LigoWave

FWBD-3700

User Guide

Revision 1.0
June 17, 2015

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FCC warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC caution

To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC radiation exposure statement

To comply with FCC RF exposure requirements in section 1.1307, a minimum separation distance of 3.9 feet is required between the antenna and all occupational persons, and a minimum separation distance of 8.7 feet is required between the antenna and all public persons.

CE mark warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

R&TTE compliance statement

This equipment complies with all the requirements of the Directive 1999/5/EC of the European Parliament and the Council of 9 March 1999 on Radio Equipment and Telecommunication Terminal Equipment and the Mutual Recognition of their Conformity (R&TTE). The R&TTE Directive repeals and replaces in the directive 98/13/EEC (Telecommunications Terminal Equipment and Satellite Earth Station Equipment) As of April 8, 2000.

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this manual and of the computer manufacturer must therefore be allowed at all times to ensure the safe use of the equipment.

EU countries intended for use

The ETSI version of this device is intended for home and office use in Austria, Belgium, Denmark, Finland, France (with Frequency channel restrictions), Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and United Kingdom. The ETSI version of this device is also authorized for use in EFTA member states Iceland, Liechtenstein, Norway and Switzerland.

EU countries not intended for use

None.

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About This Guide

Purpose

This document provides information and procedures on installation, setup, configuration, and management of the LigoPTP unit.

Definitions, acronyms and abbreviations

The following typographic conventions and symbols are used throughout this document:

Additional information that may be helpful but which is not required.

Important information that should be observed.

bold Menu commands, buttons, input fields, links, and configuration keys are displayed in bold

italic References to sections inside the document are displayed in italic.

`code` File names, directory names, form names, system-generated output, and user typed entries are displayed in constant-width type

Device Access

First connection via Ethernet

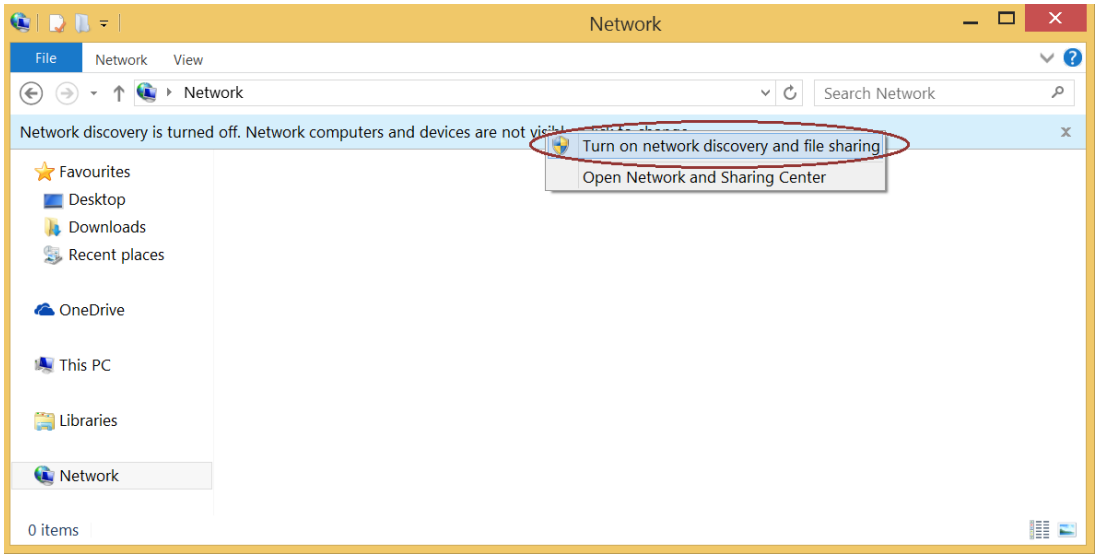
By default LigoPTP device obtains the IP address from the DHCP server. Follow the steps to access device on different OS:

In case the LigoPTP device is unable to obtain IP address from a DHCP server, it fallback to the default static IP 192.168.2.66.

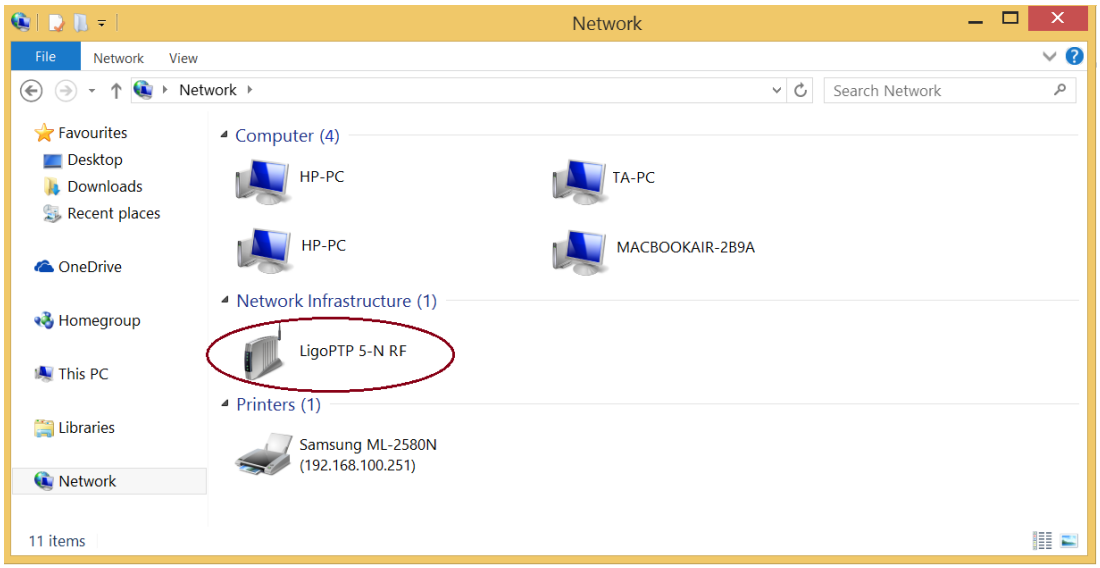
Windows OS

Step 1: Connect your PC directly to the LigoPTP device via Ethernet.

Step 2: Open Windows **Explorer**, click on **Network** drive, and turn on **Network discovery**:



Step 3: Find the required LigoPTP device icon:

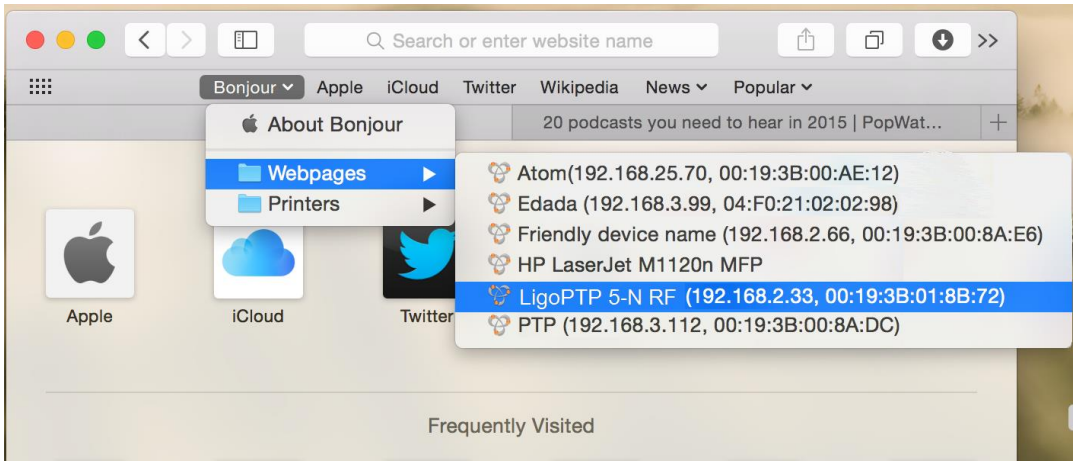


Step 4. Double-click on the device icon – you will be redirected to the device webpage automatically.

MAC OS

Step 1: Connect your PC to the LigoPTP device via Ethernet.

Step 2: Run **Bonjour** application, click on **Webpages** and find the required LigoPTP device name:



Step 3: Click on the selected item and the device web management interface will be loaded on the default web browser.

Linux (Ubuntu)

Step 1: Connect your PC to the LigoPTP device via Ethernet.

Step 2: Open terminal application GNOME Terminal (or Konsole for Kubuntu) and type command "`avahi-browse -tr _http._tcp`". Find the IP address of the required LigoWave device in the received output:

```
Ubuntu> avahi-browse -tr _http._tcp
+   eth2 IPv4 HP LaserJet 2200 (0001E660DF4D)            Web Site             local
+   eth0 IPv4 NFT 2N (192.168.5.10, 00:19:3B:00:8A:DA)   Web Site             local
=   eth2 IPv4 HP LaserJet 2200 (0001E660DF4D)            Web Site             local
   hostname = [NPI60DF4D.local]
   address = [192.168.100.145]
   port = [80]
   txt = []
=   eth0 IPv4 NFT 2N (192.168.5.10, 00:19:3B:00:8A:DA)   Web Site             local
   hostname = [NFT-2N-008ADA.local]
   address = [192.168.5.10]
   port = [80]
   txt = []
```

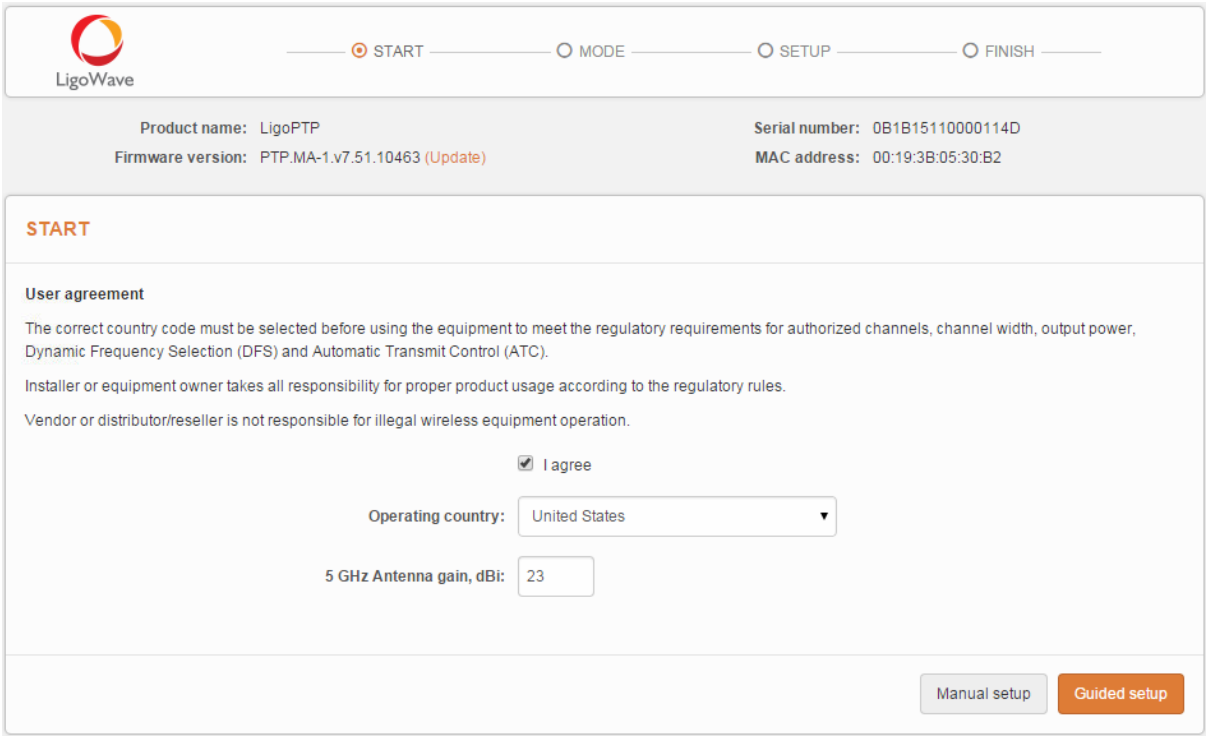
Step 3: Open a web browser ant type discovered IP in the address field to open device web management interface.

First access to web management interface

Follow the steps for first connection to the LigoPTP device web management interface:

Step 1. Start your Web browser.

Step 2. Enter the device default IP address **192.168.2.66** in the web browser's IP field. By default, out of the box, or reset to defaults, LigoPTP unit will load the user agreement page. After user agreement was signed, choose the LigoPTP unit's operating country. According to the chosen country, the regulatory domain settings may differ. You will be not allowed to select radio channels and RF output power other the permitted values for your chosen country and regulatory domain.



The Antenna Gain value should be set for products with external antenna only.

Step 3. After successful administrator login, you will see the main page of the device Web management interface. The device now is ready for configuration.

LigoPTP Link Guided Setup

The LigoPTP link consists of two units, one on each end: Master and Slave. If the radio settings of the LigoPTP Master and Slave units are met (and units are properly aligned on installing), the wireless link will automatically establish itself and the traffic will begin to pass between Master and Slave.

After the first login to the LigoPTP web management interface, the setup wizard provides simplified options to help you quickly get your LigoPTP link up and running.

Click **Guided setup** button to start LigoPTP units' installation:

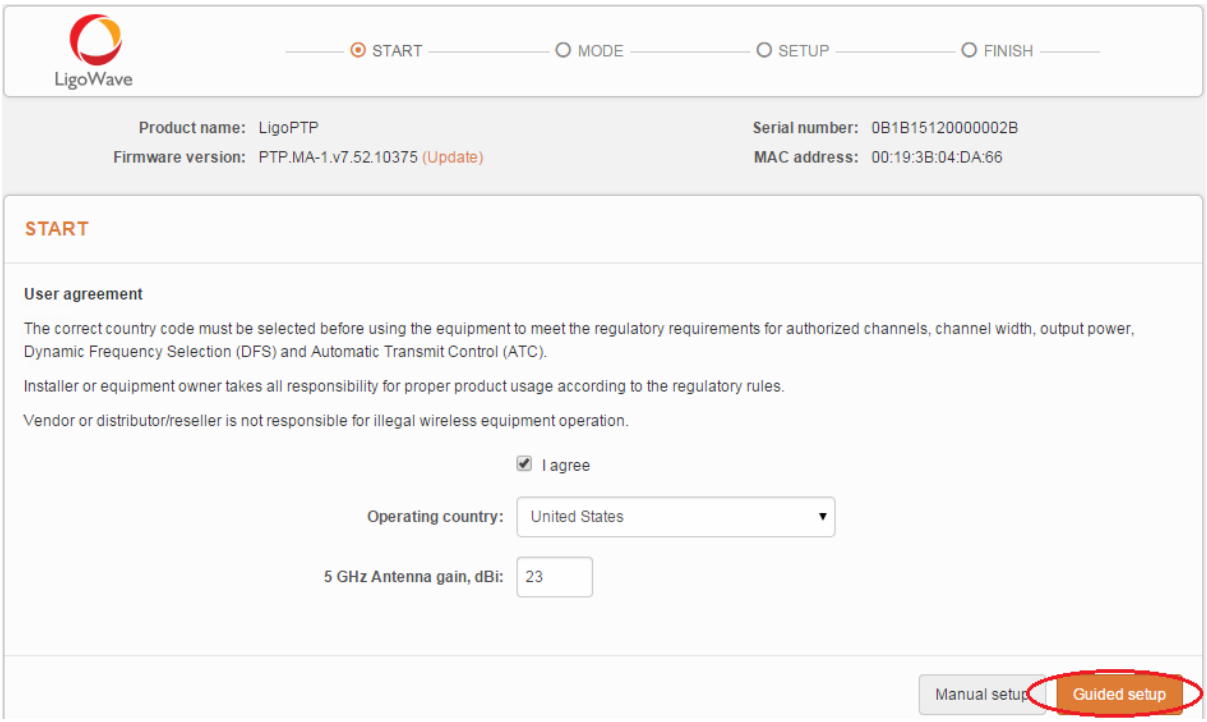


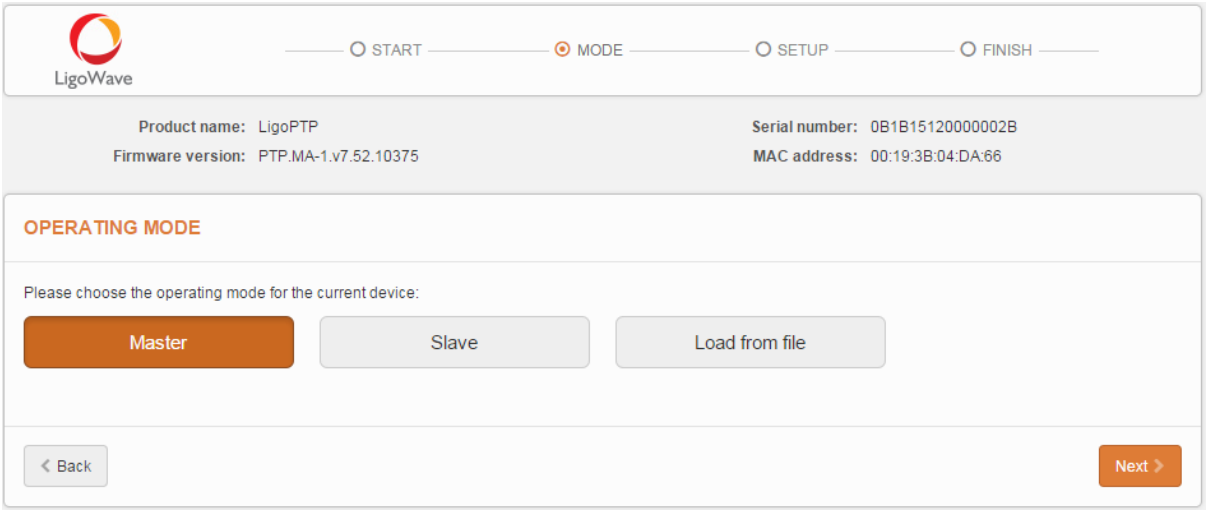
Figure 1 – LigoPTP guided setup

To setup LigoPTP unit manually you can cancel this wizard at any time (not recommended).

