

## EKOSync 1588B

### PTP / NTP TIME SERVER

### USER MANUAL



## Safety

For your safety, the following general safety precautions must be observed during all phases of operation of this instrument.

### CAUTION

**WARNING! THIS DEVICE MUST BE EARTHED**

Do not use this equipment in a manner not specified by the manufacturer. The protective features of this product may be impaired. It could cause unavoidable damage to the equipment, personal injury and/or death.

Reviewing the complete documentation before installing or operating the instrument is important.

**WARNING! HAZARDOUS VOLTAGES CAN CAUSE SHOCK, BURNS AND DEATH.**

The power plug shall be disconnected from all voltage sources before it is opened for any adjustment, replacement, maintenance or repair.

Any adjustment, maintenance and repair of the opened instrument under voltage shall be avoided and, if unavoidable, shall be carried out only by a qualified person who is aware of the general device test practices.

All recommended equipments that should be earthed. Any interruption of the mains earth conductor inside or outside the instrument will make the instrument dangerous.

Do not install substitute parts or perform any unauthorized modification to the product.

Unless otherwise specified in the documentation, there are no user-serviceable parts inside this instrument.

Instruments that appear damaged or defective should be secured against unintended operation until they can be repaired by qualified service personnel.

This instrument is intended for use in dry, indoor locations only.

Do not wet the instrument when cleaning it.

## Safety Symbols

These symbols, which have these meanings, may be marked on this instrument.



EARTH (GROUND) TERMINAL

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# EKOSync 1588B PTP TIME SERVER

## I. FEATURES & SPECIFICATIONS

### 1 Description

EKOSync 1588B PTP Time Server provides sub-microsecond accuracy time information for synchronizing energy distribution subsystem intelligent electronic devices, and proceeding according to IEEE 1588 v2 time protocol. Product includes adjustable hold-over times for discontinuities with GPS communication, and compensation for antenna reception distortions.

### 2 Features

- DC IRIG-B (Unmodulated, DCLS - C37.118.1)
- TCP/IP remote M&C management option
- Synchronized TOD (Time of Day) and PPS (Pulse per second) outputs
- User defined 10MHz/5MHz frequency output
- TCP/IP configuration option
- NTP/ SNTP (IEC 61850)
- IEEE 1588 PTP Server
- 90-265V DC Isolated power supply
- Password protection and user authentication

### 3 Specifications

#### Electrical:

#### Input

Power Supply	
Voltage:	<b>90 to 265 V DC</b>
Power consumption:	<b>40W max</b>
Ethernet (RJ45 UTP)	<b>10/100/1000Mbps</b>
Ethernet (SFP)	<b>1Gbps</b>

#### Isolation

Power to GPS input	<b>3 kV</b>
Power to I/O	<b>3 kV</b>

#### Outputs

Relay output	<b>250V 2A</b>
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8 TTL outputs

**Time codes or pulses or user defined**  
**Electrical specification:**  
**TTL/CMOS compatible 0-5 V, 2 mA**  
**sink/source**  
**Timing accuracy: ≤50 ns to UTC**

## Networking:

### GENERAL

DHCP:

**Auto-configuration with fall back to ARP tested link-local address**

VLAN:

**Packet tagging**

### PTP (IEEE 1588 V2)

General:

**One-step or two-step operation**  
**End-to-end or peer-to-peer delay calculations**  
**Layer 2 (Ethernet) or Layer 3 (UDP) transport**  
**Slave only mode**  
**Default Profile support**

Power Profile support:

**C37.238**

TLV support:

**C37.238 offset from TAI time base used by PTP**

Alternate Time Offset TLV support: **with automatic or manual offset**

### NTP

General:

**Stratum-1 NTP & SNTP time server**  
**Multicast & Broadcast server capability**  
**Optional MD5 authentication**

## Environmental Specifications:

### Operating and Storage conditions

Operating Temperature

**-40° to 70°C (-40 to 158°F) according to IEC 60065**

Storage Temperature

**-40° to 80°C (-40 to 176°F)**

Operating Ambient Humidity

**3% to 97% (non-condensing conditions)**

Altitude

**3000m (9842 ft)**

## Mechanical Specifications:

Dimensions (H x W x D)	<b>47 x 442 x 292 mm</b>
Weight	<b>3.920 kg</b>

## Antenna Port Specifications:

Voltage	<b>3.3 VDC</b>
Current	<b>100 mA (max)</b>
Impedance	<b>50 <math>\Omega</math></b>

## II. OPERATION DESCRIPTIONS

### 1 Precise Time Synchronization

Precision Time Protocol (PTP), included in IEEE standard 1588 was originally designed to provide timing for critical industrial automation. PTP identifies two types of clocks, masters and slaves. A clock in a terminating device is known as an ordinary clock, a clock in a transmission component like an Ethernet Switch as a boundary clock. A master which is controlled ideally by a radio clock or a GPS receiver, synchronizes the slaves connected to it respectively.

