LigoPTP UNITY v6.94

User's Guide

Revision 1.0

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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 UNITY 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

Introduction

The PTP (Point to Point) link consists of two units, one on each end: Master and Slave. Master unit operates as an access point; therefore the Slave connects to the Master and operates as a client.

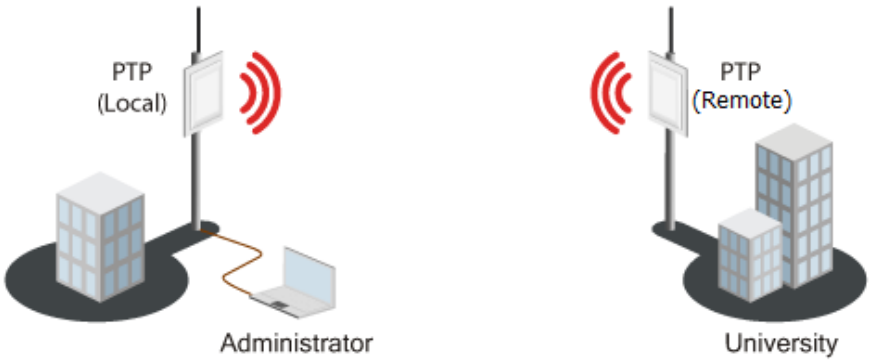


Figure 1 – Point-to-Point Link Elements

From the point of view of the administrator the **Local unit** is the one with the direct connection to the Web management interface and the **Remote unit** is the one which is connected to the Local unit in PTP link. The concept of the Local unit and the Remote unit is not related to the operating mode (Master or Slave). This terminology will be used throughout the manual, particularly in the description of statistics.

Product Overview

LigoWave unleashes its highest-end, license-free PTP device with the release of the LigoPTP UNITY series product line. Making use of ground breaking 2x2 MiMo technology, the LigoPTP 5-23/5-N UNITY delivers real aggregate throughput capability of up to 220 Mbps (110 Mbps full-duplex) combined with high packets-per-second performance (140000) and at the same time a link bonding option integrated on the device to double the capacity for up to 400 Mbps (200 Mbps Full-duplex). Link bonding is done using a powerful CPU and uses fair queuing mechanism. The throughput is not only doubled, but it also ensures radio link redundancy at the same time and works efficiently when traffic source is coming from a single MAC address.

Additionally, the new product is compatible with previous LigoPTP 5-23 MiMo, LigoPTP 5-N MiMo, LigoPTP 5-23 PRO and LigoPTP 5-N PRO models that can be used concurrently to double the throughput over the same link. This product enables carrier-class point-to-point capability, ideal for dedicated access or backhaul applications (including VOIP or other small packet applications). The Ligo PTP UNITY product family couples flexible channel width capability (20 or 40 MHz) and industry-leading proprietary software mechanisms to set the utmost standard in spectral efficiency.

The LigoPTP 5-23/5-N UNITY products feature either an integrated dual-polarized antenna or two N-type connectors. They are housed in rugged, cast aluminum enclosures. Combining digital signal processing, dual polarization antennas and proprietary W-Jet 2 MiMo protocol these bridges have a high spectral efficiency of 7.5bit/Hz.

The LigoPTP 5-23/5-N UNITY showcase an array of advanced software mechanisms that provide optimal point-topoint connectivity for high-throughput, long distance links. LigoWave's proprietary PTP mechanisms utilize techniques such as Dynamic Time Division Duplexing (TDD) to dynamically allocate bandwidth in the direction needed, thus increasing link efficiency and greatly decreasing the impact that distance has on throughput of the link.

The LigoWave point-to-point products also features selective repeat ARQ technology, an enhanced error-correction software mechanism that optimizes data traffic to provide very high throughput over high-bandwidth, long-range links even in the presence of interference.

Additionally, the new devices support L2 and L3 QoS (quality of service which allows prioritizing of mission critical data going on a wireless link.

The new UNITY series products have an extremely powerful integrated 28 dBm (+/-2 dBm) radio which allows building solid long-distance links even with an integrated antenna. The output power on highest modulation (MCS 15) is 23 dBm (+/- 2 dBm) which is hard to find elsewhere in the market today. Gigabit Ethernet port and 802.3 af standard support makes the UNITY series product line even more flexible. Superior SURGE and ESD protection makes this product ideal for mission critical and harsh-weather condition installations. SURGE and ESD protection meets IEC 61000-4-2 (ESD) and IEC 61000-4-5 (SURGE) standards.

The LigoPTP 5-23/5-N UNITY is also compatible with LigoWave's online link calculator and WNMS, a centralized configuration, firmware, and statistics server offered by LigoWave for remote diagnostic and configuration.

LigoPTP UNITY Features

Technical Features

- 5 GHz PTP bridge, ideal for:
  - Dedicated Access
  - Backhaul
  - Private networks
- Flexible center channel and channel width capability (20/40 MHz) for throughput optimization
- Radio rate of up to 300Mbps
- True aggregate throughput up to 220 Mbps
- Advanced proprietary W-jet MiMo 2 wireless protocol
- High packet-per-second (PPS) rate – ideal for VOIP backhaul applications (140000)
- Low packet latency (2ms)
- Great spectral efficiency (7.5 bit/ Hz)
- ARQ (Selective Repeat) for very high throughput
- Dynamic TDD for allocating bandwidth in real-time to the direction needed
- Integrated dual-polarized antenna (2 N-type connectors for the LigoPTP 5-N UNITY product)
- 2nd Ethernet port used to bond two links together
- L2 and L3 QoS support
- PoE built-in for single cable installation (802.3 af compatible)
- 2 x 1000 BaseT Ethernet ports
- 28 dBm (per chain) integrated radio
- Advanced security technologies

Management

- Web GUI
- Command line management via SSH
- WNMS server support for configuration
- SNMP V1/2/3 with traps supporting MIBs: 802.1, 802.1x, MIBII
- Syslog support
- Compatible with LigoWave link calculator
- Real-time alerts

Reliability

- Rugged articulating bracket solution for multi-facet mounting
- OLED screen for antenna alignment
- IP-67 compliant

LigoPTP UNITY Installation

This chapter provides installation instructions for the hardware and software components of the LigoPTP UNITY unit.

The LigoPTP UNITY system is available in two versions:

- PTP unit with integrated antenna (LigoPTP 5-23 UNITY);
- PTP unit with N-type connector for external antenna (LigoPTP 5-N UNITY).

Hardware Overview

The PTP unit is housed in an aluminum enclosure and features an N-Female type connector (LigoPTP 5-N UNITY) or an integrated 23dBi directional antenna (LigoPTP 5-23 UNITY). The panel of the PTP unit contains:

- Two **Gigabit Ethernet connectors** in the form of passive PoE through standard Ethernet cable
- **N-Female** type antenna connector (for units with external antenna only)
- **OLED screen**
- **Grounding stud**

The LigoPTP 5-23 UNITY unit with integrated antenna has a custom enclosure hole plug instead of N-type connector.