Master's guided setup

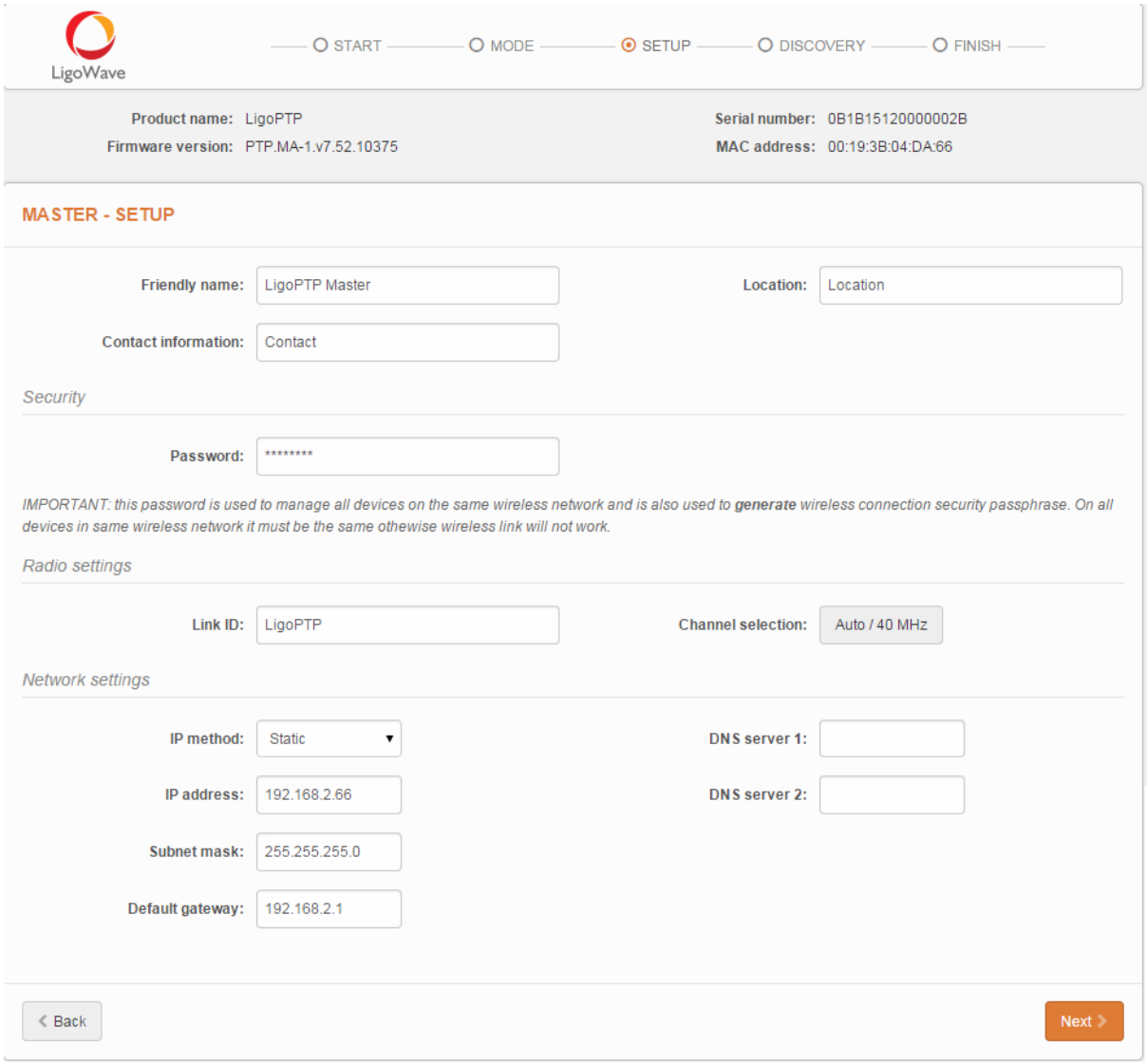
Follow the steps to setup LigoPTP link from the Master unit's side. With this wizard, the administrator is able to setup Master unit as well as scan the air, find the Slave unit, assign required settings, thus creating the LigoPTP link.

Step 1. Choose the operating mode: choose **Master** and click Next button:

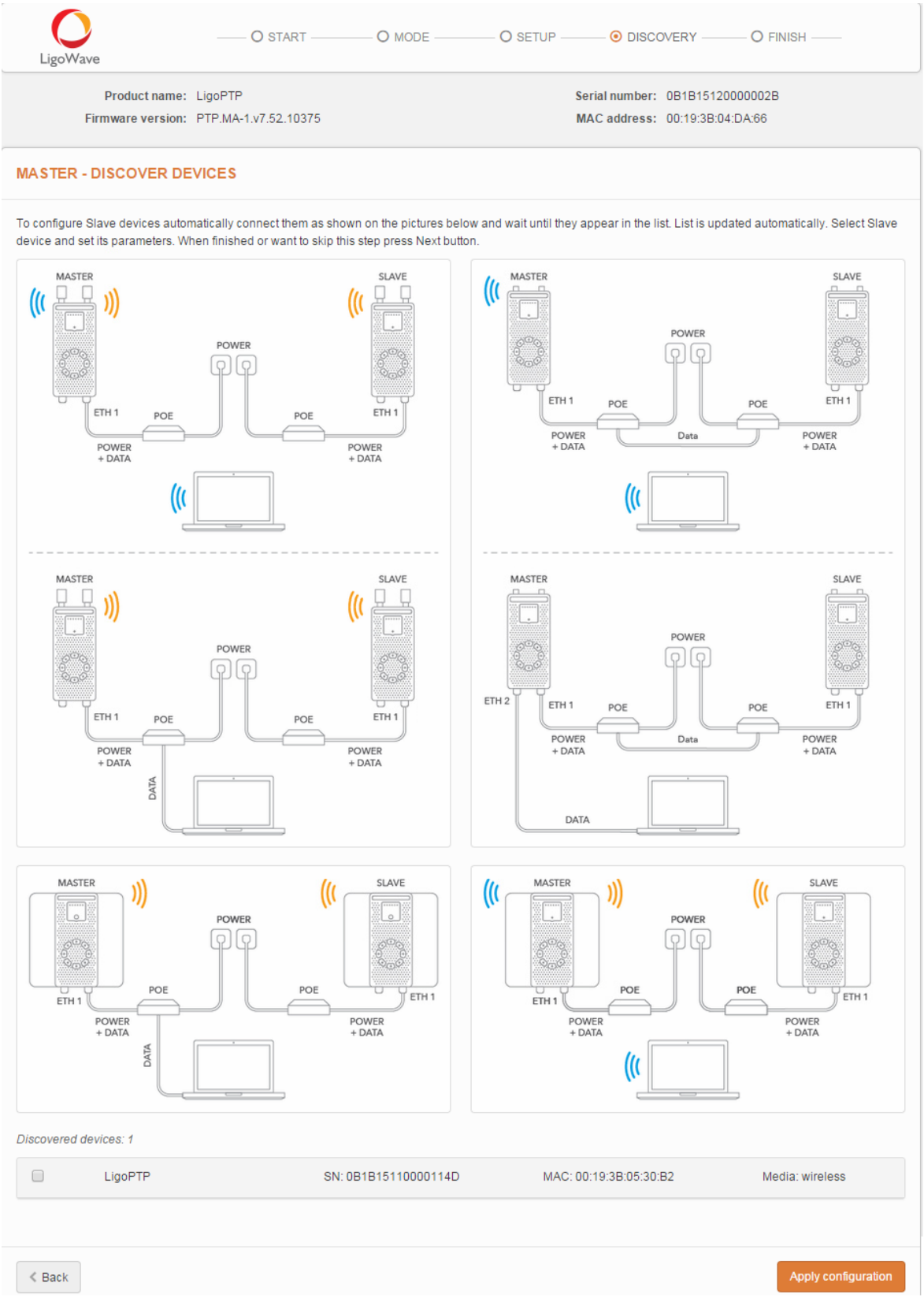


Step 2. Specify essential parameters of the Master unit and click Next button:

Note that the Security -> **Password** is for connection security between LigoPTP units as well as password to login to the web management interface. This password on Master and Slave units must match.



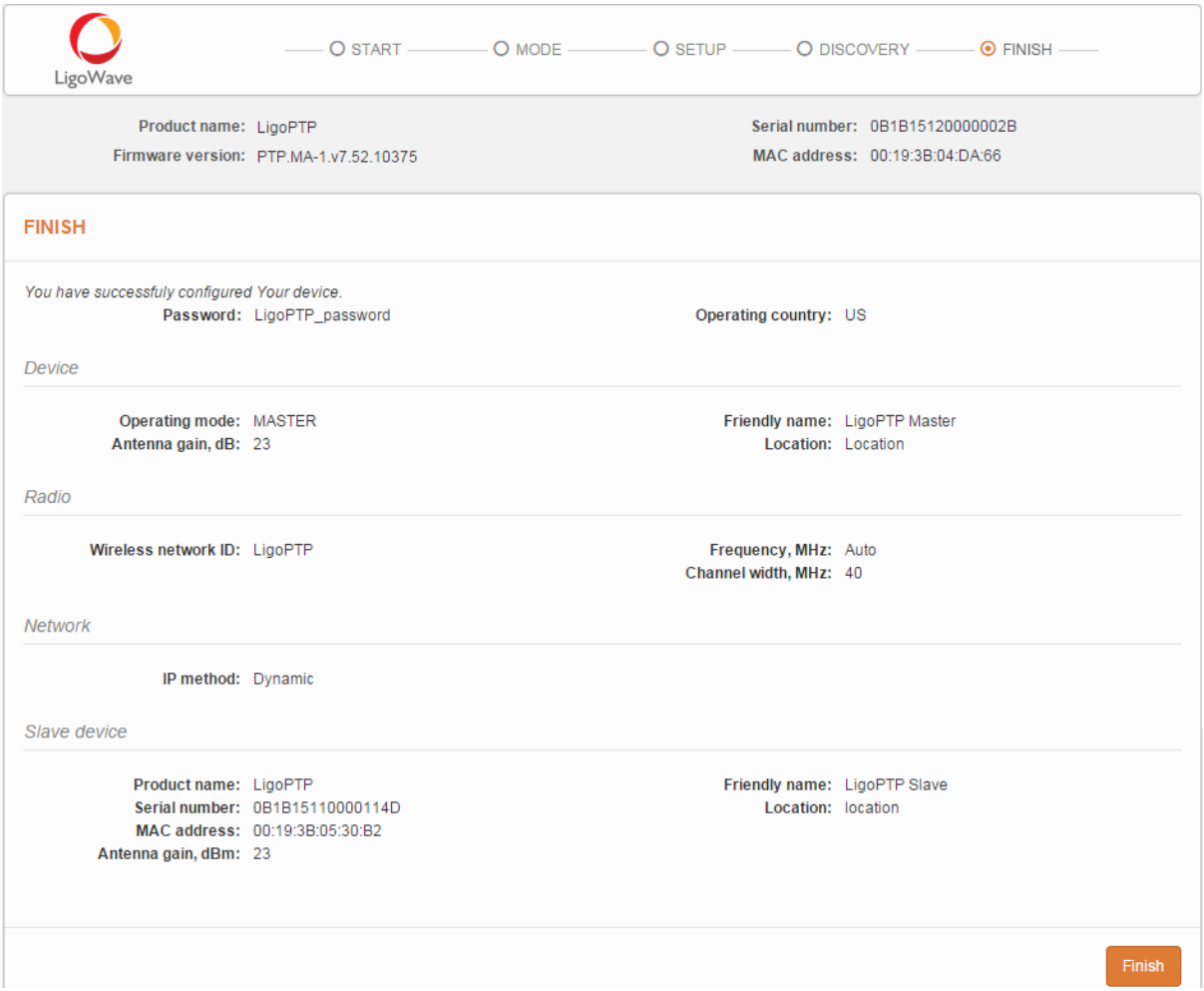
Step 3. Connect Slave unit to Master unit as shown in pictures below (choose one of the given connection options) and wait until the Slave units appear in the list if the bottom of the page:



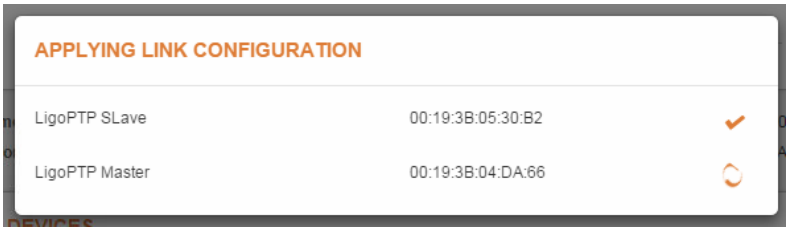
Note that Discovered device list displays remote LigoPTP devices having the default settings only. Already configured devices will not be included in the list.