PTP time server, namely GPS Clock, which provides synchronization in PTP (IEEE 1588) protocol on Ethernet network by using time from GNSS satellites utilizes existing data network so that an installation of a separate timing network is eliminated. Its 25ns accuracy and redundancy mechanisms are also advantages of new generation synchronization system.

Control, protection and measurement devices in modern electric grids need correct time for synchronous operation. To identify the sequence of events in case of unexpected outage, to manage the grid synchronously and to be able to make the measurements in the required accuracy a modern synchronization protocol is needed.

### The IRIG-B Time Code Standard

IRIG-B is the industry standard for GPS time synchronization. The IRIG time codes were originally developed by the Inter-Range Instrumentation Group (IRIG), part of the Range Commanders Council (RCC) of the US Army. IRIG time code B is widely used in the electrical power industry.

IRIG-B refers to a serial time code format. The IRIG-B time code consists of 100 bits produced every second, 74 bits of which contain various time, date, time changes and time quality information of the time signal. IRIG-B sends Day of Year, Hour, Minute and Second data on a 1KHz carrier, with an update rate of one second. IRIG-B DCLS (DC level shift) is IRIG-B without the 1KHz carrier.

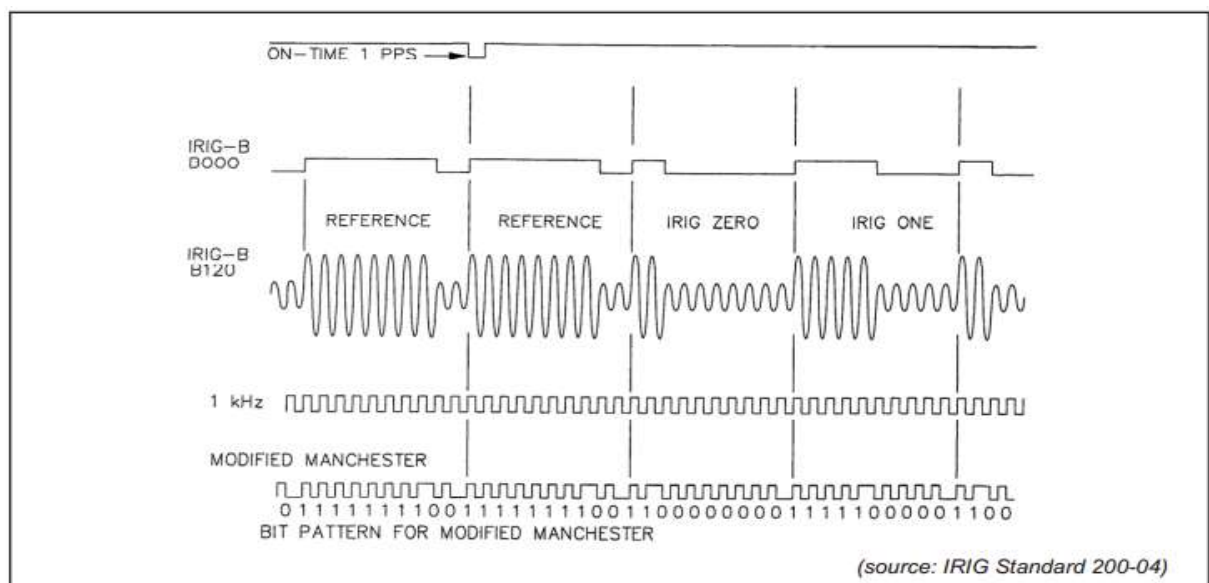
There are three methods of communicating analogue pulses in the IRIG Standard:

- **Modulated** : amplitude-modulated, sine wave carrier
- **Unmodulated** :DC level shift, no carrier signal
- **Modified Manchester** : amplitude-modulated, square wave carrier

Three types of coded expressions are used in the IRIG standard:

- **Binary Coded Decimal** time-of-year (BCDTOY) and year (BCDYEAR)
- **Control Functions (CF)**, set of bits reserved for user applications
- **Straight Binary Seconds (SBS)** time-of-day (0 to 86400 seconds)

A comparison of IRIG-B coding methods is given in the figure below.





## Network Time Protocol / Simple Network Time Protocol

Network Time Protocol (NTP) has been the traditional way to synchronization time over Ethernet networks. NTP allows time synchronization up to 100 milliseconds. The IEEE 1588 PTP is required to achieve tighter synchronization.

There is NTP led on front panel. When the NTP is enable, the led is ON. To enable the NTP server of the PTP/NTP Time Server check the Enable checkbox in the NTP configuration page.

PTP is basically a faster version of NTP. IEEE 1588 is designed for local systems requiring very high accuracies beyond those attainable using NTP, which is sufficient to transfer data across networks at speeds of up to 10 Mbps. As data rates have increased, the need for synchronised transmission and reception have increased with it. At speeds of 1 Gbps and above, PTP is necessary.

## SNTP

A less complex implementation of NTP, using the same protocol but without requiring the storage of state over extended periods of time, is known as the Simple Network Time Protocol (SNTP). It is used in some embedded devices and in applications where high accuracy timing is not required.