General View of the **LigoPTP 5-23 UNITY**:

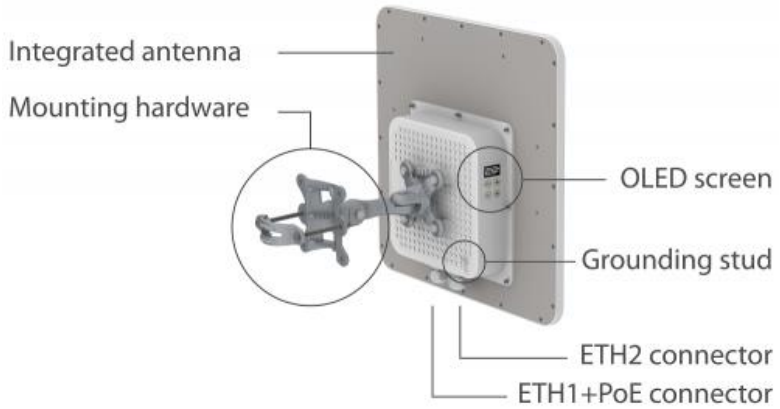


Figure 2 – LigoPTP 5-23 UNITY Overview

General View of the **LigoPTP 5-N UNITY**:

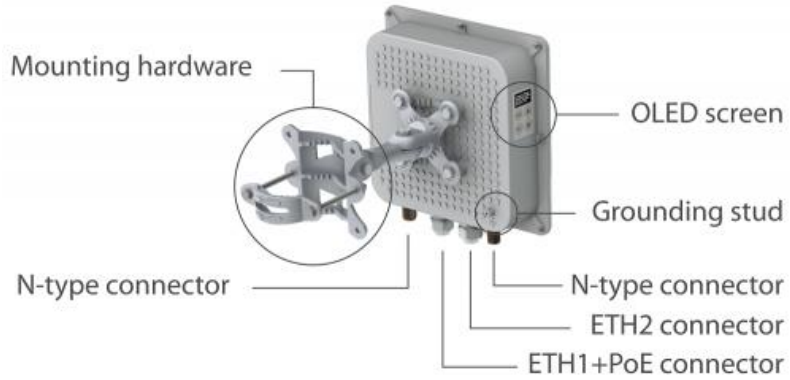


Figure 3 – LigoPTP 5-N UNITY Overview

Accessing the PTP Unit's Web Management

The first connection to the LigoPTP UNITY can be made using a standard Ethernet cable connected directly to your PC.

The default IP address of the LigoPTP UNITY is 192.168.2.66 with a subnet mask of 255.255.255.0.

Step 1 Configure your PC with a static IP address on the 192.168.2.0 subnet (i.e. 192.168.2.10) with mask 255.255.255.0. Connect the LigoPTP UNITY Ethernet interface in to the same physical network as your PC. Open the Web browser and type the default IP address of the unit: https://192.168.2.66/

Step 2 Enter the administrator login details to access the Web management:

The default administrator login settings for all LigoPTP UNITY are:
Login: **admin**
Password: **admin01**

Step 3 After successful administrator log on you will see the main page of the LigoPTP UNITY Web management interface. The unit now is ready for configuration. For further instructions on Web management refer to the respective document at the LigoWave wiki at `http://www.ligowave.com/wiki`

Default Settings

The default settings of the PTP unit configuration parameters are listed in the table below:

Parameter	Default value
IP address	192.168.2.66
Netmask	255.255.255.0
Login	admin
Password	admin01
Link ID	LigoWave-PTP
Encryption	None
Ethernet configuration	auto
SNMP R/O community	public
SNMP R/O user	public
SNMP R/O password	password

Quick Setup Guide

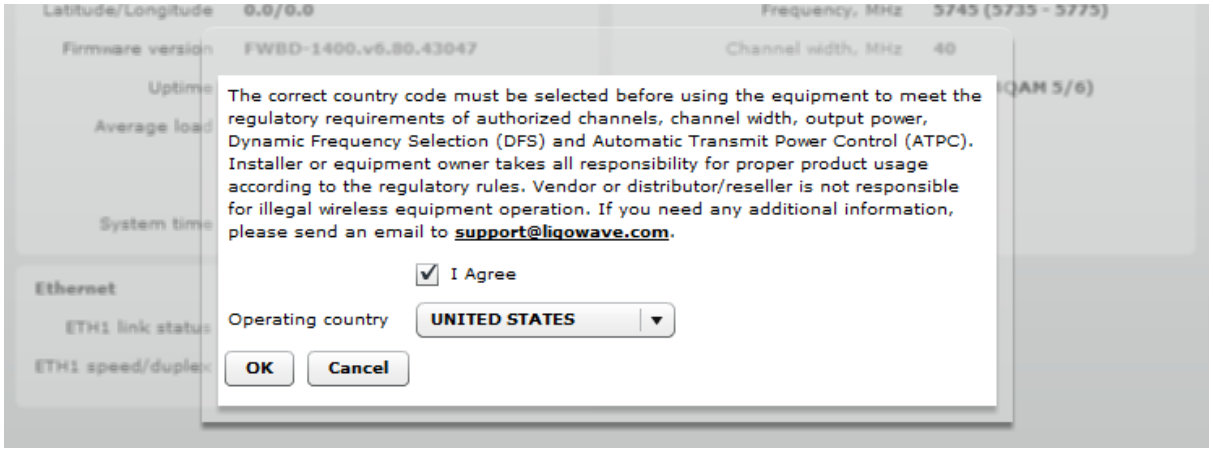
Step 1. **Login in to the PTP unit web management.** To access the PTP unit Web management interface, configure your PC with a static IP address on the 192.168.2.0 subnet with mask 255.255.255.0. Connect the PTP unit in to the same physical network as your PC. Open the Web browser and type the default IP address of the PTP unit `https://192.168.2.66/` and the login page will be loaded. Enter default administrator login settings:

Figure 4 – Login Page

The default administrator login settings for PTP unit are:
Login: **admin**
Password: **admin01**

After successful administrator login you will see the main page of the PTP unit Web management interface. The PTP unit now is ready for configuration.

Step 2. **Confirm the disclaimer of the LigoPTP UNITY.** According to the chosen country the regulatory domain settings may differ. You are not allowed to select radio channels and RF output power values other the permitted values for your country and regulatory domain.



Additionally the Antenna Gain value must be specified for the LigoPTP 5-N UNITY unit.

Step 3. **Specify the operation mode: Master or Slave.** The difference in configuration of Master and Slave is that the frequency does not need to be specified for the Slave. The Slave scans the air and chooses the proper frequency automatically after finding the Master unit.