Step 4. Select discovered Slave unit, assign following parameters:

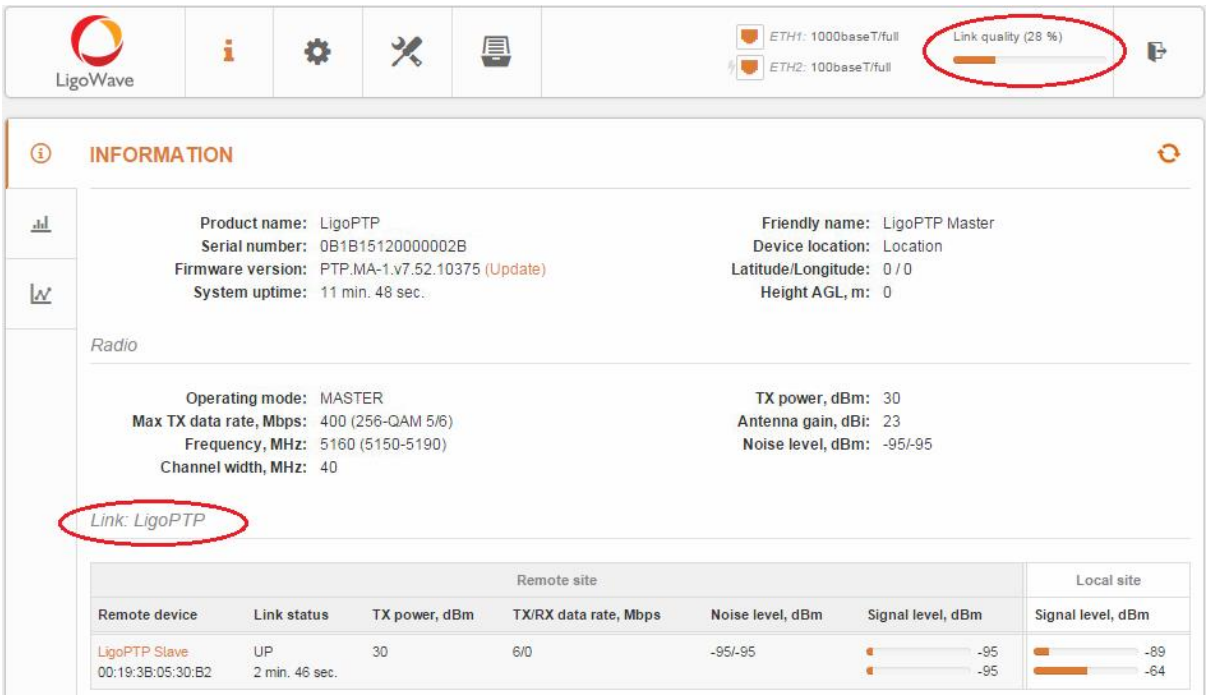
Step 5. Click **Apply configuration** and review the LigoPTP link's assigned settings:



Step 6. Click Finish to enable newly assigned settings for both units of the LigoPTP link:



Step 7. The LigoPTP link is successfully configured. Check parameters of the established LigoPTP link on the Status-> Information page:

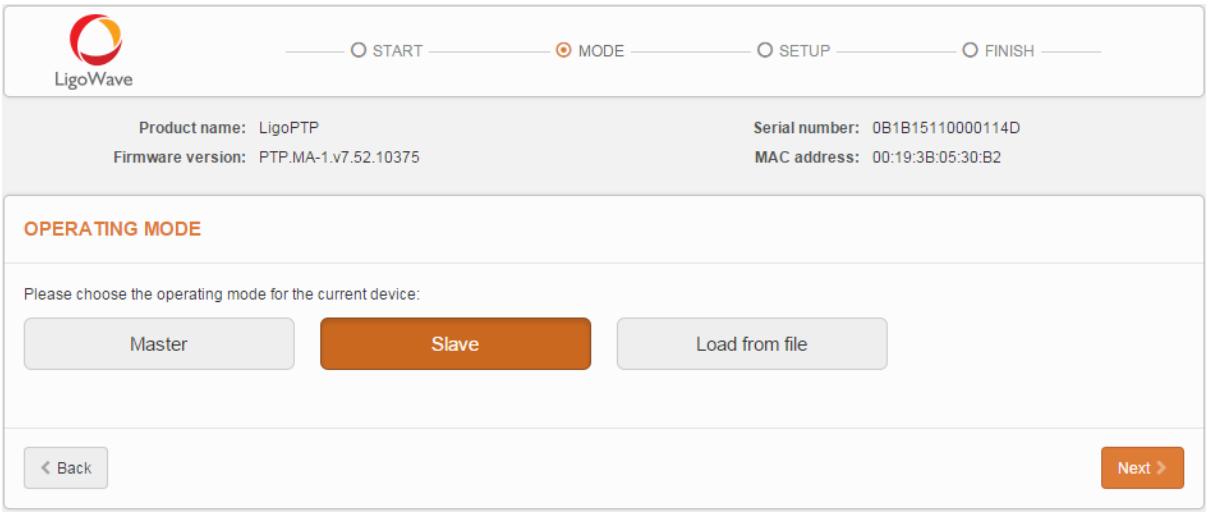


The LigoPTP unit is now running but probably requires additional configuring to conform to your network operational and security requirements. Refer to the next chapter *LigoPTP Configuration* in this manual for the information you need to complete the configuration.

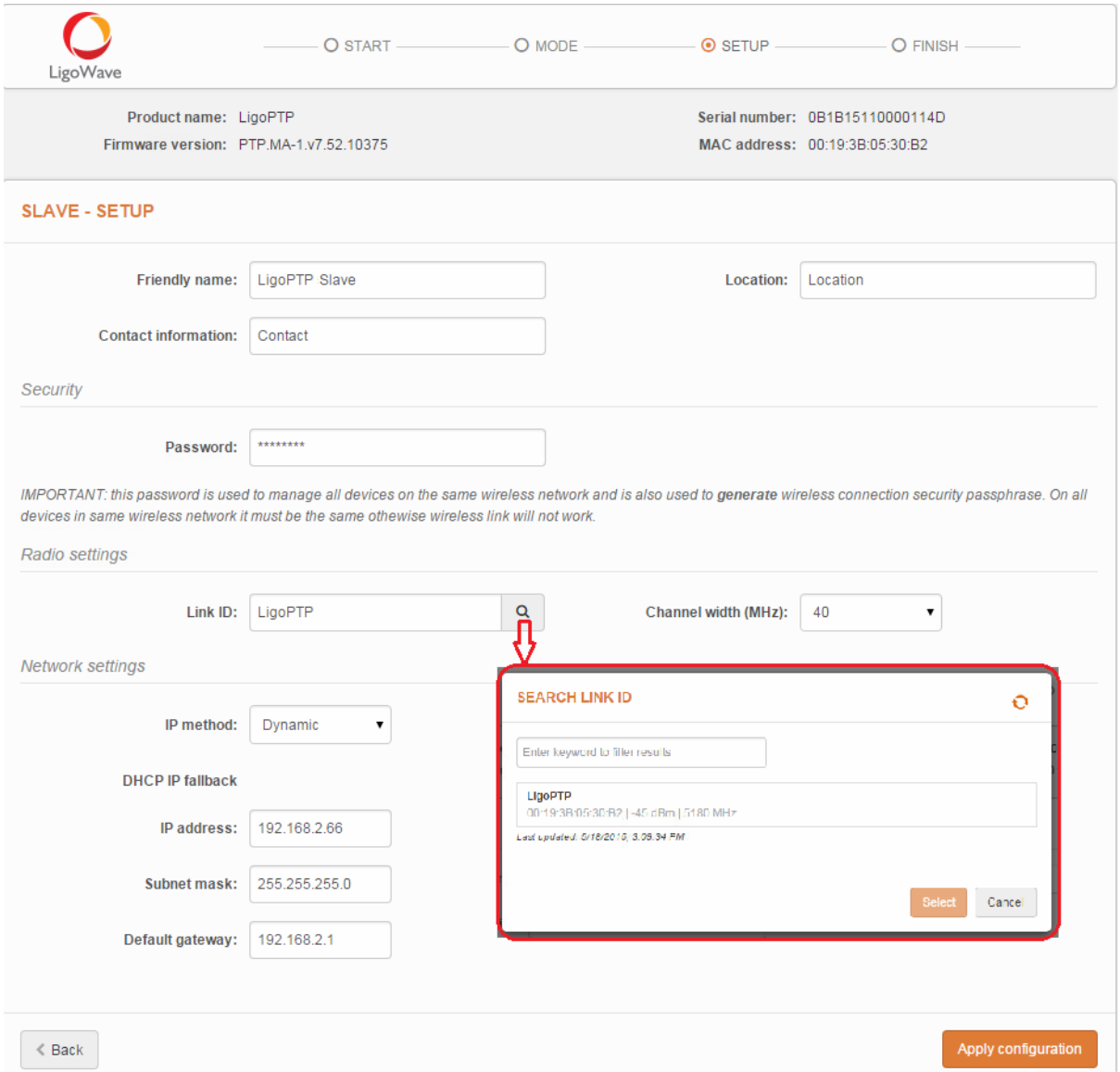
Slave's guided setup

Follow the steps to setup Slave unit. With this wizard the administrator is able to setup Slave unit to scan the air, find and assign the Master unit, thus creating the LigoPTP link.

Step 1. Choose the operating mode: choose **Slave** button and click Next button:



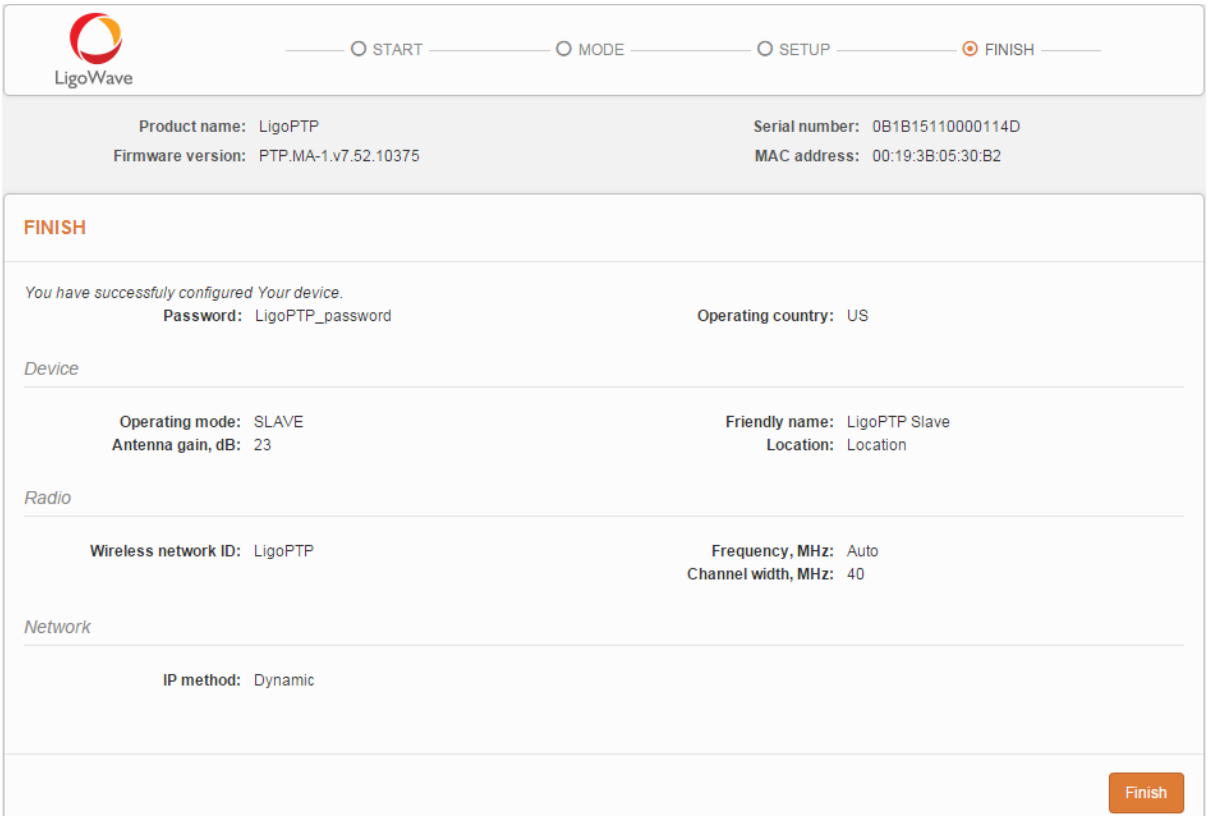
Step 2. Specify the required settings for the LigoPTP Link and click Apply configuration button:



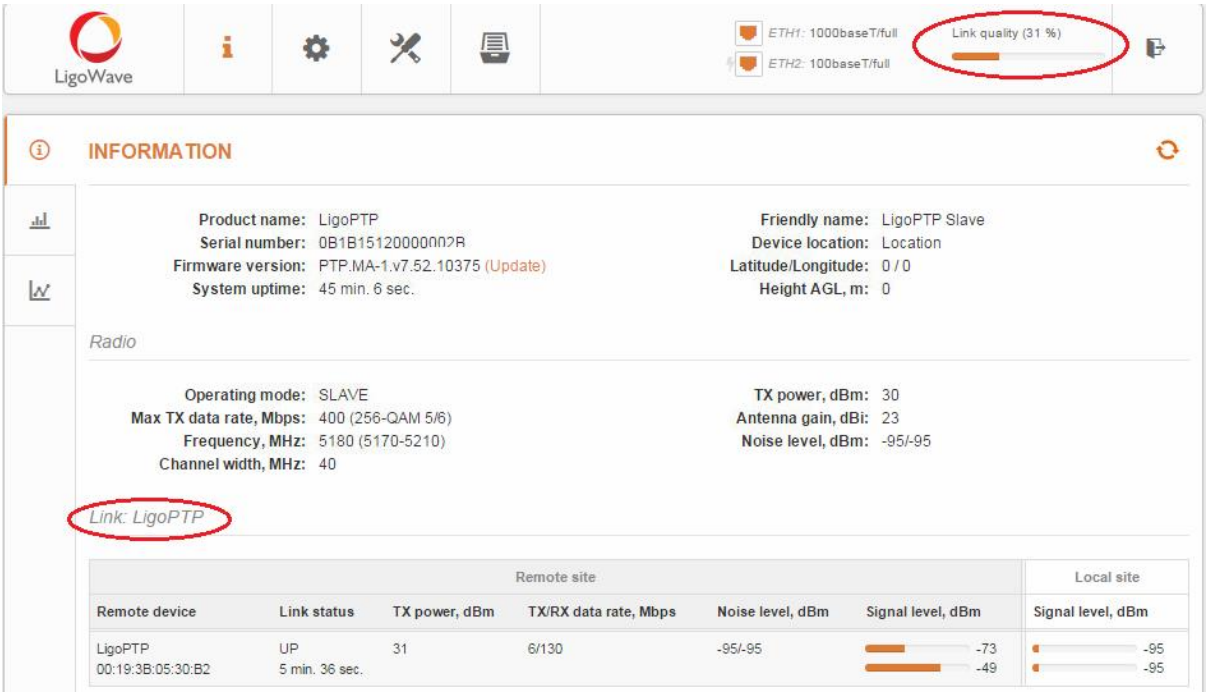
Note that the Security -> **Password** is for connection security between LigoPTP units as well as password to login to the web management interface. This password on Slave and Master units must match.

For convenience use search button next to **Link ID** to scan for the Master device

Step 3. Click **Finish** to enable newly assigned settings for Slave unit. After the setup process will be finished, you will be redirected to Login page. Submit a password (assigned on the Step 2) for login to the web management interface.



Step 4. Check parameters of the established LigoPTP link:



The LigoPTP unit is now running but probably requires additional configuring to conform to your network operational and security requirements. Refer to the next chapter *LigoPTP Configuration* in this manual for the information you need to complete the configuration.

LigoPTP Configuration

Appling and saving configuration changes

The four buttons appear right after the configuration changes were made on the GUI, located on the right top corner of the WEB GUI allowing managing device configuration:

- **Save changes** – if pressed new configuration settings are applied instantly and written to the permanent device memory.
- **Test changes** – if pressed the device will start operating with newly set configuration settings for 3 minutes. During this test time, the administrator is able to gauge if device is working properly, and then Save changes. In case wrong settings were chosen (or even after faulty settings administrator have lost connection with the device), the device automatically reverts back configuration to an old one.
- **Discard changes** – if pressed parameter changes are discarded. It should be noted that if Save changes is pressed it is not possible to discard changes.
- **Logout** – if pressed, the user will be redirected to the Login page.

It is not required to press **Save changes** in every Web GUI tab. The device remembers all changes made in every tab and after action button is used, all changes will be applied.

Status

After login, the main Web management page displays Status Information page. The header of Web management page displays Link quality and Ethernet port(s) status:

Figure 2 – Web Management Interface

Information

Use the Status Information menu to check the current status of the LigoPTP unit and established link (this is the default page when accessing the device's web management interface). The Information page displays generic information and status of the LigoPTP unit. The page divided into four main categories: System, Radio, Link and Network. The System section displays the identification information of the LigoPTP unit. The Radio section presents main wireless settings. The Link table describes the LigoPTP link (Local and Remote site) connectivity parameters. The Network section displays a short summary about network configuration (IPv4 and IPv6).

The information in the page can be updated using Refresh icon.