## NTP / SNTP in the EKOSync 1588B

The EKOSync 1588B can act as an NTP or SNTP server, and is intended to be an NTP time server. The EKOSync 1588B synchronizes to GPS to provide accurate timing signals, and NTP time signals are published through the clock Ethernet port.

## FREQ

The EKOSync 1588B has one Frequency out port which produces 5-10-20-25MHz.

## ALARM RELAY

Connect the Sync indication relay to the alarm circuit if required.

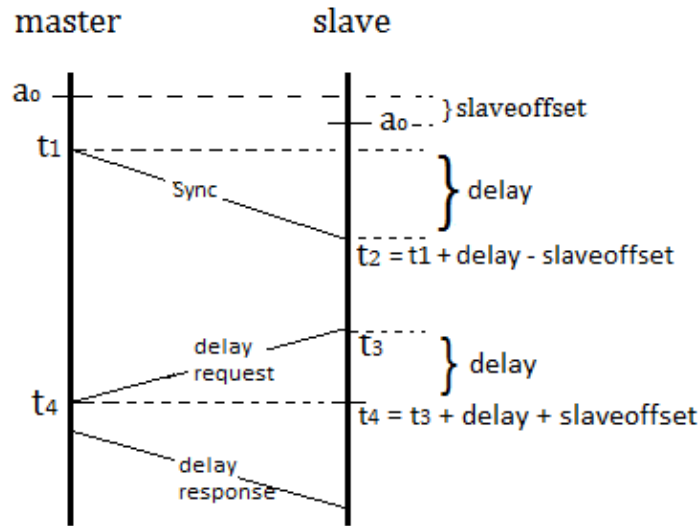
(CM = Common, NO = Normally Open, NC = Normally Closed)

Example;

The relay alarms when the antenna problems, poor sky view or power supply fails.

## IEEE 1588 / PTP / C37.238

The IEEE 1588 precision time protocol (PTP) provides a standard method to synchronize devices with sub microsecond precision over a local area network (LAN) [6]. The protocol synchronizes slave clocks to a master clock ensuring that events and timestamps in all devices use the same time base. IEEE 1588 protocol uses the Best Master Clock algorithm to automatically determine which clock in the network is the most precise. It becomes the master clock that is a GPS disciplined time reference. All other clocks become slaves (e.g. a IEDs) and synchronize their clocks with the master. IEEE 1588 defines one-step and two-step clock operations. One-step clock updates accurate timestamp in synch message but two-step clock sends accurate timestamp in a follow up message. One step clock is recommended to use because this eliminates the need to read the transmit timestamp over MDIO and also eliminates the need to send a follow up message. Figure 1 shows an one step clock synchronization. The synchronization of the clocks is achieved using a series of message packets between master and slaves. There are three message types - Sync, Delay Request and Delay Response.



*One-step clock synchronization*

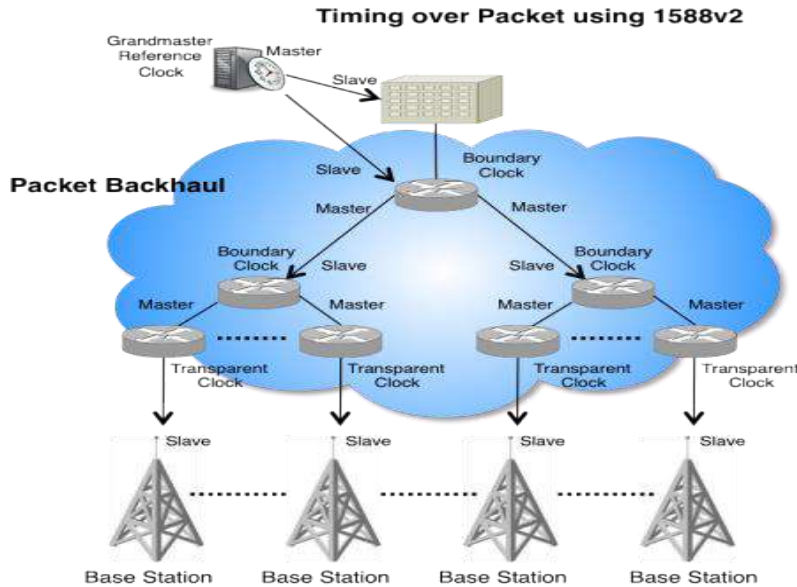
The master stamps the time ( $t_1$ ) on the Sync message that leaves the master. The message arrives at slave clock at  $t_2$  and sends a Delay-Req message at time ( $t_3$ ) to the master, which is received by the master clock at a later time,  $t_4$ . The master then sends a packet containing  $t_4$  to the slave. The slave has all the information needed to calculate the slave offset. In this way the slave use this equations [ $t_2 = t_1 + \text{delay} - \text{slaveoffset}$  (1) and  $t_4 = t_3 + \text{delay} + \text{slaveoffset}$  (2)] to obtain following equation:

$$\text{Slaveoffset} = [(t_4 - t_3) - (t_2 - t_1)] / 2 \quad (3)$$

Now, using this equation the slave arranges its time clock. This equation (3) can be only used if the delays are equal to each other between  $t_1$  to  $t_2$  delay and  $t_3$  to  $t_4$  delay.