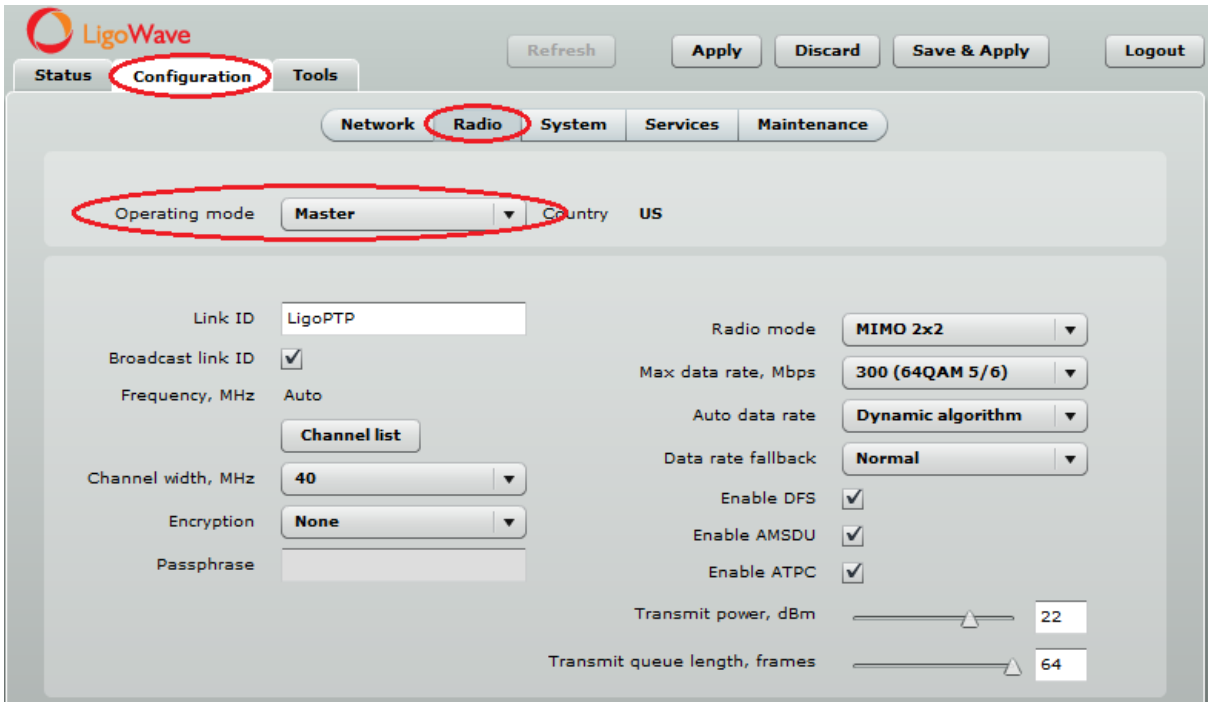


Figure 5 – Specify Unit's Operating Mode

Step 4. **Specify a Link ID.** Link ID must be identical for each unit of the same link.

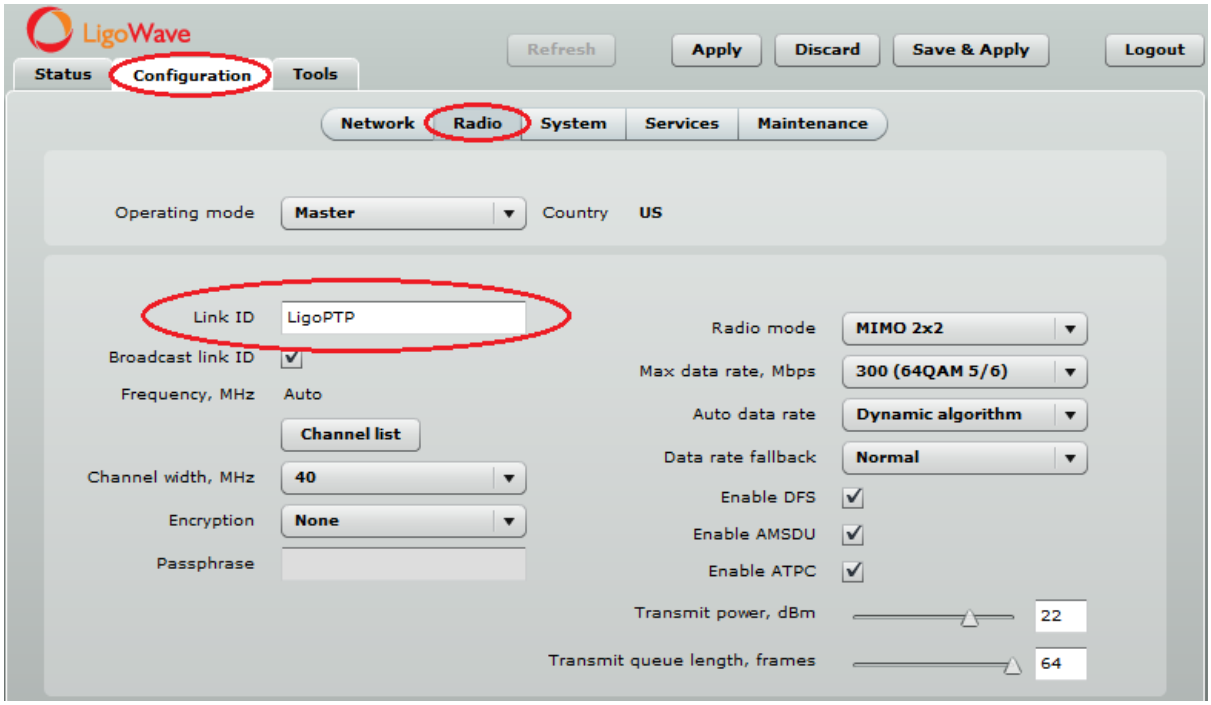


Figure 6 – Specify PTP Link ID

Step 5. **Select Frequency at which PTP link will operate on Master unit**, or leave the option **Auto.** The Frequency change applies only for Master units. The Slave unit will choose the frequency automatically after the Master unit will be found.

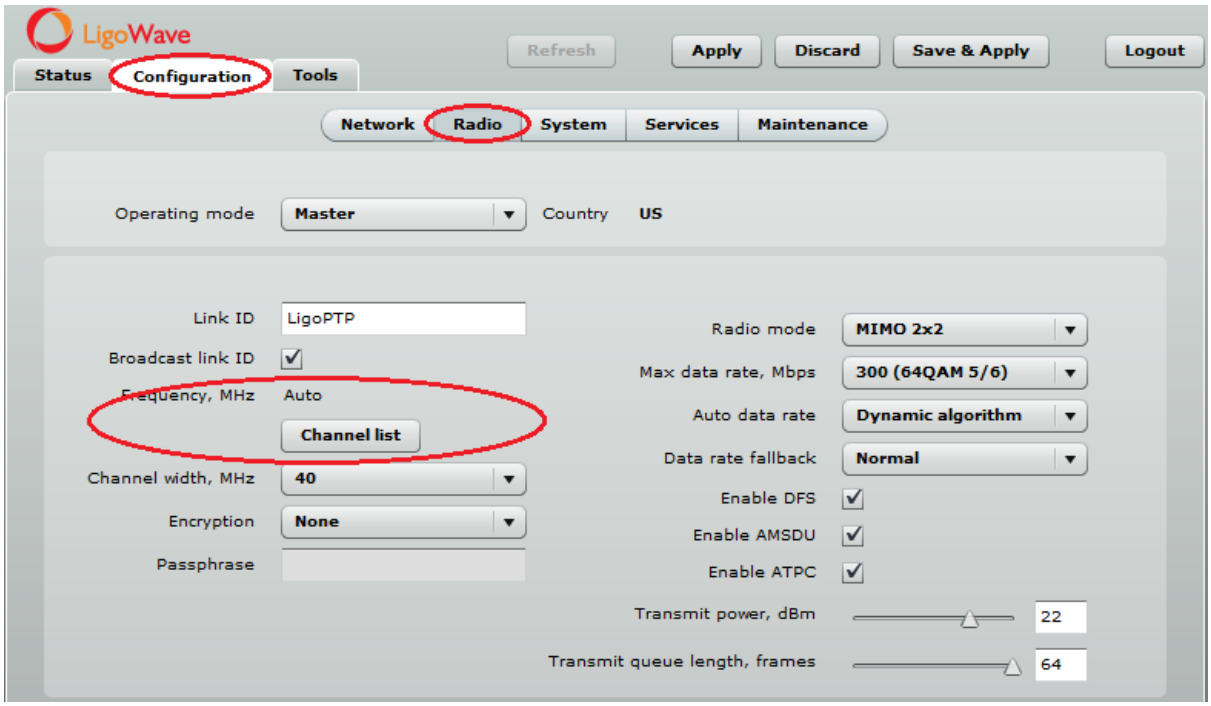


Figure 7 – Specify Frequency

It is recommended to use **Spectrum Analyzer** to choose the operating frequency with the best signal level.

