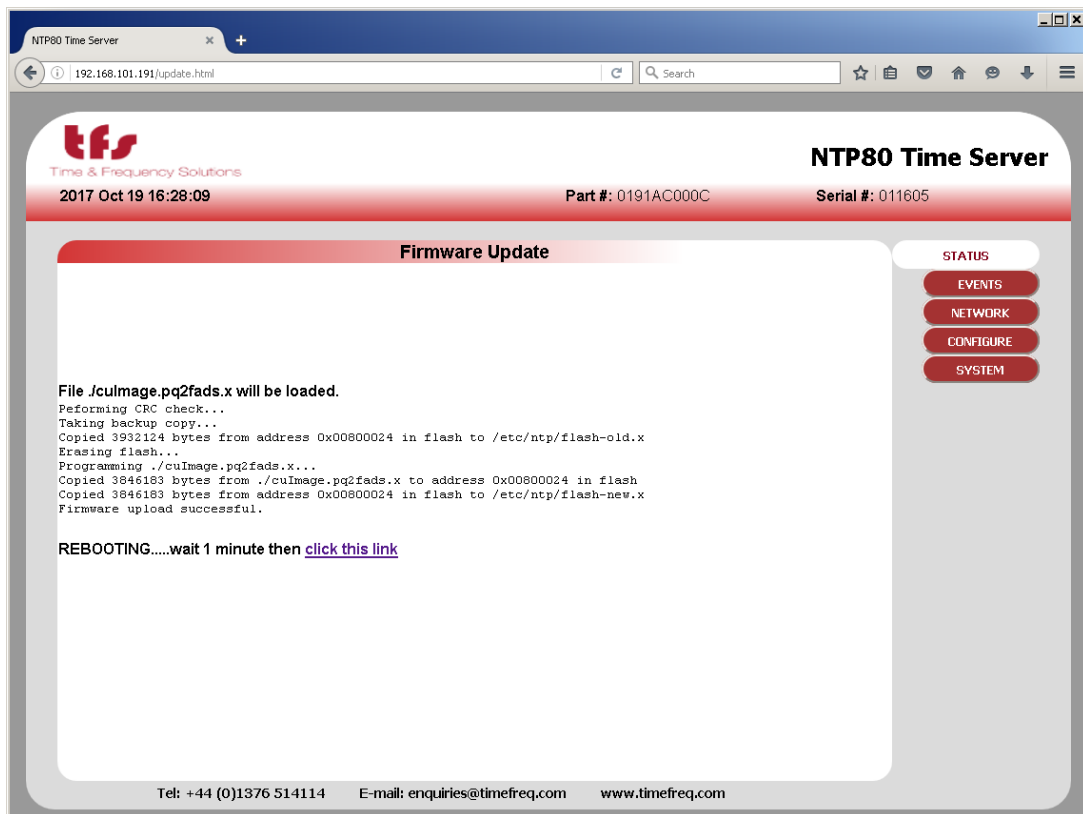


Wait 1 minute for reboot and press the link to take you back to the status page.
If there are any problems with the uploaded file or in the process of writing the new file to flash memory these will be detected and the original firmware restored.

# 13 Appendix B: MIB File

The MIB files for the NTP80plus and NTP80plus are listed here. There are three MIB files that define the NTP80plus enterprise MIB:

## 13.1 TFS-NTPCOMMON-MIB.mib

```
--***********************************************************************--
--  TFS Enterprise MIB                                                 --
--                                                                     --
--  for s/w 0123NT-X                                                   --
--                                                                     --
--  v7.00 Rationalisation of TFS mibs for all products.               --
--             Initial specific common MIB for NTP80plus.      --              --
                                                            --
--***********************************************************************--

  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),
NTP80plus (8),
ptp80 (9),
ptp8 (10)
          }
    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}

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,
                            function OCTET STRING,
                            description OCTET STRING
                          }

      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 15.25ns 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
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION "Originating module"
            ::={syslogEntry 5}

        function OBJECT-TYPE
            SYNTAX OCTET STRING
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION "function within module"
            ::={syslogEntry 6}

        description OBJECT-TYPE
            SYNTAX OCTET STRING
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION "Description of event"
            ::={syslogEntry 7}


linuxlogTable OBJECT-TYPE
  SYNTAX SEQUENCE OF LinuxlogEntry
  ACCESS not-accessible
  STATUS mandatory
  DESCRIPTION "System log table"
  ::= {systemstatus 4}

linuxlogEntry OBJECT-TYPE
  SYNTAX LinuxlogEntry
  ACCESS not-accessible
  STATUS mandatory
  DESCRIPTION "System log record"
  INDEX {line}
  ::= {linuxlogTable 1}

LinuxlogEntry ::= SEQUENCE {        line INTEGER,
                                    timestr OCTET STRING,
                                    process OCTET STRING,
                                    message OCTET STRING
                        }

        line OBJECT-TYPE
            SYNTAX INTEGER (1..2147483647)
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION "Event log index"
            ::={linuxlogEntry 1}

        timestr OBJECT-TYPE
            SYNTAX OCTET STRING
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION "Event type"
            ::={linuxlogEntry 2}

        process OBJECT-TYPE
```

```
        SYNTAX OCTET STRING
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION "Event type"
        ::={linuxlogEntry 3}

     message OBJECT-TYPE
        SYNTAX OCTET STRING
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION "Description of event"
        ::={linuxlogEntry 4}



  modules OBJECT IDENTIFIER ::= {tfs 8}



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

END
```