This measurement is repeated every second between the master clock and the slave clock and the synchronization accuracy can be reduced to approximately 100 ns.

IEEE 1588 synchronization network



## Grandmaster Clock

The root timing reference is called the grandmaster. The grandmaster transmits synchronization information to the clocks residing on its network segment. A grandmaster clock is the highest-ranking clock within its PTP subdomain and is the primary reference source for all other PTP elements. In a PTP network a grandmaster is the node that defines the correct time.

## Ordinary Clock

An ordinary clock is a PTP clock with a single PTP port. It could be a master clock (grandmaster) or a slave clock. Ordinary clocks are the most common device within a PTP network.

## Boundary Clock

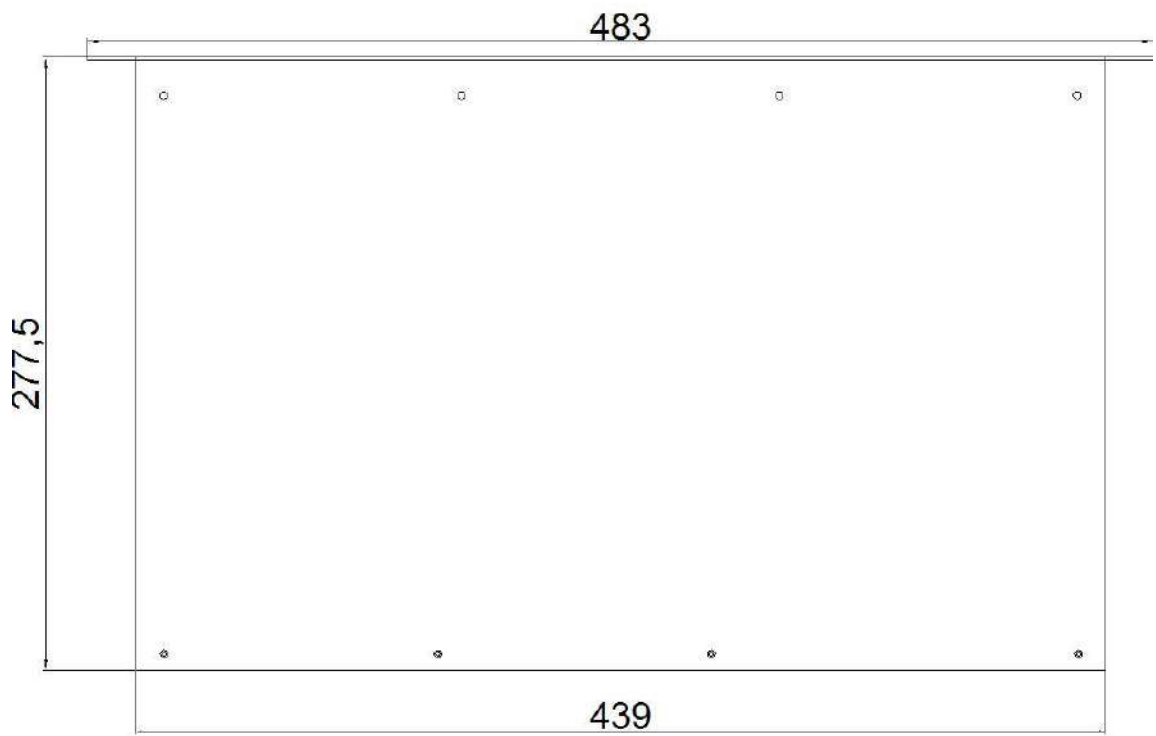
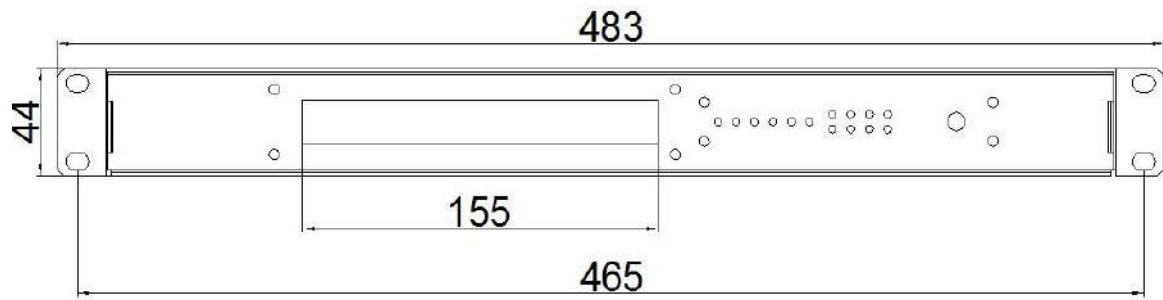
A boundary clock is a device between PTP grandmaster and PTP slave clients. A boundary clock has multiple network connections and can act as a source (master) and a destination (slave or client) for synchronization messages. The boundary clock intercepts and processes all PTP messages and passes all other traffic.