Step 6. Set Channel width at which PTP link will operate

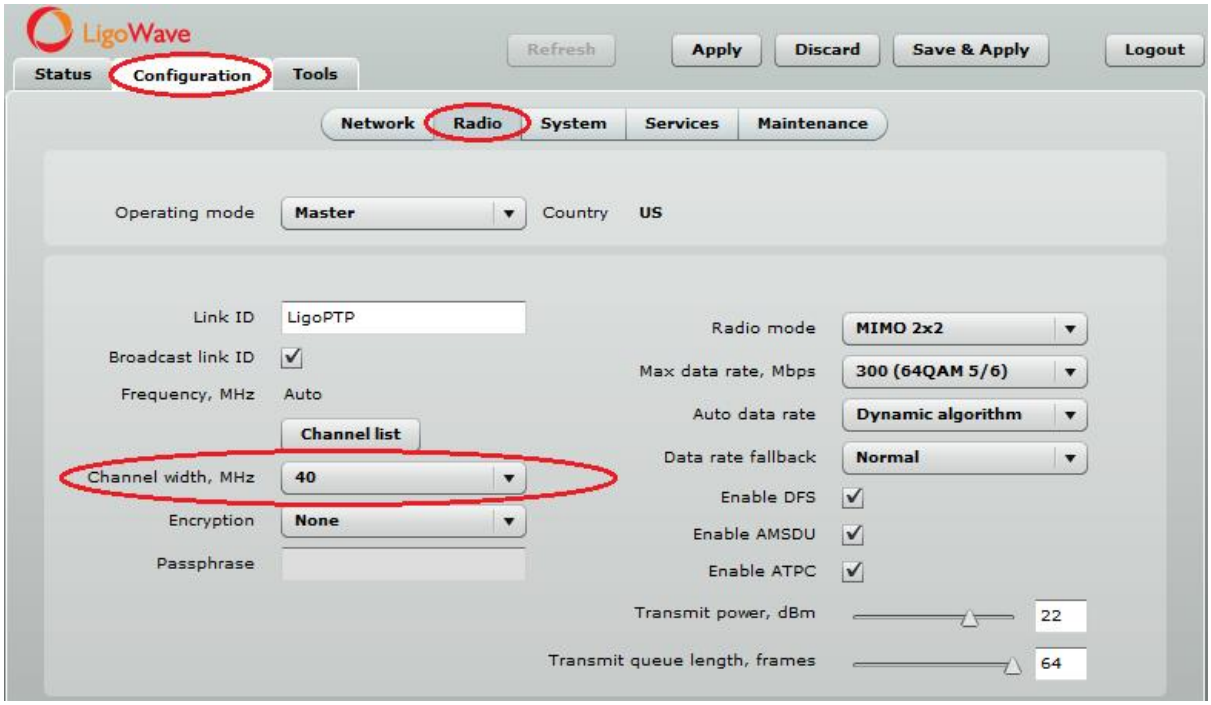


Figure 8 – Specify Channel Width

Step 7. **Set link encryption for secure data transfer between PTP units.** The security settings (encryption and passphrase) must be the same on each side of the link otherwise the link will not establish.

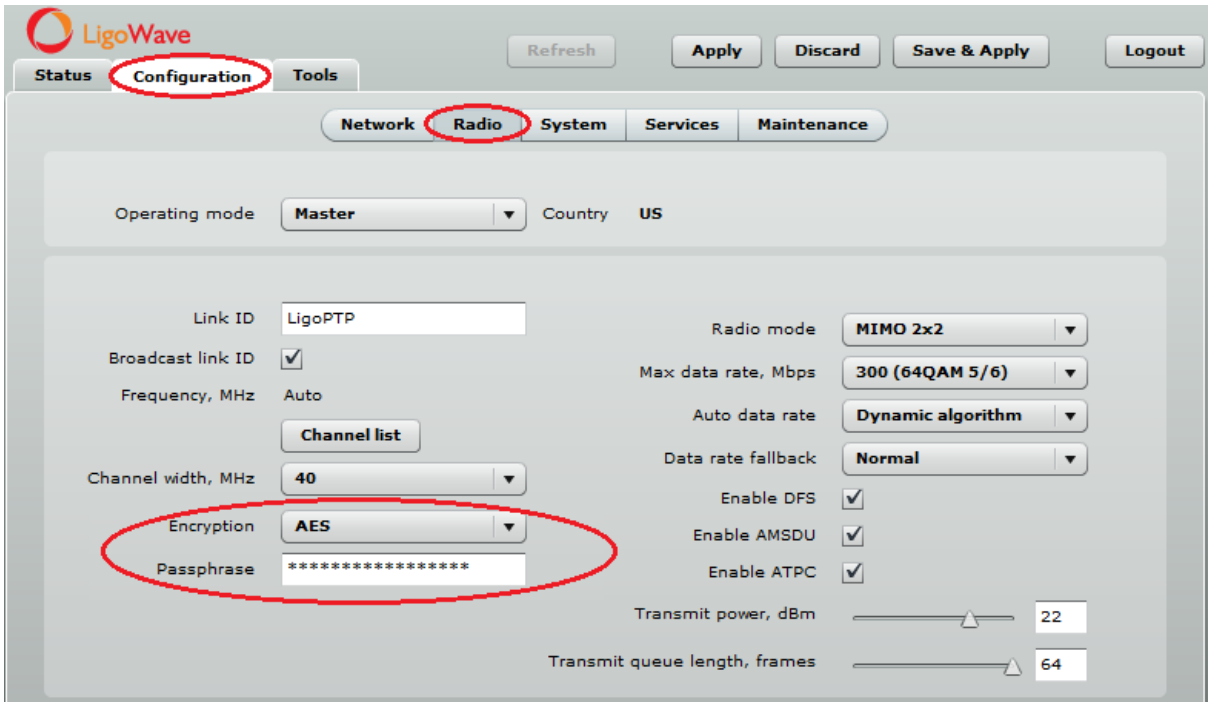


Figure 9 – Set the Encryption

Step 7. **Reduce Transmit Power** before testing the units placed on a table. PTP units placed in short distance with high transmit power may not work or even damage the peer's radio's receiver.