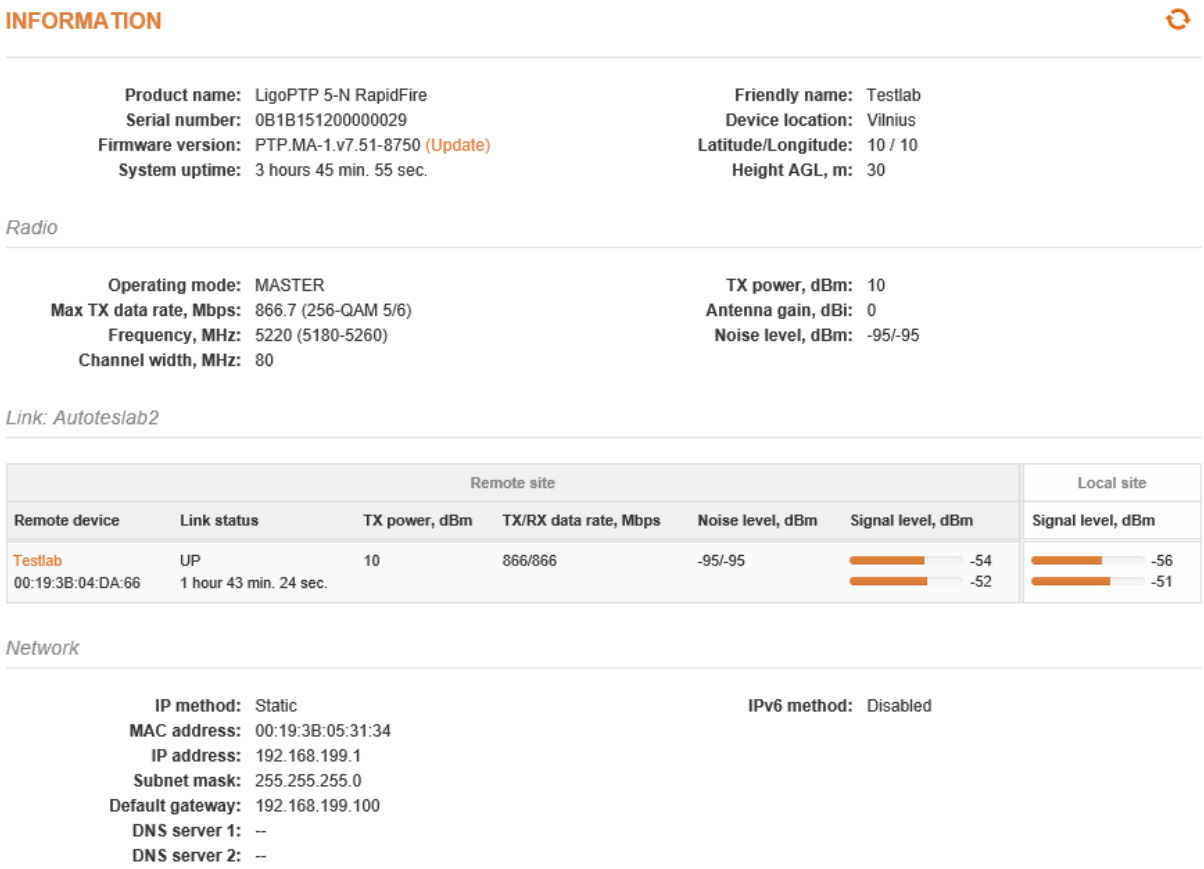


Figure 3 – Device Information Page

If LigoPTP unit operates as Master, the Link table contains possibility to manage remote device's (Slave) configuration. Click on the active link (Friendly name of the remote device) and the dialog box containing Slave's settings will be loaded.

Statistics

The statistics page displays detailed statistics of the PTP link performance. The Statistics page divided into the two sections: Interfaces and W-Jet V statistics.

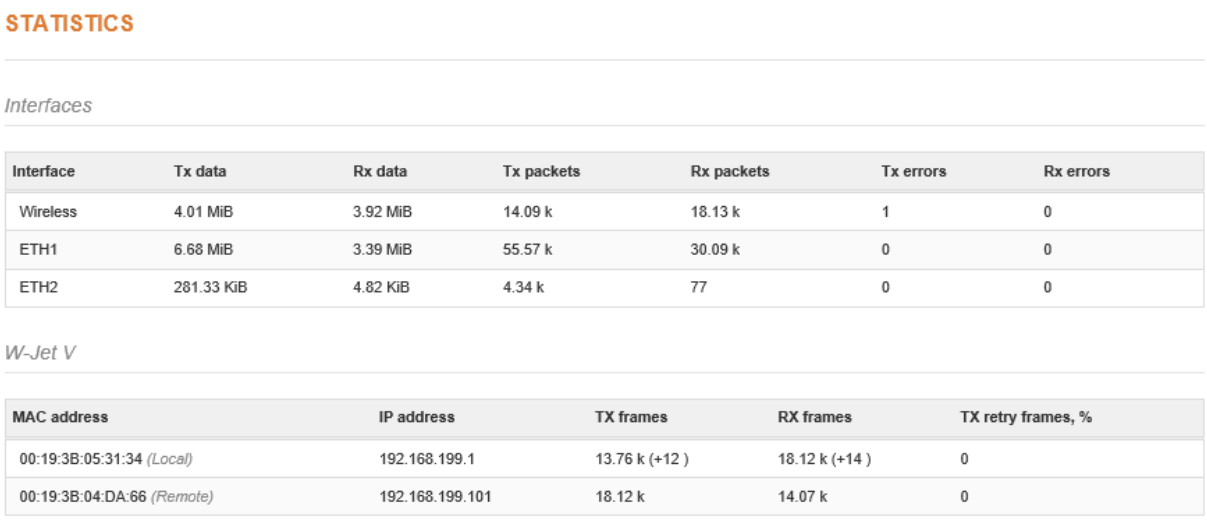


Figure 4 –Interface counters

Interfaces

This table contains detailed statistics of Ethernet and Wireless interfaces:

TX data – displays the total number of sent bytes by the Ethernet or Wireless interface of the link.

RX data – displays the total number of received bytes by the Ethernet or Wireless interface of the PTP link.

TX packets – displays the total number of sent packets by the Ethernet or Wireless interface of the PTP link.

RX packets – displays the total number of received packets by the Ethernet or Wireless interface of the PTP link.

TX errors – displays the total number of sent corrupted packets by the Ethernet or Wireless interface of the PTP link.

RX errors – displays the total number of received corrupted packets by the Ethernet or Wireless interface of the PTP link.

W-JET V

W-Jet V is advanced proprietary wireless protocol that combines special techniques to achieve superior performance and reliability even over long distances. This table displays statistical counters of the PTP link communication protocol.

MAC address – displays MAC addresses of the Local and Remote units.

IP address – displays IP addresses of the Local and Remote units.

TX frames – number of transmitted data frames. The number in brackets (+xx) displays the data change since the last page refresh.

RX frames – number of transmitted data frames. The number in brackets (+xx) displays the data change since the last page refresh.

TX retry frames % – the percentage of attempts to retransmit data frames. The number in brackets (+xx) displays the data change since the last page refresh.

Graphs

The Graphs page contains device statistics in graphic diagrams and is used for device monitoring.

This page displays graphic diagrams of the following statistics: Signal level, Wireless and Ethernet Throughput, Wireless and Ethernet PPS, CPU load, and Memory usage. Statistics in diagrams are displayed real time, as well as can be displayed on hourly, daily, weekly or monthly basis.

Point the mouse cursor on the diagram line and you will get the numeric expression of the particular statistic.

Signal strength diagram displays signal change of the Local and Remote PTP units at the chosen period:

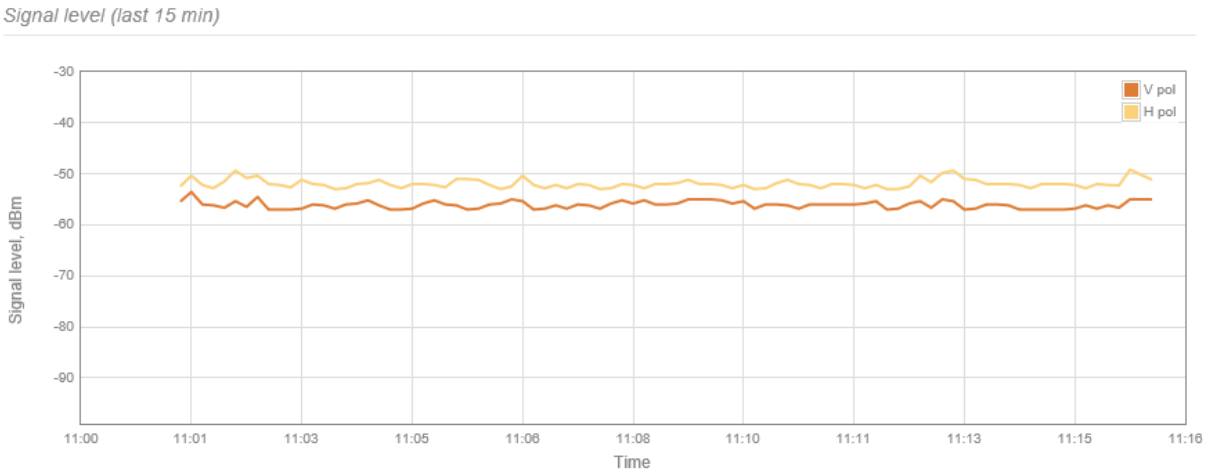


Figure 5 - Signal Strength Graph

Data throughput shows graphical expression of Wireless and Ethernet interfaces throughput statistics of the PTP link in last 15 minutes.

Packets per seconds (PPS) displays graphical expression of Wireless and Ethernet interfaces PPS of the PTP link in last 15 minutes.

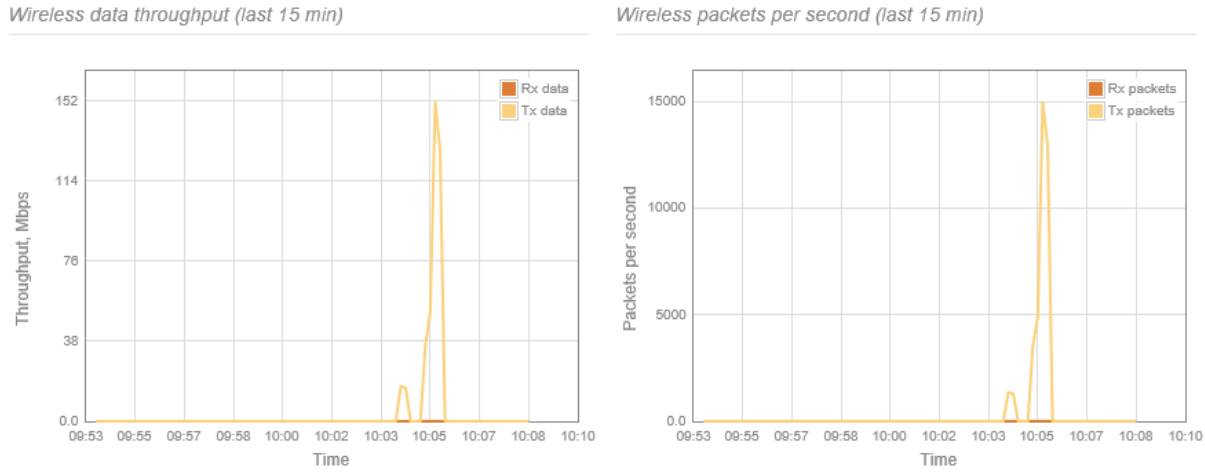


Figure 6 - Data Throughput and PPS (Wireless interface) graphs

CPU load diagram displays device CPU load in appropriate time basis.

Memory diagram displays the graph of device memory usage:

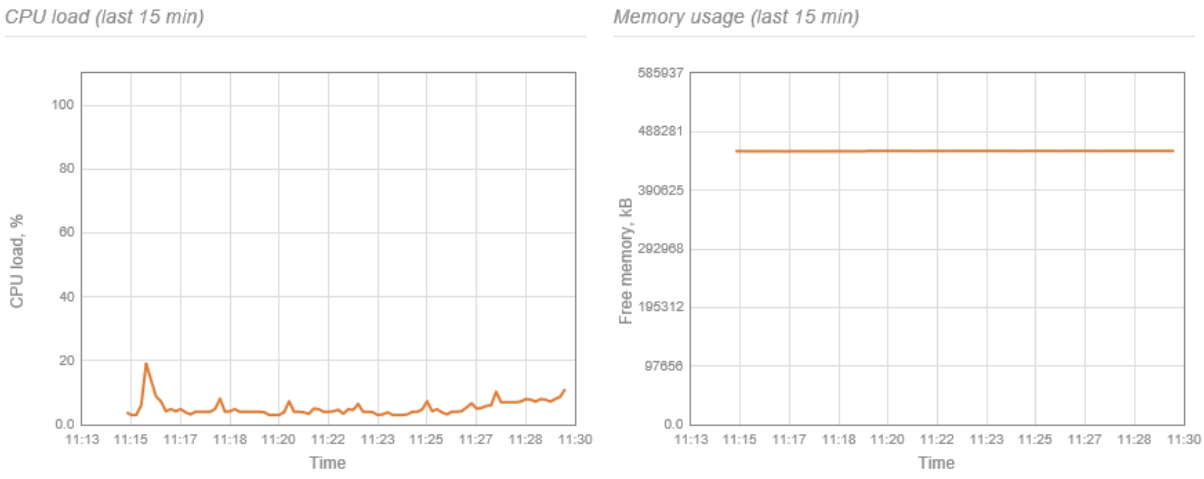


Figure 7 - CPU load and Memory usage graphs

Settings

Figure 8 – Web Management Interface

Radio configuration

Before changing Radio settings manually verify that your settings will comply with local government regulations. At all times, it is the responsibility of the end-user to ensure that the installation complies with local radio regulations.

The wireless security is hardware accelerated AES-128 encryption on all LigoPTP units. The passphrase of the wireless link security can be changed in **Settings->Security** page.

Use the **Configuration | Radio Configuration** menu to set up radio settings for the PTP link:

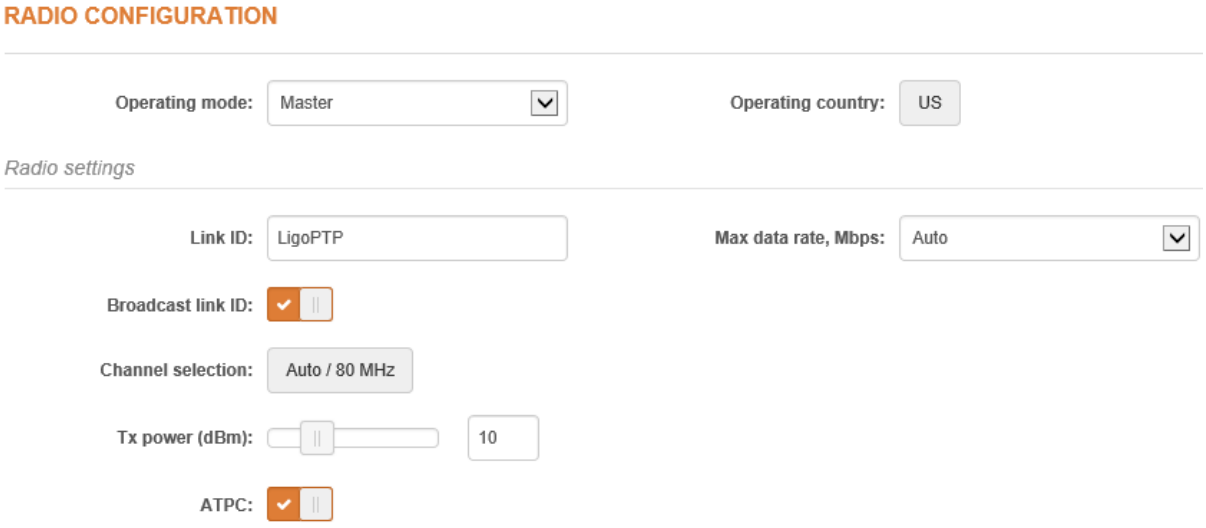


Figure 9 - Radio settings

Operating mode – specify the operating device role to create PTP link:

- **Master –** the controlling unit of the PTP link.
- **Slave** – in this mode, the PTP unit connects to the Master unit thus creating the PTP link.

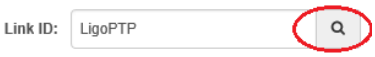
Operating country – displays LigoPTP unit operating country. The Country selection determines the available channels and transmission power level based on regulatory restrictions in the operating country. Initially country is selected on the first step of the LigoPTP unit's installation, though can be updated if required.

Link ID – specify the wireless network name, for a LigoPTP link identification.

For PTP link establishment both units (Master and Slave) of a link must have exactly the same **Link ID**.

Broadcast link ID – enables or disables the broadcasting of the link ID. Disabling Link ID Broadcast makes LigoPTP unit invisible for all wireless clients.

If unit operates as **Slave,** there is possibility to scan for LigoPTP Master's Link ID automatically:



The scan results will appear in the Search SSID table.

Tx power – set the radio transmit power at which the device will transmit data. The larger the distance, the higher transmit power is required. To set transmit power level use the slider or enter the value manually. The transmit power level that is actually used is limited to the maximum value allowed by your country's regulatory agency.

ATPC – select to enable Automatic Transmit Power Control (ATPC). If enabled, LigoPTP radio will continuously communicate with remote unit's radio in order to adjust the optimal transmit power automatically.

Max data rate, Mbps – choose the data rates in Mbps at which LigoPTP should transmit packets. LigoPTP will attempt to transmit data at the highest data rate set and If there will be an interference encountered, the device will step down to the next lower data rate automatically.