## Transparent Clocks

Transparent clocks measure and adjust for packet delay. The transparent clock computes the variable delay as the PTP packets pass through the switch. There are two types of transparent clocks, end-to-end and peer-to-peer. End-to-end transparent clocks update the time interval field for the delay associated. However peer-to-peer transparent clocks measure the line delay associated. Transparent clocks improve synchronization between the master and slave clocks and ensure that the master and slave clocks are not impacted by the effects of packet delay variation.



## Mechanical Sizes



## Hardware Installation

1. Install the antenna in a location with a clear sky view.
2. Install the EKOSync 1588B in the desired location and connect to the antenna.
3. Connect the EKOSync 1588B to the network switch.
4. Connect to power, ensuring the correct DC voltage (90 - 265VDC) is used.
5. Connect the Sync indication relay to the alarm circuit if required.  
(CM = Common, NO = Normally Open, NC = Normally Closed)
6. Once the EKOSync 1588B is installed and configured, connect the clock outputs to your devices.

- An RG58 cable is recommended to connect devices to the output ports.
- A termination resistor of 120  $\Omega$  can be added to the end of a TTL run to achieve good impedance matching.

## IV. CONFIGURATION & SETTINGS

### 1 Front Panel Overview

This section explains use of the front panel.

#### LED Indicators

Front panel of the EKOSync 1588B contains fourteen LEDs:

Label	Off	Flashing	On
Sync	-	Sync	Not Sync
PWRA	Red LED	-	Green LED
PWRB	Red LED	-	Green LED
NRM	Red LED (indicates error in device)	-	Green LED (normal operation)
PTP	Red LED	-	Green LED
NTP	Red LED	-	Green LED

Label	Upper LED On	Both LEDs On	Below LED on
ETH	1 Gbit	10Mbit	100Mbit

#### Menu Architecture

### 1 -LANGUAGE

- 1 -ENGLISH
- 2 -FRENCH
- 3 -TURKISH

Choose your language in this part.

### 2 -GPS CONFIG.

- 1 -QUALITY PARAMTRS
- 2 -BACK
- 3 -MAIN



### 3 -SYNC CONFIG.

1 -SYNCH1-SYNCH3 → 1 -PPS → 1 -PULSE PERIOD

- 1- 1s
- 2- 60s
- 3- 3600s

2 -PULSE DURATION

- 1 -100 ms
- 2 -200 ms
- 3 -500 ms

3 -EDGE MODE

- 1 -RISING
- 2 -FALLING

4 -BACK

5 -MAIN

2 -FREQ → 1 -5 MHz

- 2 -10 MHz
- 3 -20 MHz
- 4 -25 MHz
- 5 -DISABLE

3 -IRIG-B → 1 -IRIG-B 003

- 2 -IRIG-B 002
- 3 -DISABLE

4-BACK

2 -SYNCH4 → 1 -TOD PORT OPT. → 1 -BAUD RATE

- 1 -4800
- 2 -9600

2 -PARITY

3 -STOP BITS

4 -DATA BITS

5 -BACK

6 -MAIN

2 -PPS/TOD MODE

3 -ENABLE

4 -ASCII PROTOCOL → 1 -NMEA

2 -ASCII

3 -CM

5 -BACK

6 -MAIN

3 -SYNC MODE

4 -BACK

5 -MAIN

#### 4 -LOCAL TIME OFFS.

1 -UTC		
2 -LOCAL	→	1 -MIT
		2 -HST
		3 -AST
		4 -PST
		5 -MST, PNT
		6 -CST
		7 -EST, IET
		8 -PRT
		9 -CNT
		10 -AGT, BET
		11 -UTC, GMT, WET
		12 -ECT
		13 -EET, CAT, ART
		14 -EAT
		15 -MET
		16 -NET
		17 -PLT
		18 -IST
		19 -BST
		20 -VST
		21 -CTT
		22 -JST
		23 -ACT
		24 -AET
		25 -SST
		26 -NST

#### 5 -LAN CONFIG.

IP: 168. 254.100. 115  
Enable Static IP  
BACK  
MAIN

#### 6 -PRODUCT RELEASE

RELEASE

1 -R1. 0/1.0

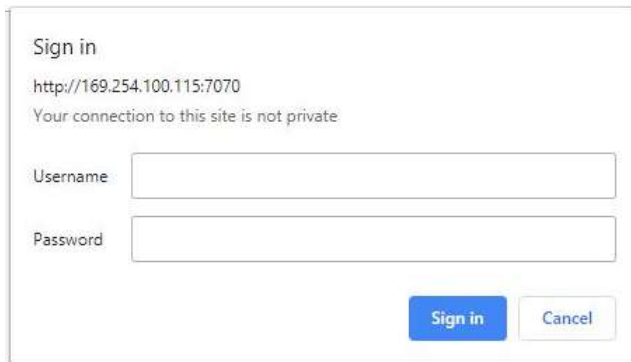
#### 7 -EXIT

Returns the main menu.