Step 8. **Change web management login password.** This is strongly recommended for security reasons. For instructions on changing the administrator's password refer to the corresponding section *Administrative Account.*

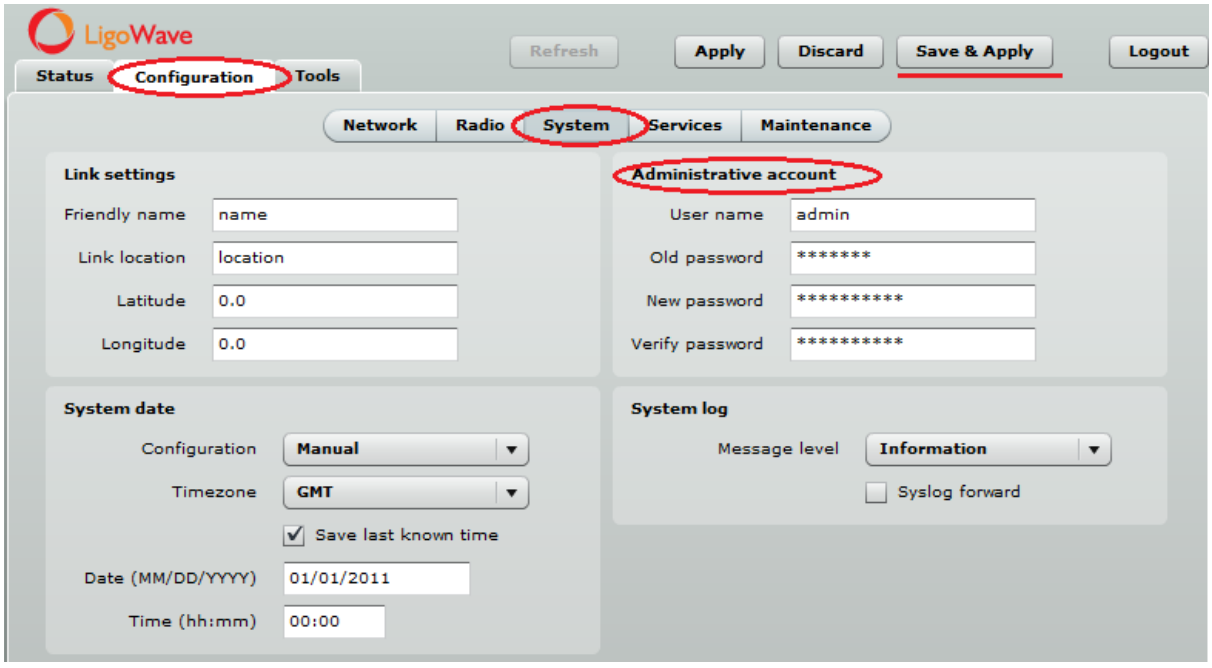


Figure 10 – Change Administrator's Password

Step 9. Click **Save&Apply** button to save configuration.

Step 10. **Setup the second unit of the PTP link** (Slave) in the same way (ensure that **Operating mode** is **Slave**) and check if configured units established a Link.

Verify PTP Link Connection

After the both units of the PTP Link are configured, verify the PTP link quality:

Step 1. Connect to the unit's web management interface.

Step 2. Check the ***Signal Indicator*** bar located at the bottom of the web management interface:

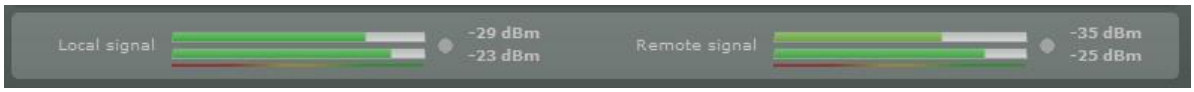


Figure 11 – Signal Indicator Bar

Step 3. Run the **iperf** tool (or use the *Link Test*) on server and client sides to verify the point-to-point connection:

```
File  Edit  View  Terminal  Help
mindaugas@mindaugas-desktop:~$ iperf -c 192.168.10.124 -w 85K -M 1.0K -l 2.0M -t 102 -i 2
WARNING: attempt to set TCP maximum segment size to 1024, but got 536
------------------------------------------------------------
Client connecting to 192.168.10.124, TCP port 5001
TCP window size:   170 KByte (WARNING: requested 85.0 KByte)
------------------------------------------------------------
[  3] local 192.168.10.1 port 43074 connected with 192.168.10.124 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0- 2.0 sec  14.0 MBytes  58.7 Mbits/sec
[  3]  2.0- 4.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3]  4.0- 6.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3]  6.0- 8.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3]  8.0-10.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 10.0-12.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 12.0-14.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 14.0-16.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 16.0-18.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 18.0-20.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 20.0-22.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 22.0-24.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 24.0-26.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 26.0-28.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 28.0-30.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 30.0-32.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 32.0-34.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 34.0-36.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 36.0-38.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 38.0-40.0 sec  16.0 MBytes  67.1 Mbits/sec
[  3] 40.0-42.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 42.0-44.0 sec  18.0 MBytes  75.5 Mbits/sec
[  3] 44.0-46.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 46.0-48.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 48.0-50.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 50.0-52.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 52.0-54.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 54.0-56.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 56.0-58.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 58.0-60.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 60.0-62.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 62.0-64.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 64.0-66.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 66.0-68.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 68.0-70.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 70.0-72.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 72.0-74.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 74.0-76.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 76.0-78.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 78.0-80.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 80.0-82.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 82.0-84.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 84.0-86.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 86.0-88.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 88.0-90.0 sec  22.0 MBytes  92.3 Mbits/sec
[  3] 90.0-92.0 sec  20.0 MBytes  83.9 Mbits/sec
[  3] 92.0-94.0 sec  22.0 MBytes  92.3 Mbits/sec
```

Figure 12 – iperf Results (TCP)

```
File  Edit  View  Terminal  Help
mindaugas@mindaugas-desktop:~$ iperf -c 192.168.10.1 -u -b 95M -t 38 -i 2 -d -w 110k
------------------------------------------------------------
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size:   220 KByte (WARNING: requested   110 KByte)
------------------------------------------------------------
------------------------------------------------------------
Client connecting to 192.168.10.1, UDP port 5001
Sending 1470 byte datagrams
UDP buffer size:   220 KByte (WARNING: requested   110 KByte)
------------------------------------------------------------
[  4] local 192.168.10.1 port 46203 connected with 192.168.10.1 port 5001
[  3] local 192.168.10.1 port 5001 connected with 192.168.10.1 port 46203
[ ID] Interval       Transfer     Bandwidth
[  4]  0.0- 2.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3]  0.0- 2.0 sec  22.8 MBytes  95.6 Mbits/sec  0.006 ms    0/16260 (0%)
[  4]  2.0- 4.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3]  2.0- 4.0 sec  22.8 MBytes  95.6 Mbits/sec  0.000 ms    0/16260 (0%)
[  4]  4.0- 6.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3]  4.0- 6.0 sec  22.8 MBytes  95.6 Mbits/sec  0.000 ms    0/16260 (0%)
[  4]  6.0- 8.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3]  6.0- 8.0 sec  22.7 MBytes  95.1 Mbits/sec  0.001 ms   86/16260 (0.53%)
[  4]  8.0-10.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3]  8.0-10.0 sec  22.8 MBytes  95.6 Mbits/sec  0.001 ms    0/16261 (0%)
[  4] 10.0-12.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 10.0-12.0 sec  22.8 MBytes  95.6 Mbits/sec  0.002 ms    0/16260 (0%)
[  4] 12.0-14.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 12.0-14.0 sec  22.8 MBytes  95.6 Mbits/sec  0.003 ms    0/16260 (0%)
[  4] 14.0-16.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 14.0-16.0 sec  22.8 MBytes  95.6 Mbits/sec  0.000 ms    0/16260 (0%)
[  4] 16.0-18.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 16.0-18.0 sec  22.7 MBytes  95.1 Mbits/sec  0.001 ms   88/16260 (0.54%)
[  4] 18.0-20.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 18.0-20.0 sec  22.7 MBytes  95.0 Mbits/sec  0.001 ms  101/16260 (0.62%)
[  4] 20.0-22.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 20.0-22.0 sec  22.7 MBytes  95.0 Mbits/sec  0.000 ms  101/16261 (0.62%)
[  4] 22.0-24.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 22.0-24.0 sec  22.8 MBytes  95.6 Mbits/sec  0.004 ms    0/16260 (0%)
[  4] 24.0-26.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 24.0-26.0 sec  22.8 MBytes  95.6 Mbits/sec  0.001 ms    0/16260 (0%)
[  4] 26.0-28.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 26.0-28.0 sec  22.8 MBytes  95.6 Mbits/sec  0.000 ms    0/16260 (0%)
[  4] 28.0-30.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 28.0-30.0 sec  22.8 MBytes  95.6 Mbits/sec  0.001 ms    0/16260 (0%)
[  4] 30.0-32.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 30.0-32.0 sec  22.8 MBytes  95.6 Mbits/sec  0.000 ms    0/16260 (0%)
[  4] 32.0-34.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 32.0-34.0 sec  22.8 MBytes  95.6 Mbits/sec  0.001 ms    0/16261 (0%)
[  4] 34.0-36.0 sec  22.8 MBytes  95.6 Mbits/sec
[  3] 34.0-36.0 sec  22.8 MBytes  95.6 Mbits/sec  0.001 ms    0/16260 (0%)
[  4] 36.0-38.0 sec  22.8 MBytes  95.6 Mbits/sec
[  4]  0.0-38.0 sec   433 MBytes  95.6 Mbits/sec
[  4] Sent 308944 datagrams
[  3] 36.0-38.0 sec  22.8 MBytes  95.6 Mbits/sec  0.000 ms    0/16260 (0%)
```

