LeoNTP

**LEONTP
NETWORK MASTER
CLOCK/TIME SERVER**

**USER GUIDE
V1.35**

Regulatory Markings

CE	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives
(WEEE symbol)	This device complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you should not discard this electronic product in domestic household waste
MADE IN BRITAIN	This product is proudly manufactured and distributed in the United Kingdom by: Uputronics Limited c/o Nevis Computers Ltd Cottingley Business Park Bingley BD16 1PE West Yorkshire Company Reg 3356647 Developed and designed by: Leo Bodnar Electronics Ltd Units 7-8 New Rookery Farm Little London Silverstone, Northamptonshire NN12 8UP Reg Number 09287270

1. System Specifications

Network	10/100Mb RJ45 Autosensing
	IPV4 DHCP/Static IP
Time Protocols	NTP V2, V3, V4, SNTP V3, V4
NTP Requests/Sec	>100K (Wire speed)
	> 1million concurrent clients typical
GPS	72 Channel
	-167dBm Sensitivity
	Power for active antenna supplied via bias tee.
Timing Performance	
GPS Accuracy	30ns RMS, 60ns 99%
	Cold start acquisition < 30s
NTP Accuracy (Typical)	< 1μS
Holdover Performance	Typically 1-4ms over 24 hours
Power	USB / 48V PoE (802.3af) only. 1W.
Mechanical Dimensions	80mm x 150mm x 25mm
BNC Output	PPS/1Mhz/10Mhz
	Accuracy 30ns RMS, 60ns 99%
Warranty	1 year return to base.
	Lifetime Firmware updates and support.
In the box	1 x LeoNTP Device
	1 x GPS Puck antenna with 3 meter cable
	1 x USB Cable
	1 x 2 meter RJ45 Patch cable.
Options	BNC to MCX Cable
	External Base antenna

2. Quick Start

Connect the GPS antenna to the SMA connector on the rear of the unit.

Connect the unit to your switch with the supplied RJ45 Cable

To power the unit either connect the RJ45 to 802.3af compatible PoE switch or injector (not supplied). Only 48V PoE is supported. Alternatively connect the supplied USB cable to any 5V supply.

3. General Operation

You can use the knob on the front of the display to select between the screens on the device. Pressing the knob selects.

The screens are :

Time / Status -> NTP Clients -> GPS Signal -> IP Address -> Network -> System -> Info

4. Time / Status Screen

This is the default screen and shows the current UTC time (default) and status indicators.

The icons on the status bar from left to right are:

PPS Indicator - Load Graph - Network - GPS Signal

The circle top left is the PPS indicator, green = PPS Locked to GPS (Unit is Stratum 1), brown = unit is in holdover mode (Unit is Stratum 1 – see Hold Over Mode Operation section) , red = no GPS signal (Unit is Stratum 16).

The load graph is an indicator of the current number of NTP requests a second the unit is subject too. Green is 0-1000, Yellow 1000 – 4000, Red = 4000+. Note the theoretical limit to units performance is 109,000 NTP req/sec.

Network indicator displays the current status of the LAN connector. If the indicator is red the unit has no network connection. Green and blinking indicates activity.

The signal strength indicator indicates the current GPS strength. Green = GPS locked, Red = GPS not locked.

If the time is amber the unit hasn't achieved an accurate time, you may need to reposition your GPS antenna to get a more optimal sky view. Once the GPS is locked the time will go white and PPS will blink green.

By default the unit shows UTC time. You can amend the display to do time zone offset by pressing the button and rotating the knob left and right until you see your desired time zone. Press the knob once more to select it.

Notes: Time zone is display only, internally the unit uses UTC. When a time zone other than UTC is selected the date is no longer displayed.

5. NTP Clients Screen

This screen shows the current NTP clients that are currently connecting to your device. Red means more than one connection a second. There is nothing to configure under this screen.

6. GPS Signal Screen

This screen shows the current time the unit has been locked, the satellites and current location. There is nothing to configure under this screen.