## 2 Accessing the PTP/NTP TIME SERVER

Make proper IP settings on PC and enter the device IP address 169.254.100.115:7070 on web browser.

The below picture will be seen;



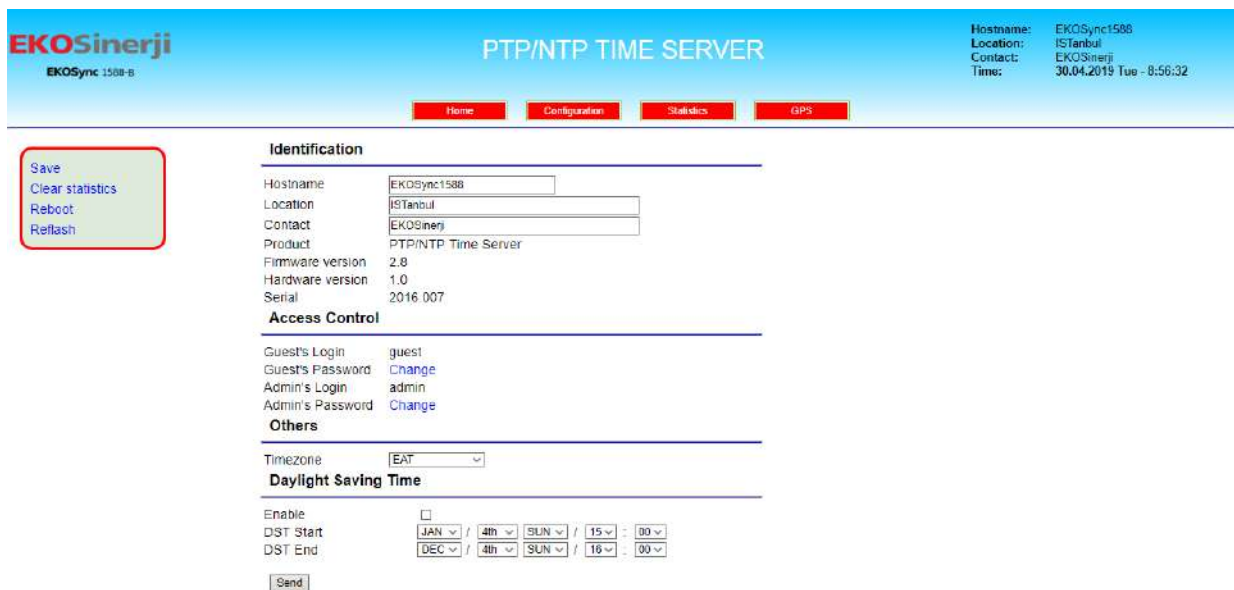
Sign in  
http://169.254.100.115:7070  
Your connection to this site is not private.

Username:

Password:

Username :	admin
Password :	nimda

Once accessed correctly, the following main screen will appear:



**EKOSinerji** EKOSync 1588-B **PTP/NTP TIME SERVER**

Home Configuration Statistics GPS

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Time: 30.04.2019 Tue - 8:56:32

**Save**  
**Clear statistics**  
**Reboot**  
**Refresh**

**Identification**

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Product: PTP/NTP Time Server  
Firmware version: 2.8  
Hardware version: 1.0  
Serial: 2016 007

**Access Control**

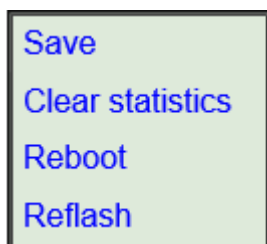
Guest's Login: guest  
Guest's Password: [Change](#)  
Admin's Login: admin  
Admin's Password: [Change](#)

**Others**

Timezone: EAT  
**Daylight Saving Time**

Enable:   
DST Start: JAN 4th SUN 15:00  
DST End: DEC 4th SUN 16:00

## General Commands:



**Save:** This command saves the configuration changes to **TIME SERVER** flash memory, so they will be available next time the **TIME SERVER** reboots.