Figure 13 – iperf Results (UDP)

Step 4. If test results are meeting the requirement and are no configuration will be done Transmit power should be increased, before mounting PTP units outside. Note that if the distance between the units is short, do not set Transmit Power to the maximum value. Observe the *Signal Indicator* bar – if it is red, decrease the Transmit Power.

Web Management

LigoPTP UNITY products are designed to provide superior performance at long range distances. With a proprietary wireless driver that was written for the sole purpose of optimizing wireless point to point links, one can achieve much higher throughput, especially at longer links, than standards based products.

General Operation

Appling and Saving Configuration Changes

There are three general buttons located on the right top corner of the WEB GUI allowing managing device configuration:

Apply – if pressed new configuration settings are applied instantly. It will take few seconds and the device will be running with new settings. It should be noted that pressing Apply button settings are not written to the permanent memory. Therefore, if the device is rebooted it will start with old configuration settings.

Discard – if pressed parameter changes are discarded. It should be noted that if Apply or Save&Apply is pressed it is not possible to discard changes.

Save&Apply – if pressed new configuration settings are applied instantly and written to the permanent memory.

It is not required to press **Apply** or **Save&Apply** 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.

Signal Indicator

The PTP web management interface has a PTP link signal indicator. This indicator displays real-time signal level in dBm between the Local and Remote units.

Figure 14 – LigoPTP UNITY Signal Indicator

The color of the Signal indicator will change according to the signal level quality of the unit. The green color means excellent link quality while the red color of the indicator means that link quality is poor.

The red circle ● beside full filled red indicator switches on immediately when the signal level becomes too high and overload is detected.

Figure 15 – LigoPTP UNITY Signal Indicator (too Strong Signal)

This may happen on an incorrect link layout, for example, in the case when the TX power parameter in the PTP units is set to maximum but physically the units are too close to each other (e.g. testing units are placed on a table).

The screenshot below displays Signal indicator if there is no PTP link established between PTP units:

Figure 16 – LigoPTP UNITY Signal Indicator (no Link Established)

Status

Use the Status menu to check the current status of the PTP 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 PTP unit. The page is divided into three main categories: System, Network and Wireless. The System section displays the identification information of the PTP unit. The Wireless section presents main wireless settings. The Ethernet section describes the PTP unit's network identity and connectivity.

The information in the page can be updated using **Refresh** button.

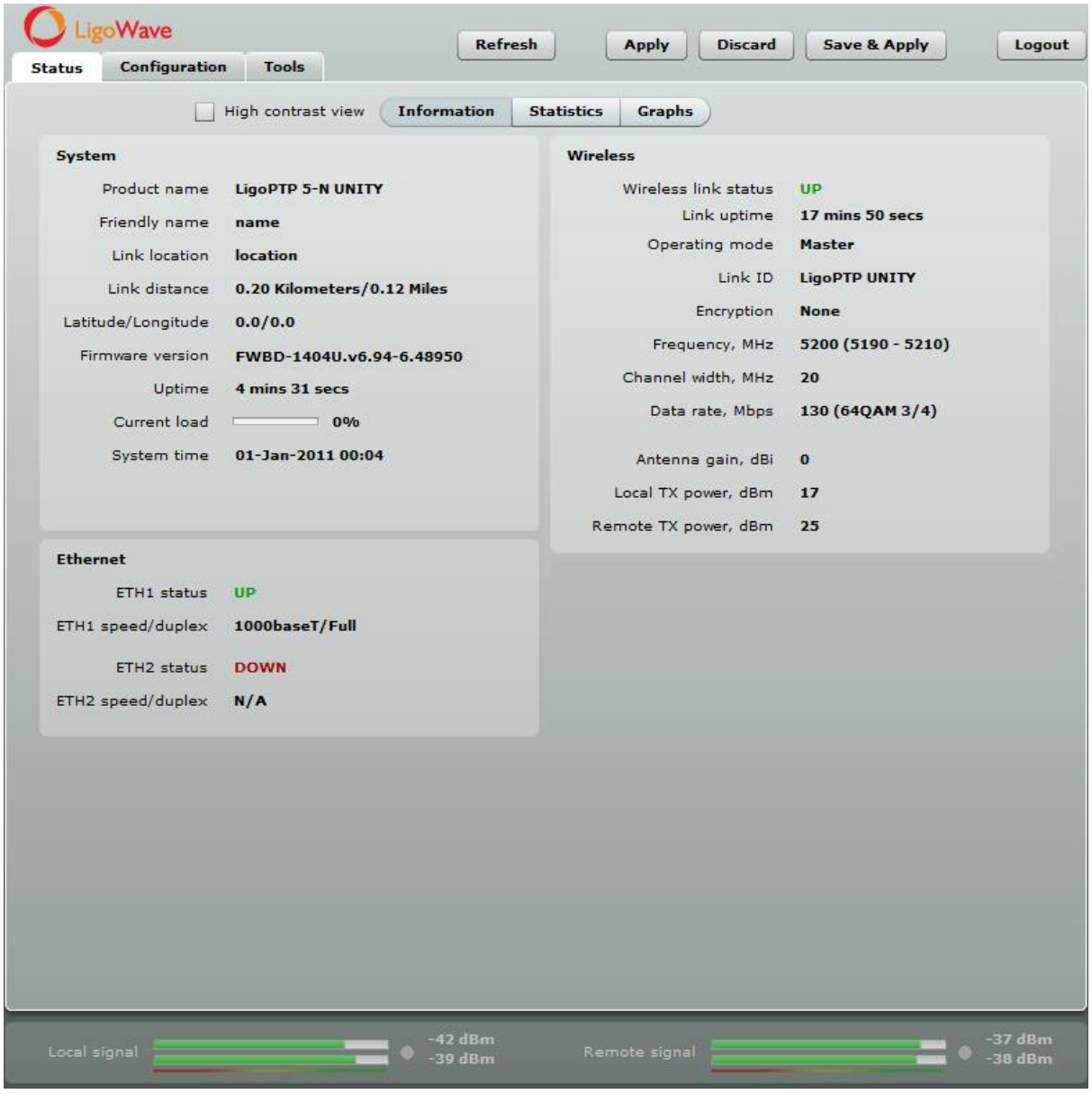


Figure 17 – Status Page

System

System section displays general information of the PTP unit.