7. IP Address Screen

This screen lets you view or select a static or DHCP IP address.

Pressing the button will high light the Configure IP, you can left and right to select manually (Static) or Using DHCP. Press again to confirm and move to the IP select if Manual is selected.

The IP address in manual mode can be set using the button using left and right to select the value of each octet. Settings are immediate and the unit doesn't need a reboot.

The default IP for the unit is 192.168.1.99

Currently IPv6 is not supported.

8. Network Screen

This screen lets you view or select a subnet mask and gateway. If DHCP is selected in the previous IP Address screen there is nothing to configure here.

If Manual IP address selection is configured press the button to highlight the subnet mask, rotate left and right to select then press the button again to confirm and move to the gateway field.

The gateway is set like the IP address. Settings are immediate and the unit doesn't need a reboot.

9. System Screen

This screen lets you view or select the BNC output, the behaviour of the clicker, factory reset and FW Upgrade options.

Pressing the button selects BNC Out. You can rotate left and right to select the frequency of the output:

OFF -> 1PPS (1Hz) -> 1Mhz -> 10Mhz

Pressing the knob sets the value and moves to the Clicker:

OFF -> NTP Req -> 1PPS -> Alarm

Off	= No clicker
NTP Req	= Click when a request is made
1PPS	= Click on PPS pulse
Alarm	= Click on alarm event (loss of GPS Signal/Network)

Pressing the knob sets the value and moves to the Factory Reset. The default on this is Skip Reset. Press the button to move to the next setting. Alternatively rotate to *RESET ALL NOW* and press the knob. This will factory reset the unit and lose any configuration.

The default on FW Upgrade is Skip Upgrade. Press the knob to confirm this setting. Alternatively rotate, select *UPGRADE NOW* and press the knob (See firmware upgrade later).

10.   Info Screen

The info screen is a scrolling screen showing:

NTP Requests
Uptime
Leap Second (Count down to the next leap second insertion)
FW Version
Power Source
Network Speed
MAC Address
Support URL

Pressing the knob at any point stops the scroll and again to restart it.

11.   Firmware Upgrade

To update the firmware you need either a Windows PC or a Mac. The update file is a standalone program and doesn't need installing.

All settings are saved on update. The latest update files are available here http://leontp.com/firmware

Extract the files from the zip file / dmg file.

Plug the LeoNTP unit into the PC/Mac with the USB cable. Rotate the knob to the system screen. Press the button four times until *Skip Upgrade* is highlighted. Rotate the knob right until the unit says UPGRADE NOW. Press the knob. The screen will now report "*Bootloader mode. Connect USB and start firmware app*"

From the extracted files run LeoNTP-Firmware. The serial number of the unit should be reported. Press Update Firmware. The unit will reboot after a short period.

12.   Hold Over Mode Operation

If the unit is in holdover mode due to lack of GPS signal the unit will internally compensate typically within 1-4ms over 24 hours.

When the PPS indicator is blinking yellow this indicates the unit is in hold over mode. After 24 hours without a GPS signal the unit will drop off to stratum 16 as it can no longer guarantee its accuracy as a time source.

As soon as the GPS signal is re-established the unit will revert to stratum 1.

13.   Client Configuration

Windows

```
w32tm /unregister
w32tm /register
net start w32time
w32tm.exe /config /manualpeerlist:<<IP of LeoNTP>>,0x08 /syncfromflags:manual /reliable:YES /update
w32tm /config /update
net stop w32time
net start w32time

w32tm /query /configuration
w32tm /query /status
```

Linux
If using NTPd just add the following config line to /etc/ntpd.conf

```
server <<IP of LeoNTP>> iburst prefer
```
Then restart ntpd.

14.   Remote Monitoring

We offer a Python script to remotely monitor the unit see Python Stats Program on the firmware page here: http://www.leontp.com/firmware/

15.   Getting Support/Assistance

If you have any queries with the LeoNTP please don't

hesitate to mail us on orders@uputronics.com or call on +44 (0) 1274 550919.