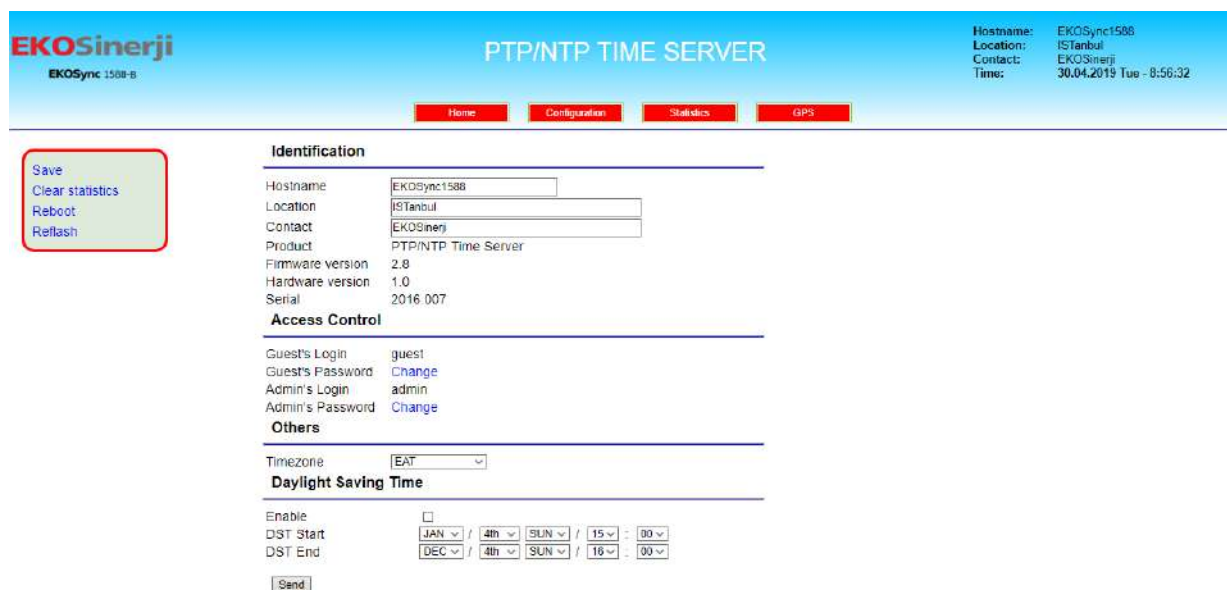
**Clear statistics:** Clear all of statistics.

**Reboot:** It restarts the **TIME SERVER**.

**Reflash:** This option allows a firmware upgrade in the **TIME SERVER**.

## From **Home** button;

General informations about time server are seen. These informations such as the hostname, location, contact and model of the **PTP/NTP Time Server** are provided. In addition; admin and guest passwords can be changed.



**EKOSync 1588B** PTP/NTP TIME SERVER

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Time: 30.04.2019 Tue - 8:56:32

Home Configuration Statistics GPS

**Save**  
Clear statistics  
Reboot  
Reflash

**Identification**

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Product: PTP/NTP Time Server  
Firmware version: 2.8  
Hardware version: 1.0  
Serial: 2016 007

**Access Control**

Guest's Login: guest  
Guest's Password: Change  
Admin's Login: admin  
Admin's Password: Change

**Others**

Timezone: EAT

**Daylight Saving Time**

Enable:   
DST Start: JAN / 4th / SUN / 15 : 00  
DST End: DEC / 4th / SUN / 16 : 00

Send

### ▪ Others

The area timezone allows to configure the time zone of the device, and converting UTC time to local time.

### ▪ Daylight Saving Time

The area DST, when enabled, allows to configure the beginning and the end of daylight saving time.

From **Configuration** button;

In this menu Web Access, LAN, SNMP(will be activated later), NTP and PTP can be configured;

- Web Access: http and https ports can be changed. Once configuration is complete, click the Send icon.



- LAN: For Static IP settings, check the **Enable** box in the LAN area. Also, IP address, gateway, mask can be changed manually. Once configuration is complete, click the Send icon.

Pre gateway shows the gateway address of the device.

If the IP address is changed, new IP address on web browser should be written. Then click the save tab, and press the **OK** button.

**Press save for permanent change.**



- **NTP:**

Click the **NTP** tab, and check **Enable** if not already checked. Also, NTP mode can be selected as Unicast, Multicast, Broadcast or Mixed.

When NTP - Local Time is selected, the local time is sent via the NTP protocol according to the time zone and DST configuration. If this option is not checked, UTC is sent.

**PTP/NTP TIME SERVER**

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Time: 30.04.2019 Tue - 8:49:47

Home Configuration Statistics GPS

**NTP**

Enable   
Local Time   
NTP poll

**NTP Mode**

Unicast   
Multicast   
Broadcast   
Mixed

Send

Web Access  
LAN  
SNMP  
**> NTP**  
PTP

Save  
Clear statistics  
Reboot  
Refresh

- **PTP:**

Click the **PTP** tab. Check **Enable**, if not already checked. 1588 accounts for the variable delay to packets from Ethernet switches that inhibits path delay measurements, and allows accuracy down to the nanosecond level at end-device clocks.

When PTP - Local Time is selected, the local time is sent via the PTP protocol according to the time zone and DST configuration. If this option is not checked, UTC is sent.

**PTP/NTP TIME SERVER**

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Time: 30.04.2019 Tue - 8:49:57

Home Configuration Statistics GPS

**PTP**

Enable   
Local Time   
Domain Number   
Announce Interval  seconds  
Sync Interval  seconds  
Min Delay Request  seconds  
Min Peer Delay Request  seconds  
Announce Receipt Timeout   
Delay Mechanism   
Protocol   
Clock Class   
Clock Accuracy   
Priority 1   
Priority 2

Send

Web Access  
LAN  
SNMP  
NTP  
**> PTP**

Save  
Clear statistics  
Reboot  
Refresh

From **Statistics** button:

General statistics on the **NTP/PTP TIME SERVER** will appear, such as:

- **Uptime:** Running time of the **TIME SERVER**, from the last time of turning on.
- **Time (UTC):** Date and time indication in UTC format.
- **Demo Mode:** When Demo Mode is enabled, it is possible to configure the date and time manually from the Web Interface in the configuration and statistics tab. Time protocols work in Demo Mode: PTP (only UTC), NTP, SNTP.