Product name – displays the product name.

Friendly name – describe the link name to identify the PTP unit on the network.

Link location – describe the link location, to identify the PTP unit on the network.

Link distance – displays automatically calculated PTP link distance.

Latitude/Longitude – displays the coordinates of the device.

Firmware version – displays the device hardware and software version.

Uptime – displays the time, expressed in days, hours and minutes since the system was last rebooted.

Current load – displays the current load of the device processor.

System time – displays current system time.

Ethernet

ETH1 link status – displays the status of the Ethernet link. A State **UP** indicates that the Ethernet link is established. A state **DOWN** indicates that the Ethernet link is not established.

Ethernet speed/duplex – displays the negotiated speed and duplex of the Ethernet interface specified in Mbps. The N/A will be displayed if the Ethernet status is down. Full duplex means that data can be transmitted in both directions on a signal carrier at the same time. Half duplex means that data can be transmitted in both directions on a signal carrier, but not at the same time. Auto means that the system will detect link speed and duplex mode automatically.

Wireless

Wireless link status – displays the status of the Wireless link. A State **UP** indicates that the Wireless link between local and remote units is established. A state **DOWN** indicates that the Wireless link between local and remote units is not established.

Link uptime - displays the time, expressed in days, hours and minutes since the point to point link was established.

Operating mode – displays the operating mode of the device. The operating mode can be Master or Slave.

Link ID – displays PTP link ID, specified by the user.

Encryption – displays encryption method: none or AES.

Frequency, MHz – displays frequency in MHz at which the PTP link communicates.

Channel width, MHz – displays the channel width (20/40) at which the PTP link communicates.

Data rate, Mbps – displays the data rate at which the PTP link communicates.

Antenna gain, dBi - displays the antenna gain value.

Transmit power, dBm - displays TX power value of the local LigoPTP UNITY unit.

Remote transmit power, dBm - displays TX power value of the remote LigoPTP UNITY unit.

Statistics

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

Network statistics contains detailed statistics of Ethernet and Wireless interfaces:

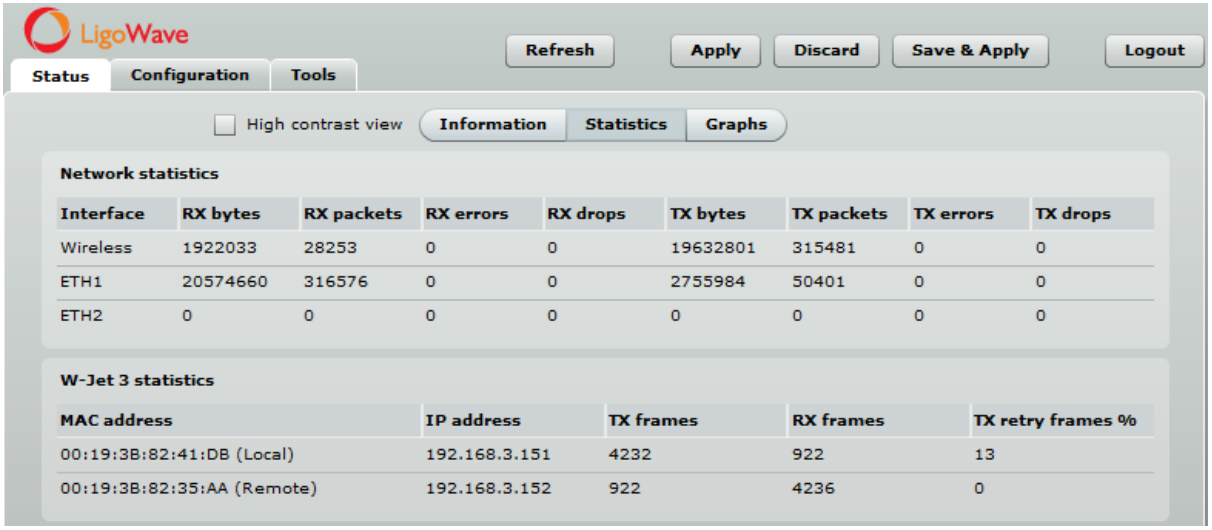


Figure 18 – Statistics Page

RX bytes – displays the total number of received bytes 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.

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

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

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

TX packets – displays the total number of sent 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.

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

W-Jet 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.

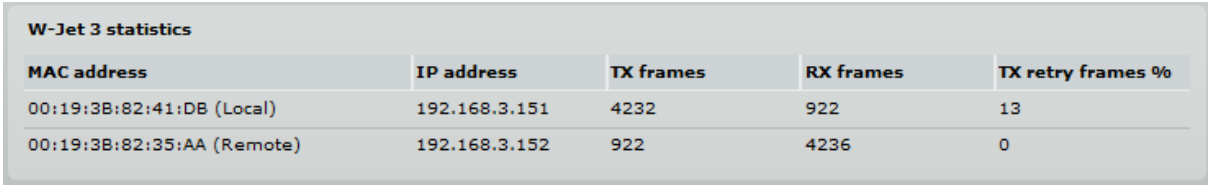


Figure 19 – W-Jet Statistics

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. Select the required statistics (RSSI, Traffic, RX/TX errors, Memory, CPU load, W-Jet frames, Link latency or Frequency change) and the corresponding graphic diagrams will be displayed. The statistics in diagrams are displayed on hourly, daily, weekly, monthly or yearly basis; hourly is chosen by default. The option **Display current time set on the system** gives possibility to convert the time stamps on the diagrams in current date, set on the administrator's PC.

To update statistics data click **Refresh** button.

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

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

Figure 20 – Signal Strength Graph

Traffic diagram displays Incoming and Outcoming traffic statistical data:

Figure 21 – Traffic Statistics Graph

W-Jet 3 data rate diagram displays the count of data frames send on chosen data rates. This gives possibility to choose the most effective data rates for the PTP unit. The data on diagram must be observed carefully: the correctly chosen data rates must generate diagram with one distinguished data rate column (300 Mbps data rate column in first picture below), thus meaning that a little or no data frame were sent on lower data rates. The second picture shows that a lot of retries were on 270 Mbps data rate (this means that administrator needs to lower the data rate).