Channel selection – select the channel(s) at which the LigoPTP units will communicate. If more than one channel is selected, then autochannel feature will be enabled. Automatic channel selection allows LigoPTP unit to select a channel which is not used by any other wireless device or, if there are no free channels available - to select a channel which is least occupied. The table displays detailed information about each channel:

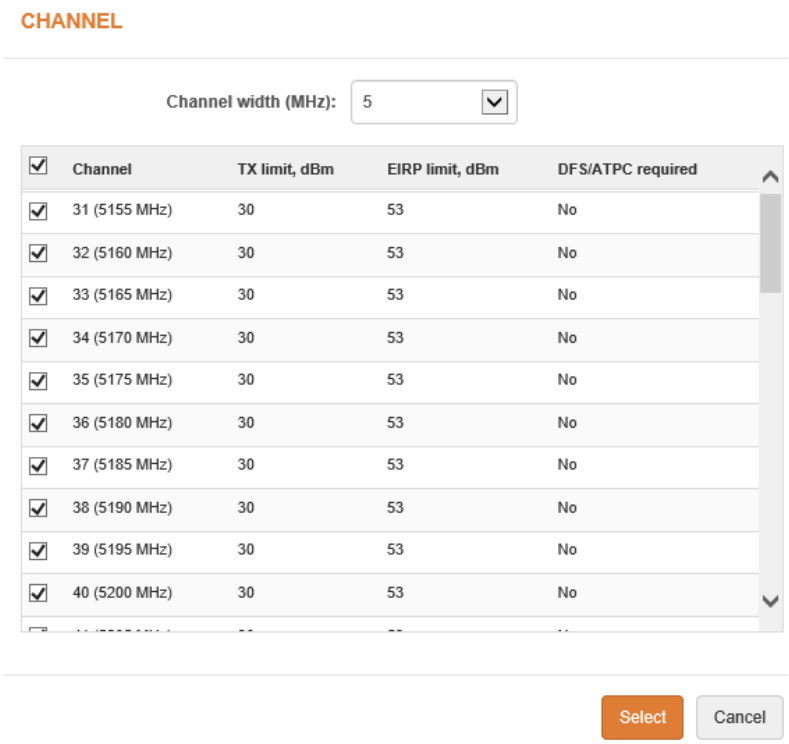


Figure 10 - Channel Selection

Channel width – select the width of the radio channel. The LigoPTP supports 5 MHz, 10 MHz, 20 MHz, 40 MHz and 80 MHz radio channel widths.

Slave operating mode has only channel width selection. Slave unit inherits channel from Master unit automatically.

Network configuration

The **Settings | Network** menu allows you to control the LigoPTP unit's IPv4 and IPv6 network configuration.

IPv4 Configuration

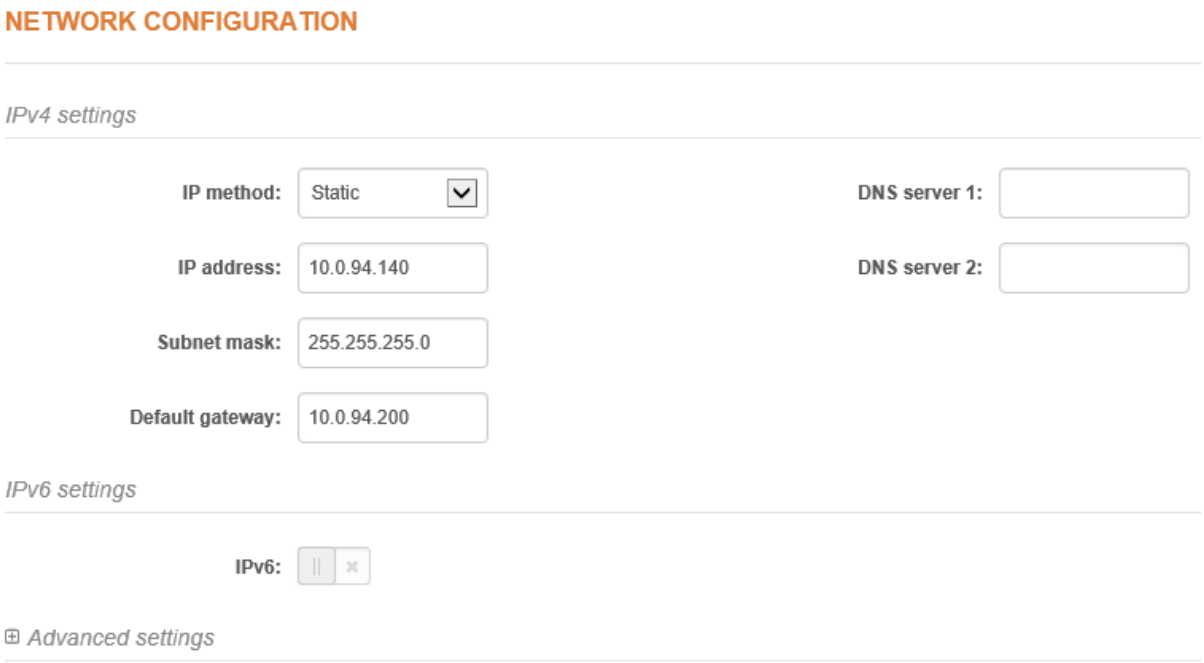


Figure 11 – Network Configuration: IPv4

When assigning IP address make sure that the chosen IP address is unused and belongs to the same IP subnet as your wired LAN, otherwise you will lose the connection to the device from your current PC. If you enable the DHCP client, the browser will lose the connection after saving, because the IP address assigned by the DHCP server is not predictable.

IP method – specify IP reception method: IP addresses can either be retrieved from a DHCP server or configured manually:

- **Static** – the IP address will be specified manually.
- **Dynamic** – the DHCP server will assign the IP address for LigoPTP unit. If DHCP server is not available, the device will try to get an IP. If has no success, it will use pre-configured fallback IP address. The fallback IP settings can be changed to custom values.

IP address – specify IP address for LigoPTP unit.

Subnet mask – specify a subnet mask for device.

Default gateway – specify a gateway IP address for device.

DNS server – specify primary and/or secondary the Domain Naming Server.

Secondary IP – specify the alternative IP address and the netmask for LigoPTP unit management.

IPv6 Configuration

Click on the **IPv6** slide to enable IPv6 configuration:

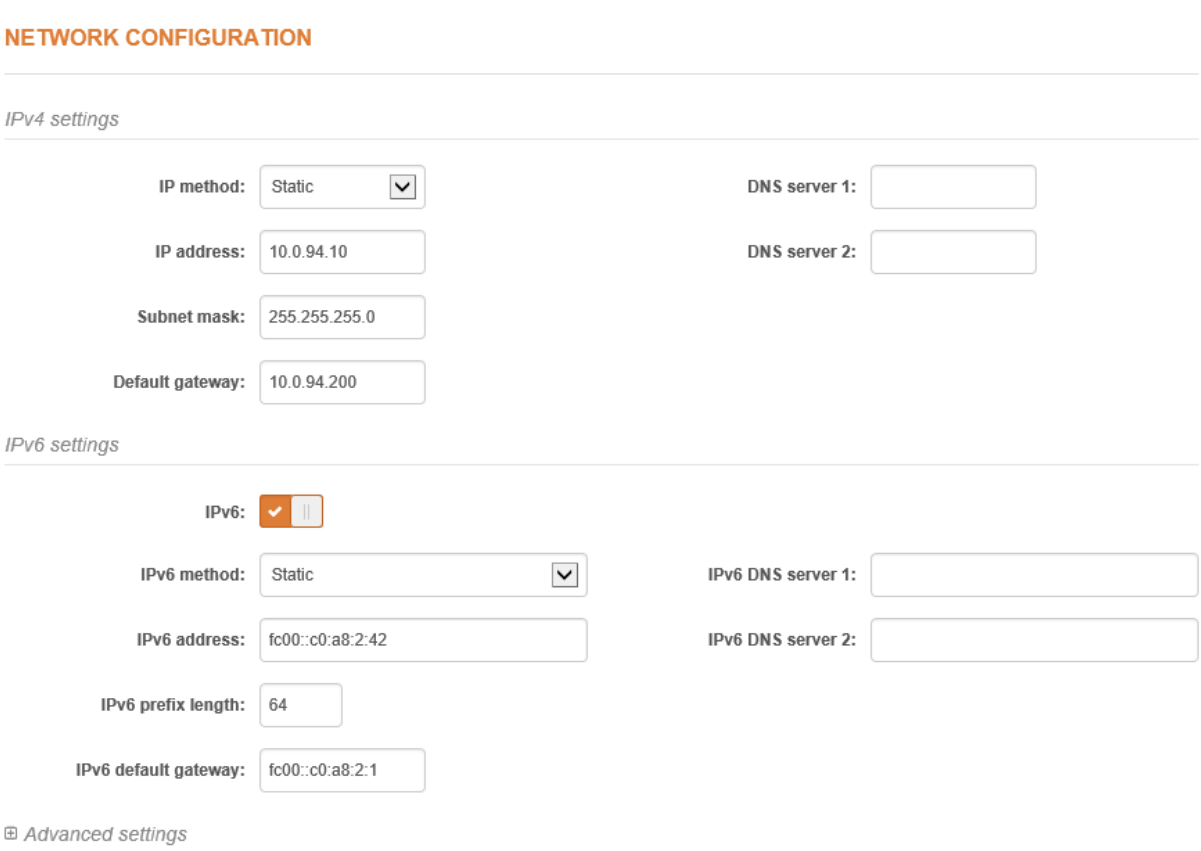


Figure 12 - Network Configuration: IPv6

IPv6 method – specify IPv6 reception method: IPv6 addresses can either be retrieved from a DHCPv6 server or configured manually:

- **Dynamic stateless IP** – the DHCPv6 client only obtains network parameters other than IPv6 address
- **Dynamic stateful IP** – the DHCPv6 clients require IPv6 address together with other network parameters (e.g. DNS Server, Domain Name, etc.).
- **Static** – the IPv6 address will be specified manually.
  - **IPv6 address** – specify the **IPv6 Address** for the interface.
  - **IPv6 prefix length**– enter the **Prefix Length** for the address.
  - **IPv6 default gateway** – specify IPv6 address for default gateway.
  - **IPv6 DNS server** – specify the Domain Naming Server IPv6 addresses.

Advanced Settings

Management VLAN – click on the check box to enable a VLAN tagging for management traffic. Access to the LigoPTP unit for management purposes can further be limited using VLAN tagging. By defining Management VLAN, unit will only accept management frames that have the appropriate Management VLAN ID. All other frames using any management protocol will be rejected.

Management VLAN ID – specify the VLAN ID [2-4095]. When a specific VLAN ID value is assigned for LigoPTP network interface, only management frames that matching configured VLAN ID will be accepted by device.

When you specify a new management VLAN, your connection to the device will be lost. For this reason, you should have a connection between your management station and a port in the new management VLAN or connect to the new management VLAN through a multi-VLAN router.

Traffic Management

The **Services** menu is divided in two sections:

- Ethernet traffic control
- QoS (available on Master only)

Ethernet Traffic Control

Configure the Ethernet traffic control on both Ethernet ports:

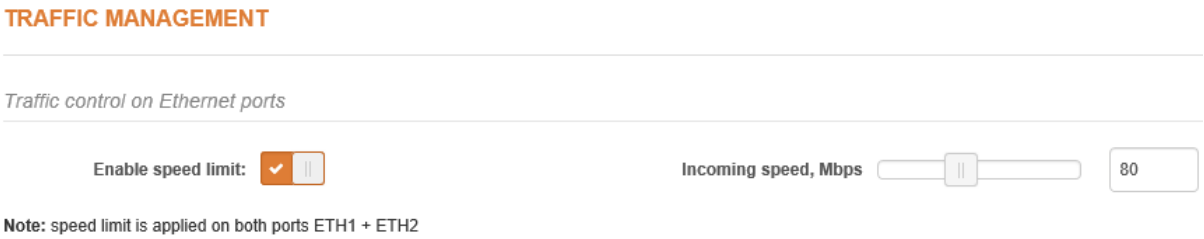


Figure 13 – Traffic control on Ethernet ports.

Enable speed limit – slide to enable speed limitation on both Ethernet ports.

Incoming speed – use slide, or specify manually the maximum speed in Mbps on incoming traffic.

QoS

QoS functionality is available only if device is operating as Master.

LigoPTP units support L2 (802.1p) and L3 (DSCP) QoS. In layer 2 QoS data is prioritized according to VLANs while in layer 3 according to IP addresses. Both types of QoS can run together or independently and traffic can be mapped into 4 different queues for each type applying strict or WRR policies. Having QoS on your link allows you to prioritize mission critical data and real time data that requires more capacity and higher PPS rate. Max capacity for each of the queues is calculated according to the wireless link, dynamically.

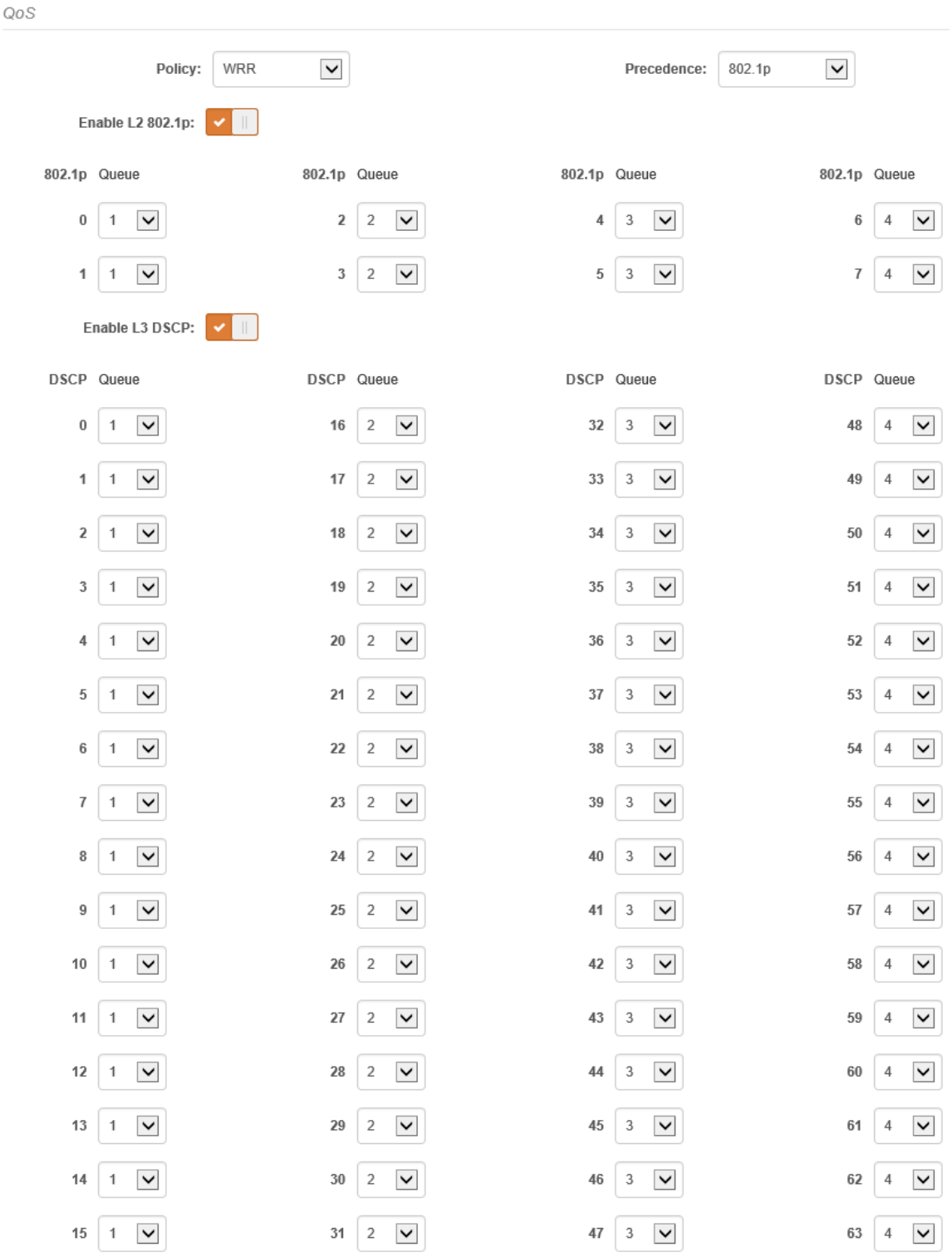


Figure 14 – QOS Configuration

QoS policy – choose the Strict or WRR prioritize method:

- **Strict** – with this scheduling the higher priority queues are transmitted before transmitting any from the lower priority queues. The value of this type of scheduling is that high priority packets are always handled before low priority packets which is required for voice or video data.