## 13.2 TFS-GPS-MIB.mib

```
--*************************************************************************--
--  TFS Enterprise MIB                                                 --
--                                                                     --
--  for s/w 0123NT-X                                                   --
--                                                                     --
--  v7.00 Rationalisation of TFS mibs for all products.                --
--             Initial  GPS MIB for NTP80plus.                         --
--                                                                     --
--*************************************************************************--


  TFS-GPS DEFINITIONS ::= BEGIN

        IMPORTS
                enterprises
                        FROM RFC1155-SMI
                OBJECT-TYPE
                        FROM RFC-1212
                TRAP-TYPE
                        FROM RFC-1215
                tfs,  modules
                        FROM TFS;

  gps OBJECT IDENTIFIER ::= {modules 1}

  gpslastupdate OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Time of Last update"
    ::= {gps 1}

  visible OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Visible Satellites"
    ::= {gps 2}

  tracked OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Tracked Satellites"
    ::= {gps 3}

  status OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "Text status."
    ::= {gps 4}

  status1 OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "GPS status flags 1"
    ::= {gps 5}

  status2 OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "GPS status flags 2"
    ::= {gps 6}
```

```
    latitude OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "latitude degrees N"
      ::= {gps 7}

    longitude OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "longitude degrees E"
      ::= {gps 8}

    height OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "m above ellipsoid"
      ::= {gps 9}

    lastlock OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Last lock time s since 1/1/1970"
      ::= {gps 10}

    statusAB OBJECT-TYPE
      SYNTAX INTEGER
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Integer value of status1"
      ::= {gps 11}

    statusAC OBJECT-TYPE
      SYNTAX INTEGER
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Integer value of status2"
      ::= {gps 12}

   gpsmode OBJECT-TYPE
      SYNTAX INTEGER
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Bit flags    2 - GPS not found,
                                1 - Not loaded last frame
                                0 - Not loaded since reset
               so zero is normal operation. "
      ::= {gps 13}

    END
```

## 13.3 TFS-NTP-MIB.mib

```
--*********************************************************************--
--  TFS Enterprise MIB                                                --
--                                                                    --
--  for s/w 0123NT-X                                                  --
--                                                                     --
--  v7.00 Rationalisation of TFS mibs for all products.               --
--              Initial specific NTP MIB for NTP80plus.                     --
--                                                                    --
--*********************************************************************--


    TFS-NTP DEFINITIONS ::= BEGIN

          IMPORTS
                  enterprises
                        FROM RFC1155-SMI
                  OBJECT-TYPE
                        FROM RFC-1212
                  TRAP-TYPE
                        FROM RFC-1215
                  tfs, modules
                        FROM TFS;

    ntp OBJECT IDENTIFIER ::= {modules 2}

    ntplastupdate OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Time of Last update"
      ::= {ntp 1}

    status OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Text status."
      ::= {ntp 2}

    syncsource OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "NTP peer or GPS."
      ::= {ntp 3}

    stratum OBJECT-TYPE
      SYNTAX INTEGER
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "unit stratum, -1 means not set."
      ::= {ntp 4}

    clkOffset OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Clock offset s"
      ::= {ntp 6}

    clkJitter OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "clock jitter s"
      ::= {ntp 7}

    clkFreq OBJECT-TYPE
```

```
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Frequency error ppm"
      ::= {ntp 8}

    clkStability OBJECT-TYPE
      SYNTAX OCTET STRING
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Clock stability ppm"
      ::= {ntp 9}

    ntpmode OBJECT-TYPE
      SYNTAX INTEGER
      ACCESS read-only
      STATUS mandatory
      DESCRIPTION "Bit flags set means
                              bit    3 - NTP no peers,
                                     2 - NTP peer to peer not locked,
                                     1 - GPS source not locked,
                                     0 - Time not loaded
              so for GPS, 4 is normal operation & for NTP only, 2 is normal."
      ::= {ntp 10}

END
```

# 14 Support Information

If the unit is still exhibiting problems not covered by the troubleshooting guide, contact us for technical support at

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