The screenshot shows the web interface for the PTP/NTP TIME SERVER. The header includes the EKOSinerji logo, the product name, and system information: Hostname: EKOSync1588, Location: ISTanbul, Contact: EKOSinerji, and Time: 30.04.2019 Tue - 8:50:10. Navigation buttons for Home, Configuration, Statistics, and GPS are visible. The 'Statistics' button is highlighted. On the left, a sidebar contains 'Save', 'Clear statistics', 'Reboot', and 'Refresh' buttons. The main content area is titled 'General Statistics' and displays the following data:

Uptime(seconds)	56267
Time(UTC)	30.04.2019,05:50:05 <a href="#">Change</a>
Demo Mode	<input type="checkbox"/> <a href="#">Send</a>
PTP Service	Enabled (Running)
Current UTC-PTP Offset	+108Enabled (Running)
NTP	Enabled (Running)
Alarm	PSU fails

At the bottom of the statistics section, there are buttons for 'Event Log' and 'Event Log\_P'.

- **Event Log:**

Click **Event Log**. Last 100 events can be viewed.

This screenshot shows the same web interface as above, but with the 'Event Log' button selected. The 'Event Log' button is highlighted in the sidebar. The main content area now displays a list of system events:

```
-- Sun Dec 16 2018, 12:52:37, PSU Failed
-- Sun Dec 16 2018, 12:52:38, Antenna Open
-- Sun Dec 16 2018, 12:56:19, DEMO MODE ON
-- Tue Oct 17 2017, 13:09:16, DEMO MODE ON
-- Sun Oct 18 2020, 21:34:33, DEMO MODE OFF
-- Sun Oct 18 2020, 21:35:26, Antenna OK
-- Wed Apr 3 2019, 11:39:02, System Started
-- Wed Apr 3 2019, 11:39:02, PSU Failed
-- Wed Apr 3 2019, 11:39:08, SYNC
-- Thu Mar 19 1987, 17:51:48, System Started
-- Thu Mar 19 1987, 17:51:48, PSU Failed
-- Thu Mar 19 1987, 17:52:15, SYNC
-- Wed Apr 3 2019, 16:23:13, Antenna Open
-- Thu Nov 6 1998, 15:28:12, System Started
-- Thu Nov 6 1998, 15:28:12, PSU Failed
-- Thu Nov 6 1998, 15:28:12, Antenna Open
-- Sat Mar 11 1978, 17:45:24, System Started
-- Sat Mar 11 1978, 17:45:24, PSU Failed
-- Sat Mar 11 1978, 17:45:25, Antenna Open
```

From **GPS** button:

In this menu the following can be viewed:

- Satellite Signal Reception
- Location
- Antenna Status
- Mask Angle
- Low Satellites
- Cable Delay

**EKOSinerji**  
EKOSync 1588-B

**PTP/NTP TIME SERVER**

Hostname: EKOSync1588  
Location: ISTanbul  
Contact: EKOSinerji  
Time: 30.04.2018 Tue - 9:00:03

Home Configuration Statistics **GPS**

Save  
Clear statistics  
Reboot  
Refresh

### Satellite Signal Reception

Satellite ID	Signal Strength
4	28
5	26
7	45
8	43
9	32
11	0
13	0
15	0
17	46
28	49
30	36
65	24
66	21
67	47
75	33
76	9
77	0
84	45
85	37
86	37

### Location

4047.51720,N 02923.94854,E

### Status

Antenna OK

### Config

Mask Angle  degrees  
Low Satellites   
Cable Delay  ns



## APPENDIX

### List of UTC offsets

Offset	Abbreviation	Description
-11	MIT	Samoa
-10	HST	Hawaii
-9	AST	Alaska
-8	PST	Pacific Standard Time
-7	MST,PNT	Mountain Standard Time
-6	CST	Central Standard Time
-5	EST,IET	Eastern Standard Time
-4	PRT	Atlantic Standard Time
-3.5	CNT	Newfoundland
-3	AGT,BET	Eastern South America
0	UTC,GMT,WET	Coordinated Universal Time
+1	ECT	European Central Time
+2	EET,CAT,ART	European Eastern Time
+3	EAT	Saudi Arabia
+3.5	MET	Iran
+4	NET	
+5	PLT	West Asia
+5.5	IST	India
+6	BST	Central Asia
+7	VST	Bangkok
+8	CTT	China
+9	JST	Japan
+9.5	ACT	Central Australia
+10	AET	Eastern Australia
+11	SST	Central Pacific
+12	NST	New Zealand