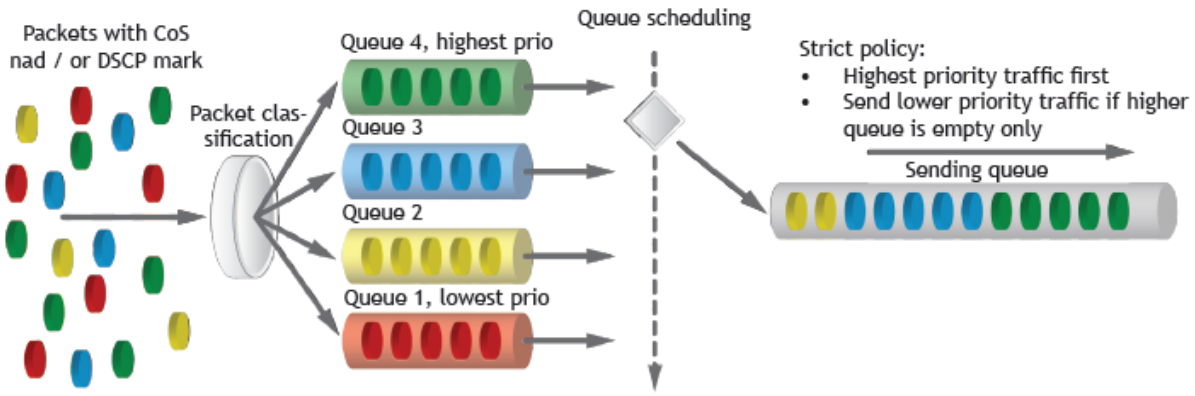


Figure 15 - QOS Policy: Strict

- **WRR** - with this scheduling, a set number of packets from each queue is transmitted, in a round robin algorithm. The higher queue's priority, more packets are transmitted in as the algorithm cycles through the queues in turn. This method guarantees that every queue receives some attention from the port for transmitting packets.

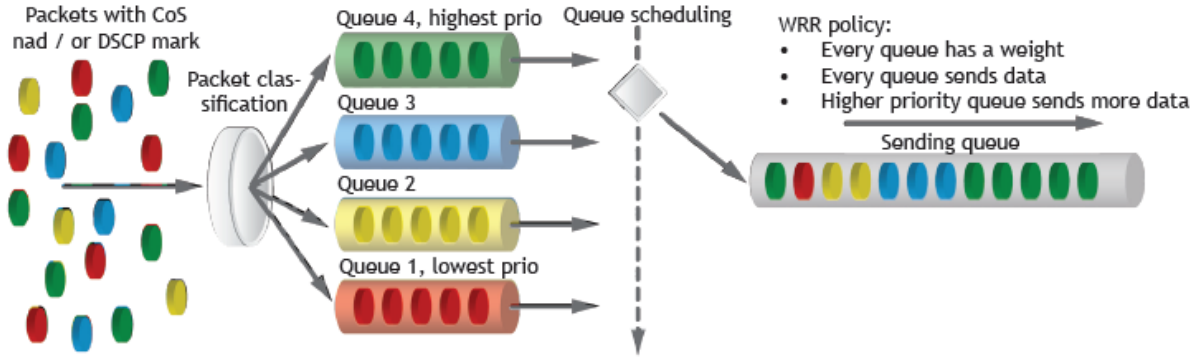


Figure 16 - QOS Policy: WRR

QoS mapping precendence – select the QoS mapping priority either L2 (802.1p) or L3 (DSCP). This option is available only if both types of QoS are enabled.

802.1p settings – enable L2 QoS and specify the priority queue [0-4] for each CoS value (0-7).

DSCP settings – enable L3 QoS and specify the priority queue [0-4] for each DSCP value (0-63).

The queue 1 has the lowest; queue 4 has the highest priority.

Services

The **Services** menu is divided into further five sections:

- Date & time
- Management
- Wireless management interface
- SNMP
- WNMS

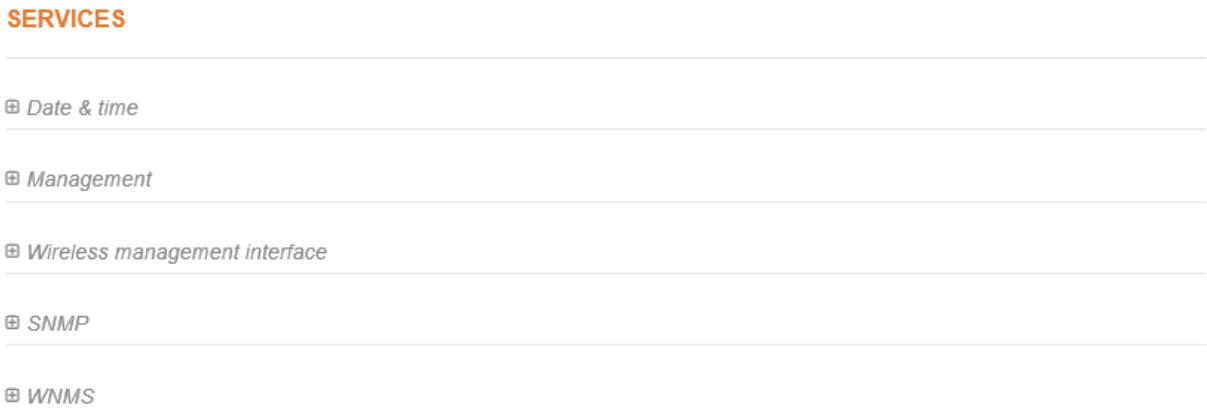


Figure 17 - Services Menu

Date & time

Use this section to manage the system time and date on the device automatically, using the Network Time Protocol (NTP), or manually, by setting the time and date on the device.

The NTP (Network Time Protocol) client synchronizes the clock of the device with the defined time server. Choose NTP from the configuration menu, select your location time zone and enter NTP server in order to use the NTP service.

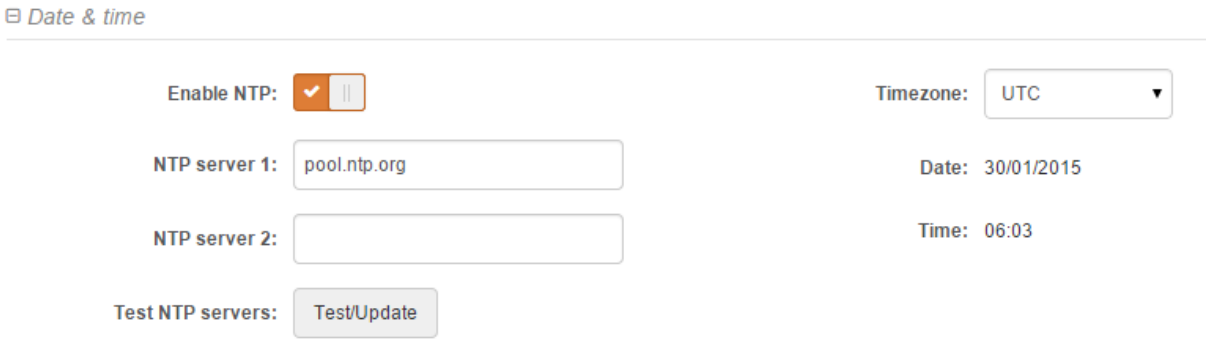


Figure 18 – Date&time: NTP Configuration

Enable NTP – select this option as enabled to configure NTP.

Timezone – select the timezone. Time zone should be specified as a difference between local time and GMT time.

NTP server – specify the trusted NTP server IP or hostname for time synchronization.

Test NTP servers - click this button to check if the specified servers responses successfully.

To adjust the clock settings manually, disable NTP option and specify the following settings on the right side:

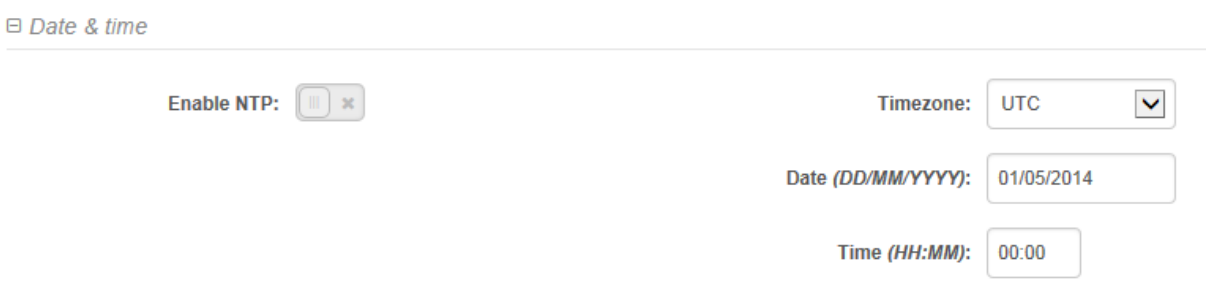


Figure 19 – Date&time: Manual Configuration

Enable NTP – disable this option to set date&time manually.

Timezone – select the timezone. Time zone should be specified as a difference between local time and UTC time.

Date – specify the new date value in format DD/MM/YYYY

Time – specify the time in format HH:MM.

Management

Use this menu to manage access to the LigoPTP via SSH and HTTP:

Figure 20 – Remote Management Configuration

Enable HTTP – select tis option to enable or disable access to the device management through HTTP.

HHTP port – specify HTTP port. Standard HTTP port is 80.

Enable SSH – enable or disable SSH access to device.

SSH port – specify the SSH service port. By default SSH port is 22.

Wireless management interface

Configure the additional management interface for easy access to the device's web management interface after newly installed (or rebooted) LigoPTP unit. After power-on, the LigoPTP unit will switch in to a remote wireless management mode.

LigoPTP unit's remote wireless management interface is accessible only visa HTTPS and SSH via IP: 192.168.111.1

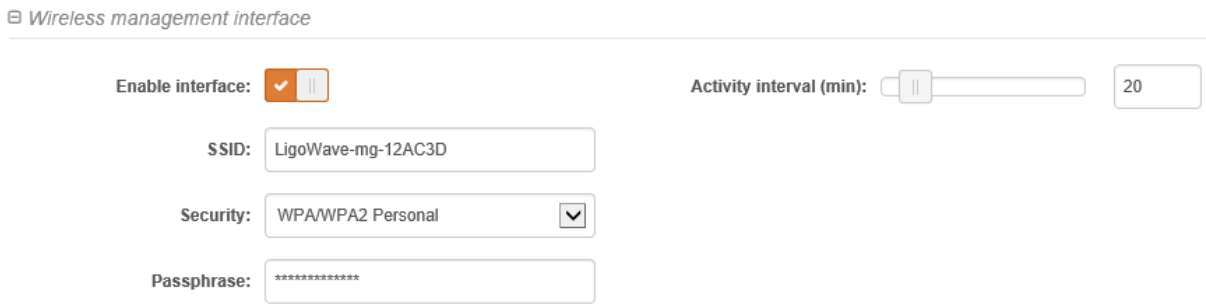


Figure 21 - Management interface configuration

SSID – assign the SSID for remote wireless management interface. Default

Security – choose the security options for remote wireless management access.

Passphrase – specify passphrase for WPA/WPA2 Personal security.

Activity interval – specify interval of remote wireless management interface activity. If no user logs into the LigoPTP web management interface, after specified amount of inactivity, the remote wireless access mode will be switched off automatically. (Default: 5 minutes).

SNMP

SNMP is the standard protocol that is widely used for remote network management over the Internet. With the SNMP service enabled, the device will act as SNMP agent.

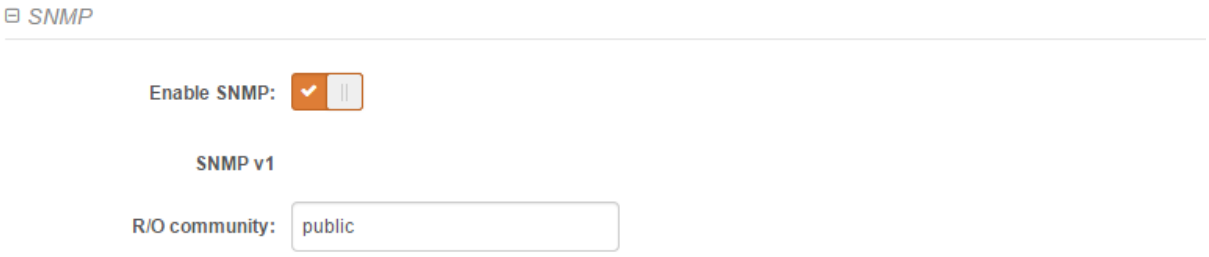


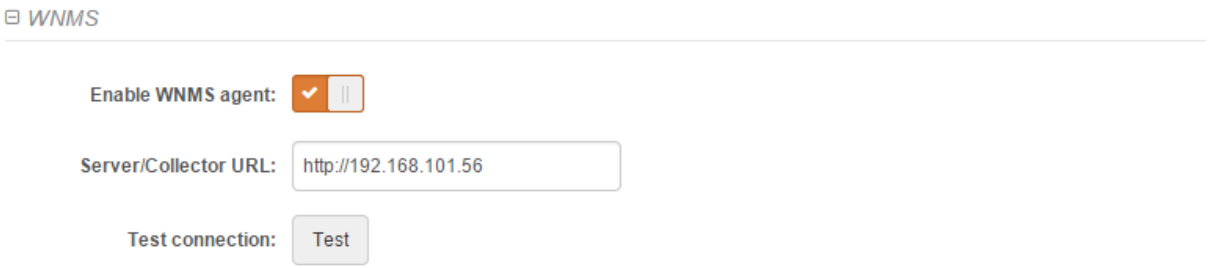
Figure 22 – SNMP Service Settings

Enable SNMP – specify the SNMP service status.

R/O community – specify the read-only community name for SNMP version 1 and version 2c. The read-only community allows LigoPTP unit manager to read values, but denies any attempt to change values.

WNMS

Wireless Network Management System (WNMS) is a centralized monitoring and management system for wireless network devices. The communication between managed devices and the WNMS server is always initiated by the WNMS client service running on every device.



Enable WNMS agent – select to enable WNMS agent.

Server/Collector URL – specify the URL of the WMS server to which that heartbeat notifications will be send.

Test connection - click this button to check if the specified server responses successfully.

System configuration

System menu is divided into further three sections:

- Device settings
- Security
- Advanced settings

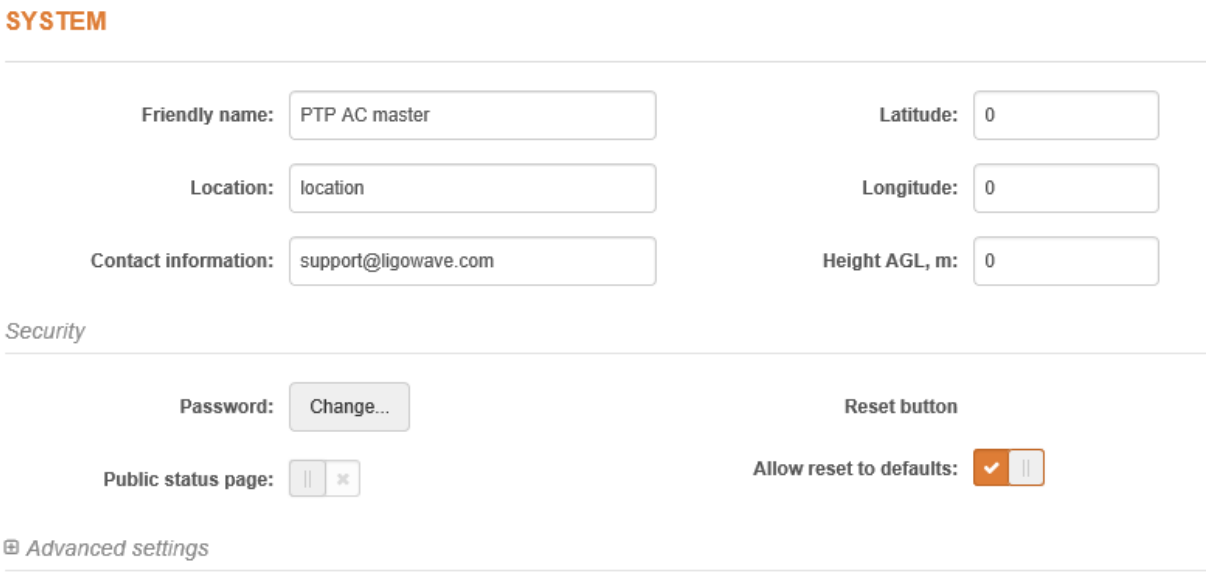


Figure 23 - System Menu

Figure 24- Device Settings

Friendly name – specify name of the LigoPTP that will be used to identify the unit.

Device location – describe the location of the LigoPTP unit.

Contact information – specify the name of the contact person, such as a network administrator, for the LigoPTP.

Longitude – specify the longitude coordinates of the device [specific decimal format, e.q. 54.869446].

Latitude – specify the latitude coordinates of the device [specific decimal format, e.q. 23.891058]. Both coordinates helps indicate accurate location of the device.

Height AGL – specify altitude above ground level in meters.

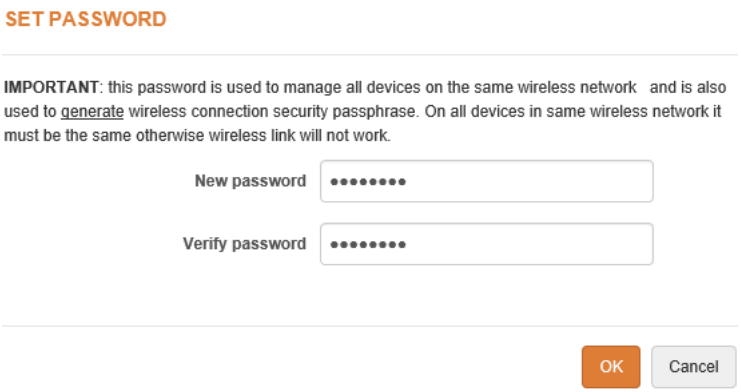
Security

For security reasons set the password for administrator login and the LigoPTP wireless link as soon as possible.

Figure 25 – Security settings

The hardware accelerated AES-128 encryption is used for user access to the device and LigoPTP wireless link between both units.

Password – click button to change password that is used to manage access to LigoPTP unit, and LigoPTP wireless link connection.



New password – enter the new administrator password for user authentication.

Verify password – re-enter the new password to verify its accuracy.

The only way to gain access to the web management if you forget the administrator password is to reset the unit to factory default settings.

Public status page –enable or disable the permission for not logged users to view the Status page.

Allow reset to default – use slide to enable or disable reset LigoPTP unit using external reset button.

Advanced settings

Figure 26 – Advanced device configuration settings

LED – choose LED operation mode:

- **Always off** – LED indication will be always disabled.
- **Always on** – LED indication will be always enabled.
- **Auto off** – LED will be disabled at specified timeout.

ETH port speed – select the ETH1 and/or ETH2 ports speed:

- Auto
- 100Mbps Full Duplex
- 100Mbps Half Duplex
- 10Mbps Full Duplex
- 10Mbps Half Duplex

PoE passthrough to ETH2 – if enabled, the ETH2 interface becomes as PoE source device.

Tools

Figure 27 – Web Management Interface

Site survey

The Site Survey tool shows overview information for wireless networks in a local geographic area. Using this test, an administrator can scan for working wireless devices, check their operating protocol, frequency, bandwidth and see signal/noise levels listed in the table or represented graphically.

To perform the Site Survey test currently, click the **Update**:

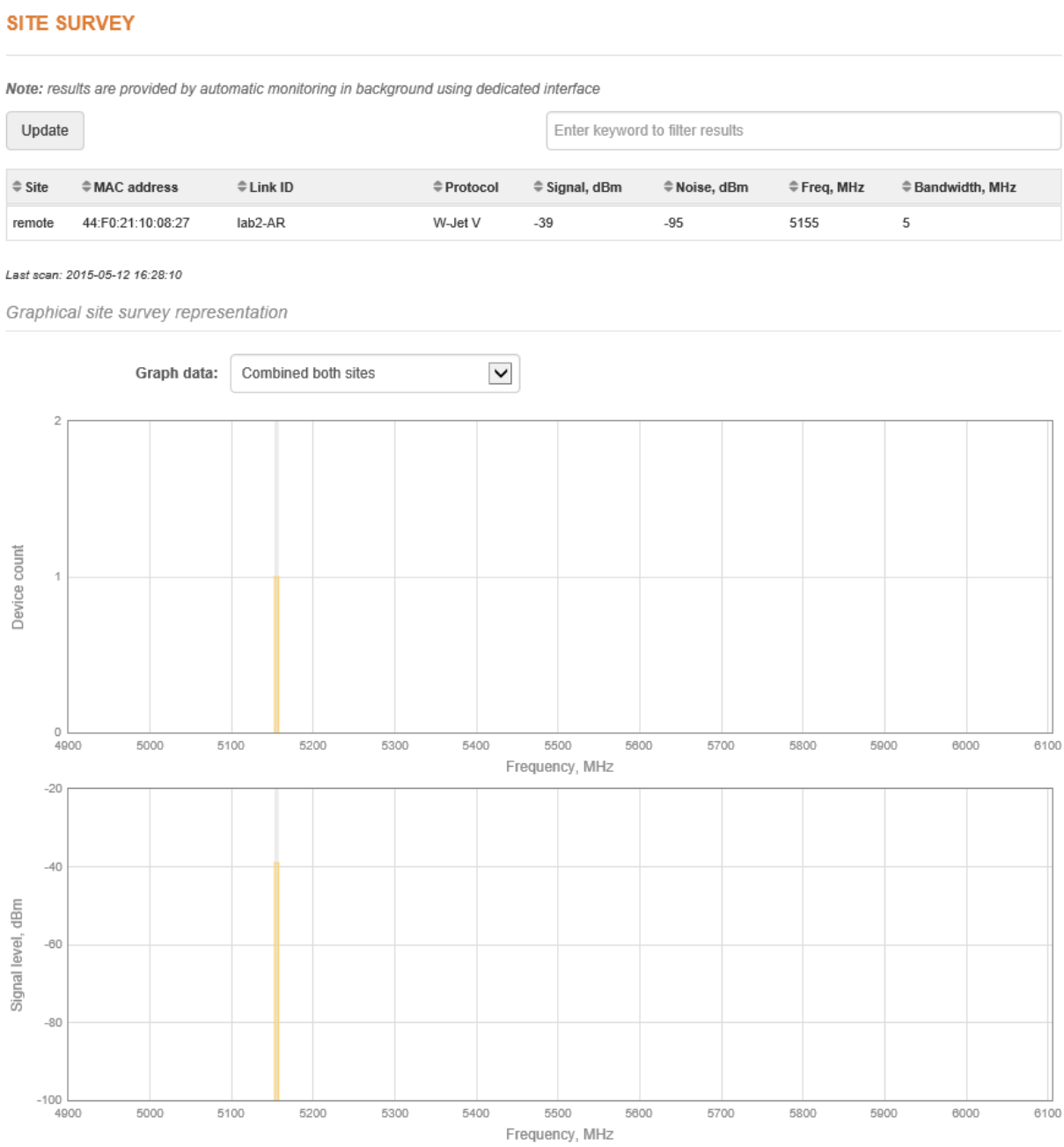


Figure 28 – Site Survey Results

Graph data – choose what data to be displayed in the graphs:

- Only local site
- Only remote site
- Combined both sites

The option **Graph data** will be hidden if Master received no data from Slave unit or unit is operating as Slave.

Antenna alignment

The Antenna Alignment tool measures signal quality between the Station and AP. For best results during the antenna alignment test, turn off all wireless networking devices within range of the device except the device(s) with which you are trying to align the antenna. Watch the constantly updated display as you adjust the antenna.

ANTENNA ALIGNMENT

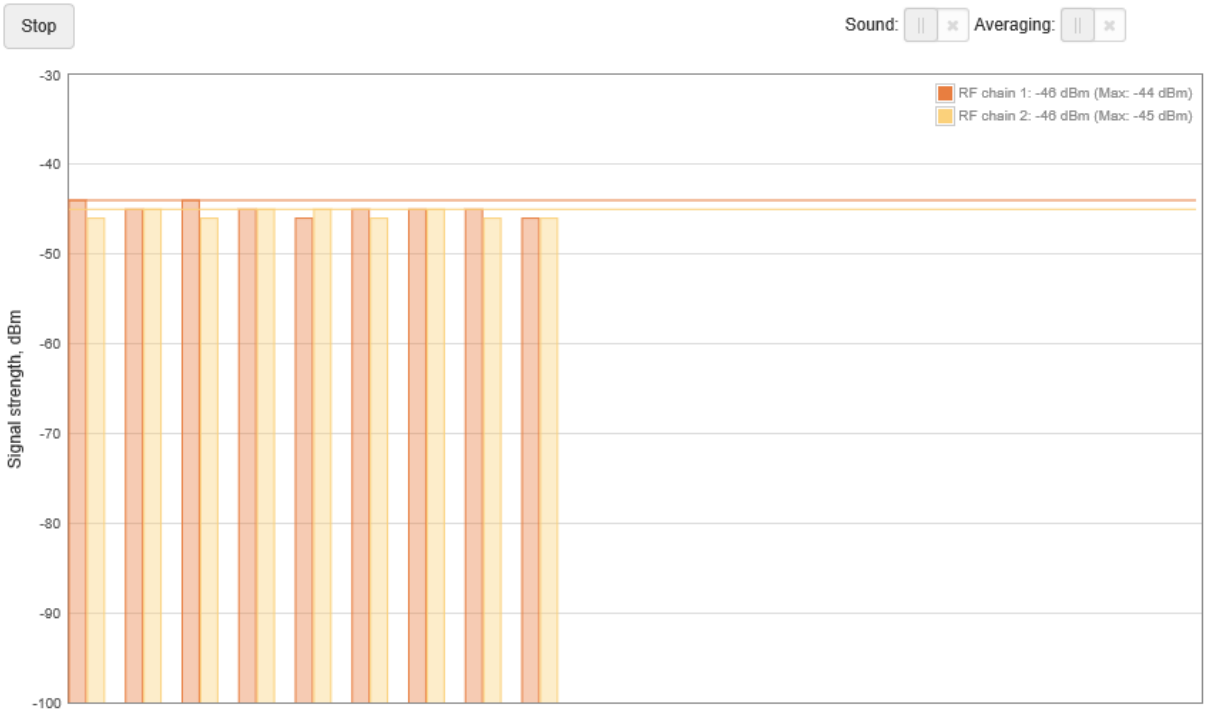


Figure 29 – Antenna Alignment

Start/Stop – press this button to start or to stop antenna alignment.

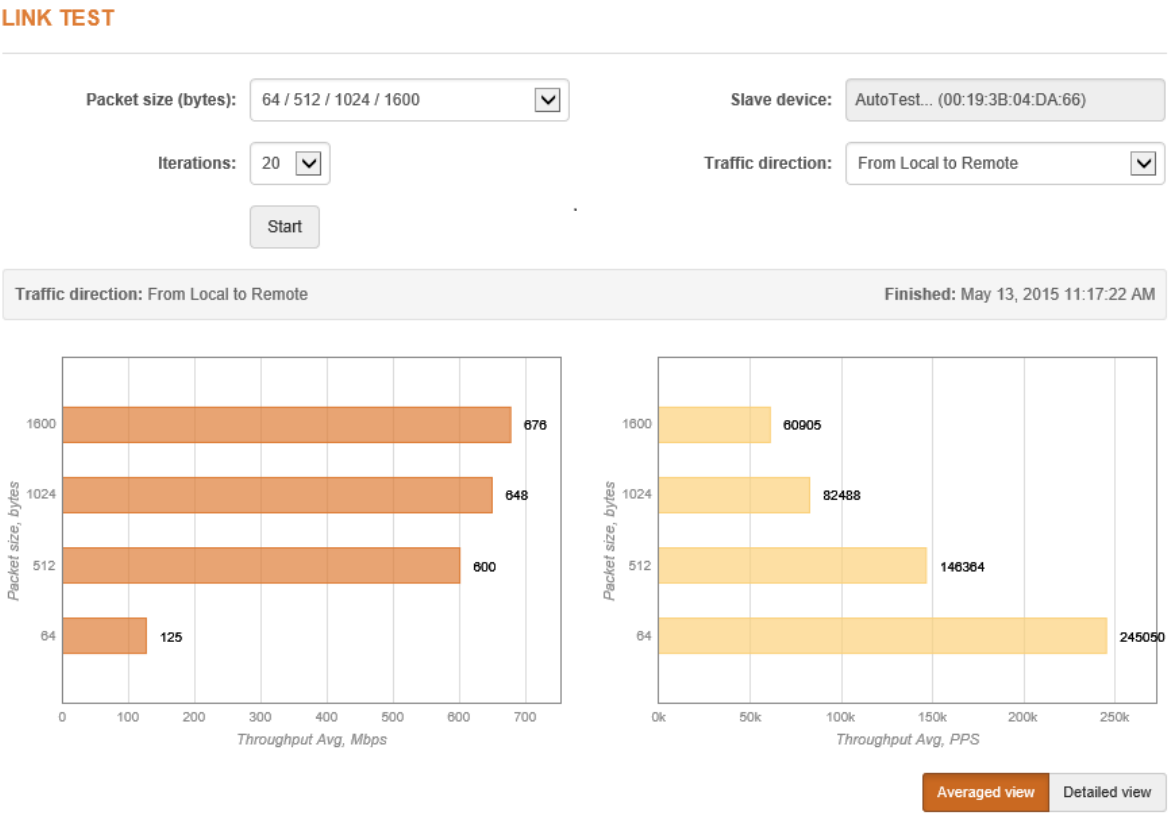
Sound – with this option enabled, the sound (beeps) will heard during the aligning process, if browser allows this.

Averaging – if this option enabled, the graph will display the average Signal Strength of both antennas.

Link test

It is recommended to ensure that there is no traffic on the link before running the **Link test** as results may not be completely accurate.

Use the Link test tool to check the quality of the established **LigoPTP** link. This tool tests the throughput at selected packet sizes and iterations.



Pkt size, bytes	Throughput, Mbps	Throughput, PPS	Packet loss, %
From Local to Remote			
64	125	245,050	0.0
512	600	146,364	0.0
1024	648	82,488	0.0
1600	676	60,905	0.0

Figure 30 – Linktest Results

Packet size – select packet sizes in bytes at which the test will be performed.

Iterations – select number of test iterations.

Master device – displays information of the Master unit (Slave side) of the established LigoPTP link.

Slave device – displays information of the Slave unit (Master side) of the established LigoPTP link.

Traffic direction – select the traffic direction for the performing test.

Start/Stop – click to start or to stop the throughput test.

Spectrum analyzer

The **Spectrum analyzer** test displays detailed information about signal level of each LigoPTP unit's antenna on each available frequency. This enables administrator choose the best available frequency/channel for the unit operation. The frequency list depends on the Country at which the unit is operating, and chosen channel width.

Spectrum analyzer may temporary disable wireless link. Spectrum analyzer will stop automatically after full spectrum scan.

Click **Start** button to perform the test:

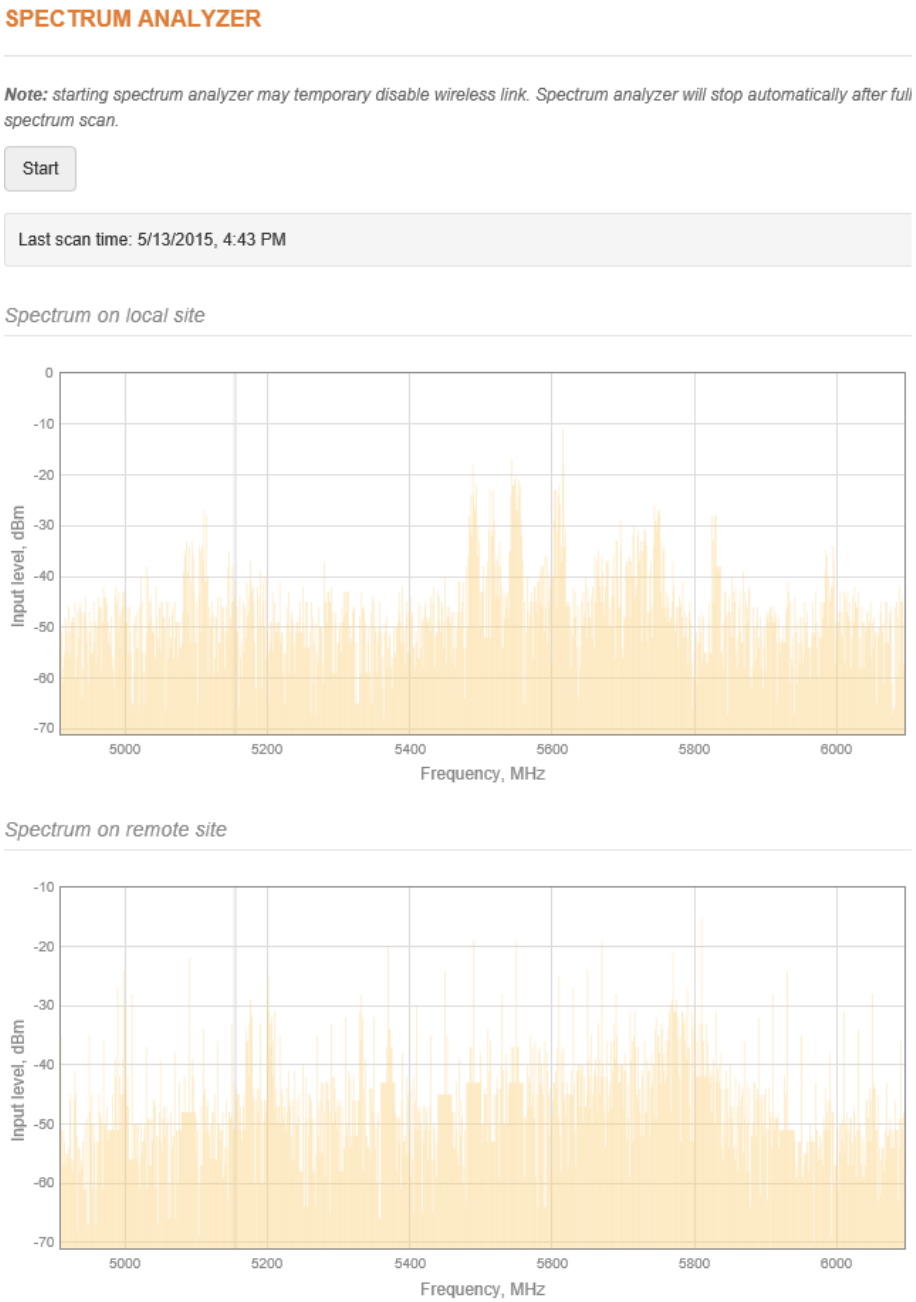


Figure 31 - Spectrum analyzer results

The **grey colored** column represents operating frequency of current LigoPTP link.

The combined (local and remote site) spectrum graph looks as follows:

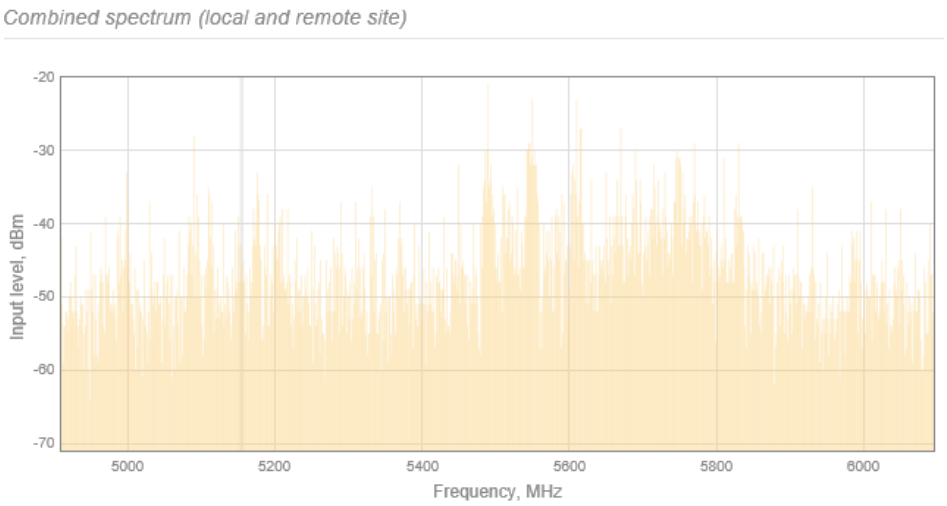


Figure 32 - Spectrum analyzer results: combined spectrum

Maintenance

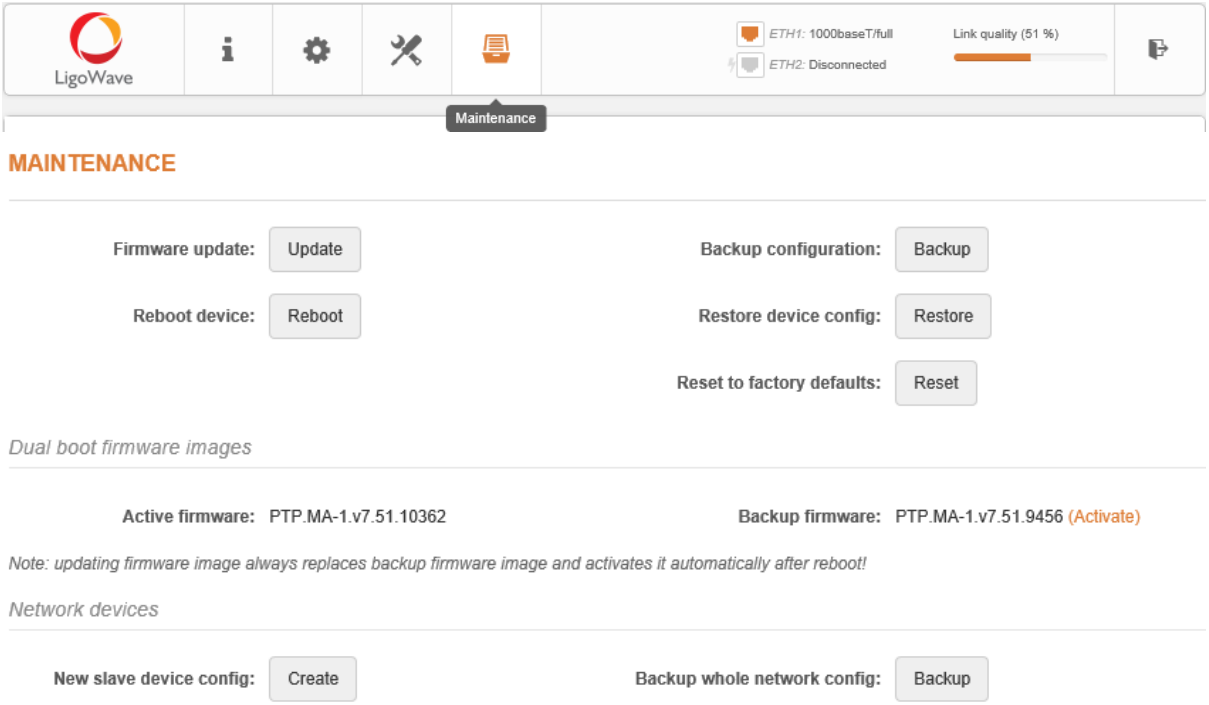


Figure 33 – Maintenance: system functions

Reboot device – click to reboot device with the last saved configuration.

Backup configuration – click to save the current configuration file. The saved configuration file is useful to restore a configuration in case of a device misconfiguration or to upload a standard configuration to multiple devices without the need to configure manually each device through the web interface.

Restore device config – click to upload an existing configuration file to the LigoPTP unit. If unit operates as Master, then there is a possibility to restore Slave's configuration as well.

Reset device to factory defaults – click to restore unit's factory configuration.

Resetting the device is an irreversible process. Current configuration and the administrator password will be set back to the factory default.

Firmware upgrade

The firmware upgrade is compatible with all configuration settings. When the device is upgrading with a newer version or the same version builds, all the system's configuration will be preserved after the upgrade.

Click the **Update** button and select the proper firmware image in the Firmware Update pop-up window:

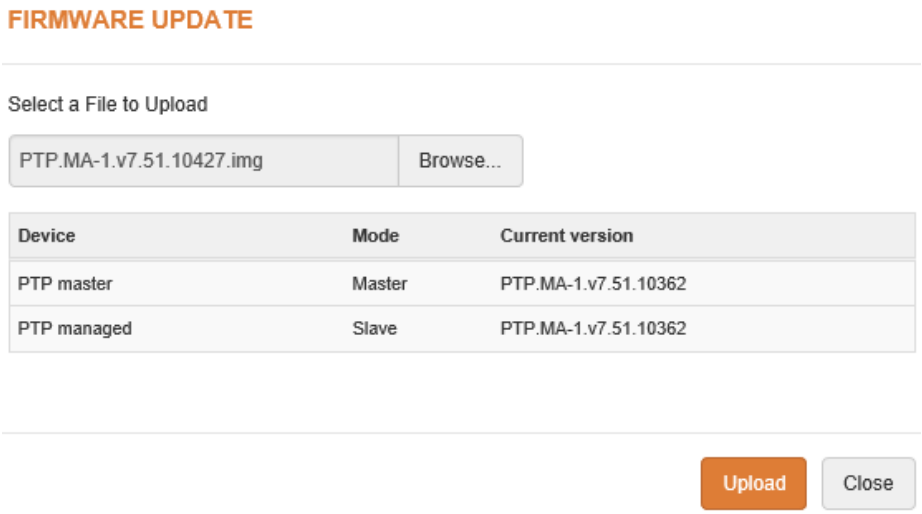


Figure 34 – Firmware Upload

The new firmware image uploaded to the unit's temporary memory. It is necessary to save the firmware into the device permanent memory. Click the **Upload** button.

After the FW image successfully uploaded, the dialog box displays table with LigoPTP link units. It is now available to choose which devices to upgrade. By default, both devices of the LigoPTP link (Master and Slave) are ready for system firmware upgrade.

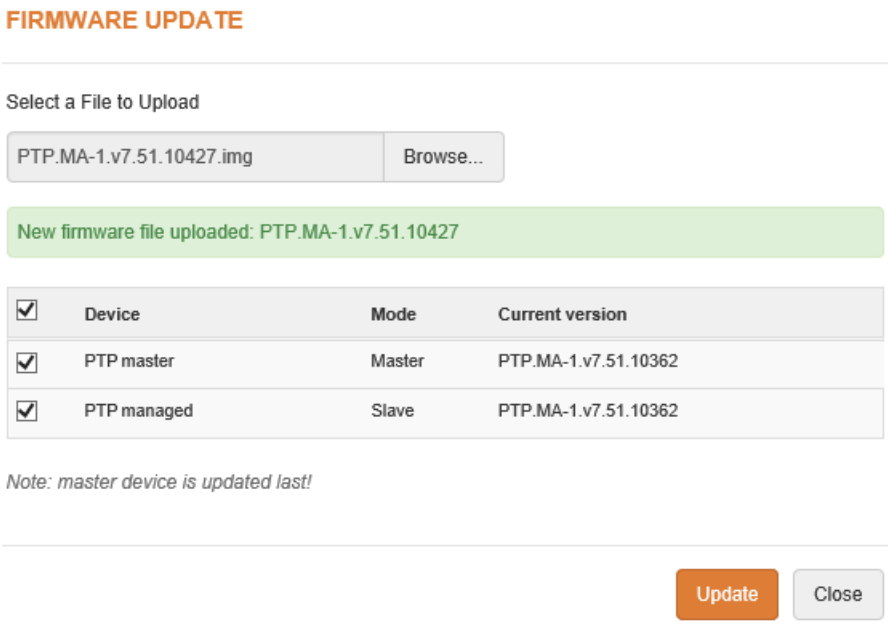


Figure 35 –Firmware Upgrade

Update – click to upgrade device with the uploaded image and reboot the system.

Do not switch off and do not disconnect the device from the power supply during the firmware upgrade process as the device could be damaged.

Dual boot firmware images

LigoPTP units have factory installed default dual-boot firmware. With a new firmware upgrade, the backup firmware is overwritten each time.

Figure 36 - Dual-boot firmware images

Activate – click link to activate backup firmware. Backup firmware will be activated after reboot.

Network devices

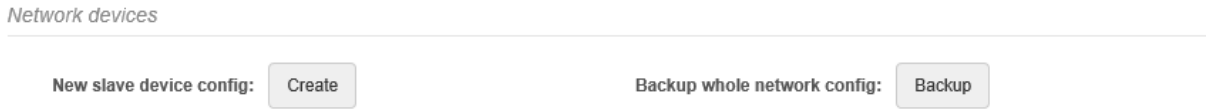


Figure 37 – Network device configuration

Backup whole network config – click **Backup** to download configuration files of whole LigoPTP link. The downloaded file will contain two configurations: Master's and Slave's.

New slave device config – click to setup and download a new configuration file for Slave unit. After the **Create** button clicked, the dialog window with some Slave's configuration parameters appears:

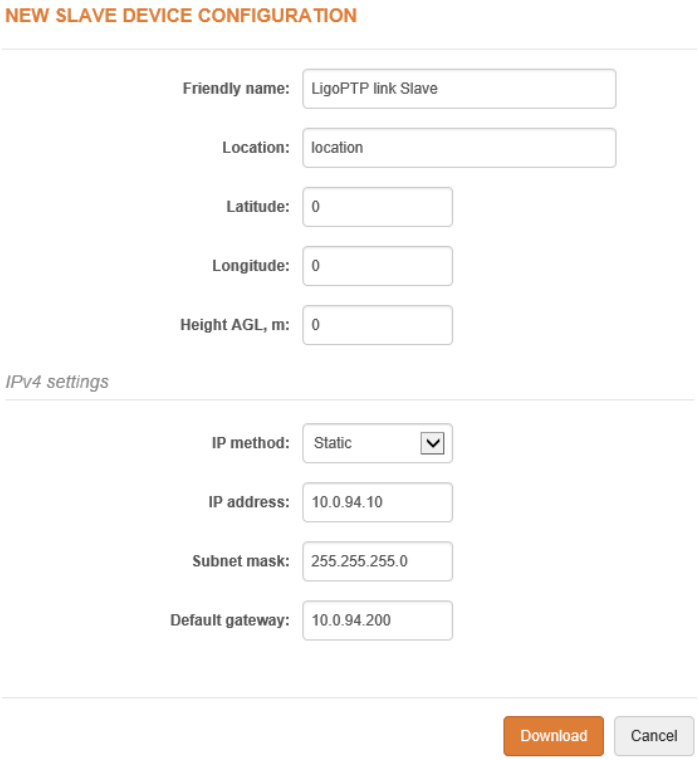


Figure 38 – Slave device config setup

Download – click to save a new created configuration file for Slave unit.

Support

The **troubleshooting file** contains valuable information about device configuration, log files, command outputs, etc. Device quickly gathers troubleshooting information automatically, rather than requiring you to gather each piece of information manually. This is helpful for submitting problems to the support team.

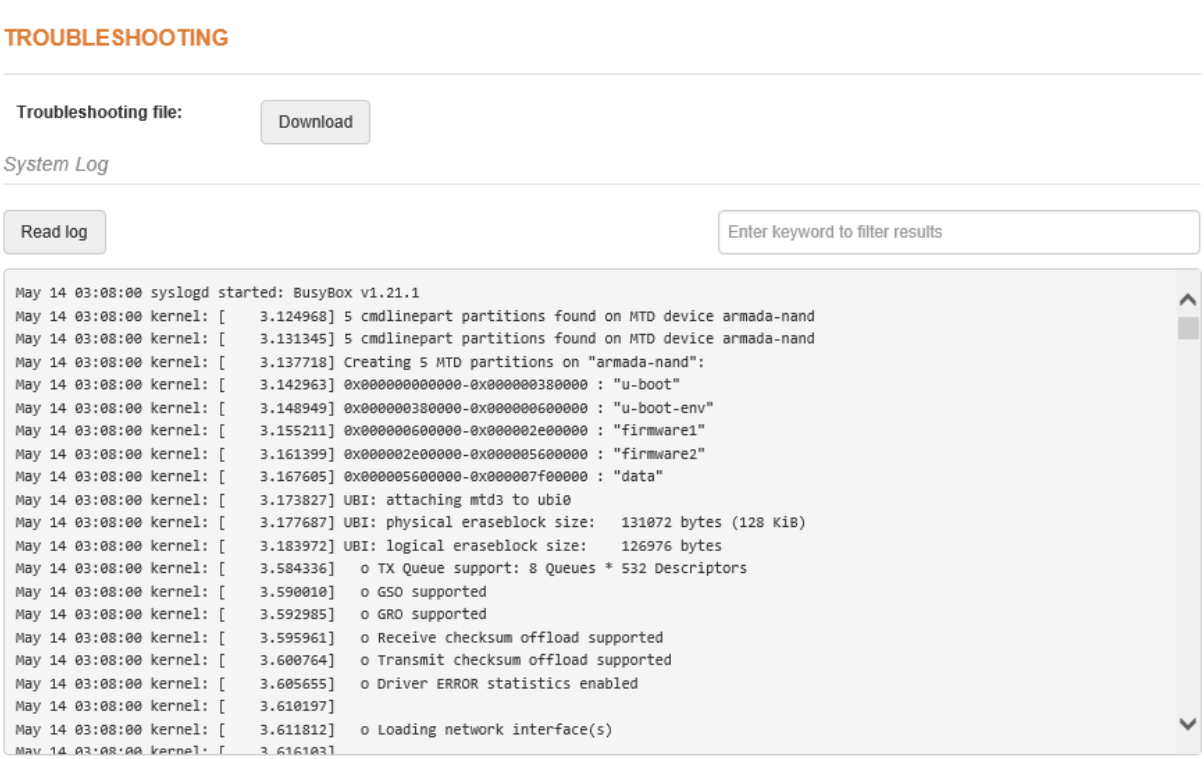


Figure 39 – Troubleshooting File Download

Troubleshooting file – click to download the troubleshooting file. This may take a few minutes to gather information and to complete download.

System log - this viewer utility provides debug information about the system services and protocols. If the device's malfunction occurs, recorded messages can help operators to locate misconfiguration and system errors.