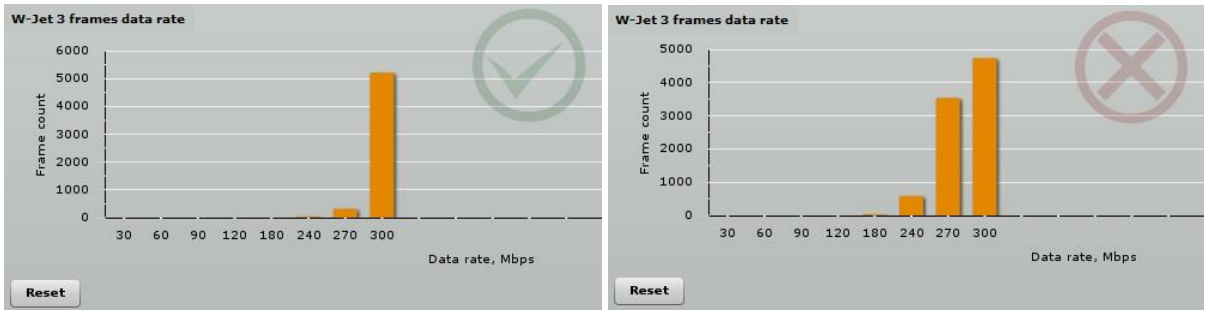


Figure 22 – Correct and Incorrect Results of W-Jet Frames Data Rates

RX/TX errors diagram displays statistical data of RX drop of the Local and Remote units, TX try of the Local and Remote units:

Figure 23 – RX/TX Errors Statistics Graph

Link latency diagram calculates the round-trip delay time (RTD) - the length of time it takes for a packet to be sent from Local unit to Remote unit, plus the length of time it takes receive packet back from Remote unit to a Local unit.

The **Link latency** graph will be displayed only if both PTP units (Remote and Local) are on the same subnet.

Figure 24 – Link Latency Graph

Free memory diagram displays memory usage data:

Figure 25 – Memory Status Graph

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

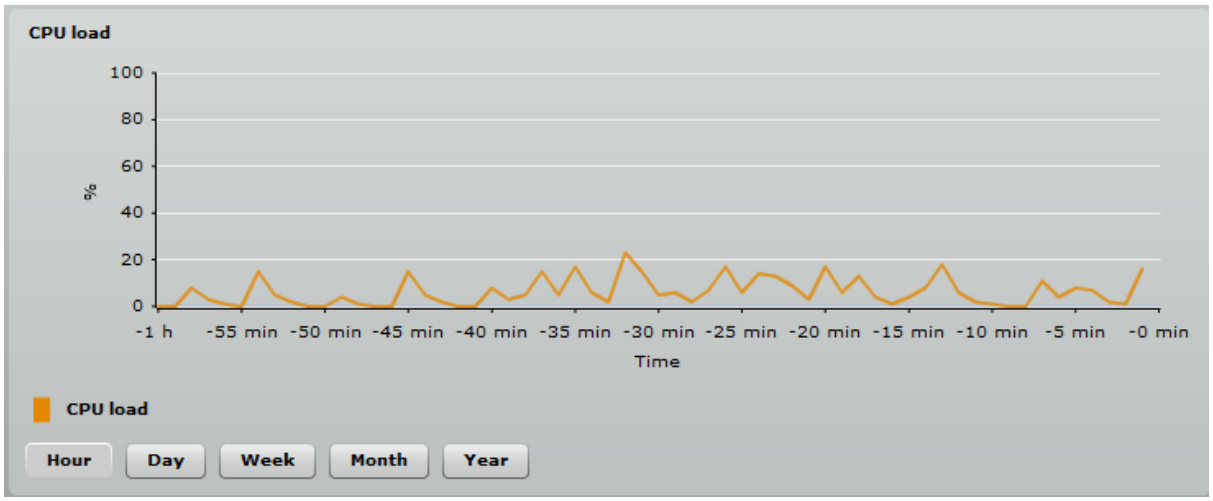


Figure 26 – CPU Load Graph

Frequency diagram displays device operating frequency in GHz:

Figure 27 – Frequency Graph at which PTP Link is Operating

Configuration

The Configuration page is subdivided into following pages:

- **Network** – to set main network configuration for PTP device.
- **Radio** – to setup radio settings of the PTP link.
- **System** – to setup system date, administrator's access settings, configure system log feature.
- **Services** – to setup SNMP, WNMS settings and configure device alerts.
- **Maintenance** – for device firmware update, reboot, reset device to factory defaults, troubleshooting file download and to view system log messages.

Network

The network configuration as described below is required for LigoPTP UNITY management purposes. Use the **Network** menu to setup the network settings of the PTP unit:

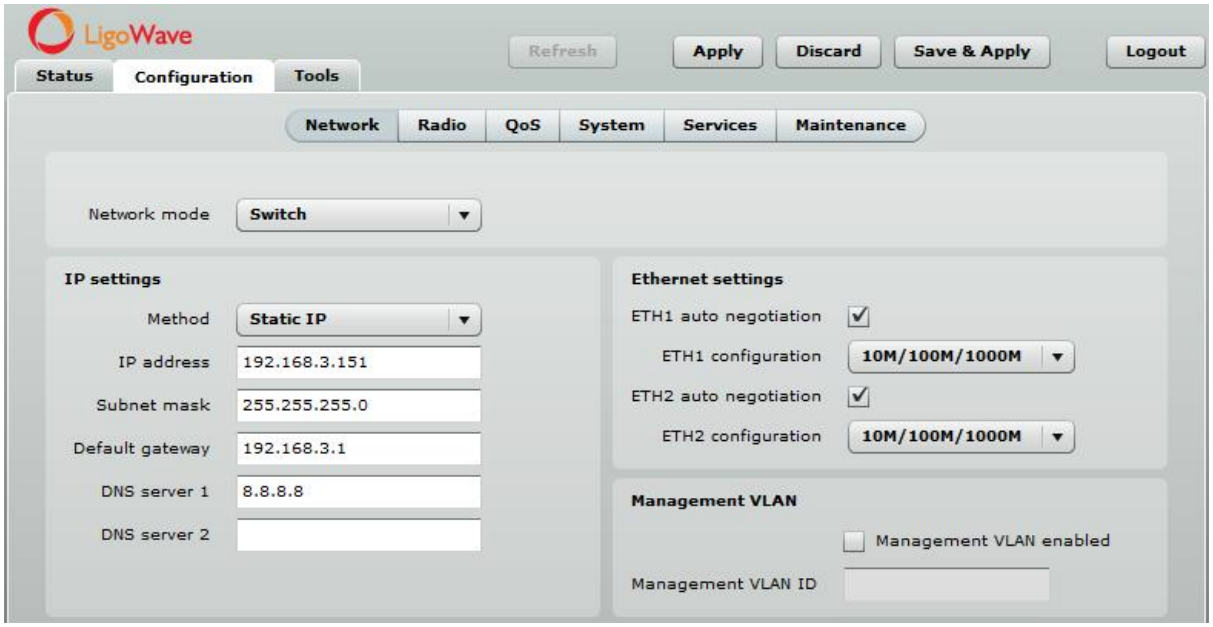


Figure 28 – Network Settings

Network mode - select the LigoPTP UNITY network operating mode:

- **Switch** - a simple network mode, where the second LigoPTP UNITY port (ETH2) is switched with the main port (ETH1) and the wireless radio. Application example: for access point or camera connection to second port (power is not provided on second port).
- **Trunking** - a special mode where traffic from second LigoPTP UNITY port (ETH2) together with wireless radio interface is integrated to main port (ETH1). Therefore a parallel LigoPTP PRO or LigoPTP MIMO device can be connected to the second port and get aggregated throughput on the main port. This method is also known as bonding.
  - **Enable packet aggregation** - if enabled, the small packets of data traffic will be aggregated to big packets.
  - **Trunking algorithm** – select the trunking algorithm:
    Round-robin – this method provides load balancing with fault tolerance and is recommended for mixed networks, consisting from routers, Windows, Mac and Linux hosts.
    Exclusive OR – this method provides load balancing with fault tolerance and is recommended for homogeneous networks, consisting mainly from Windows hosts.

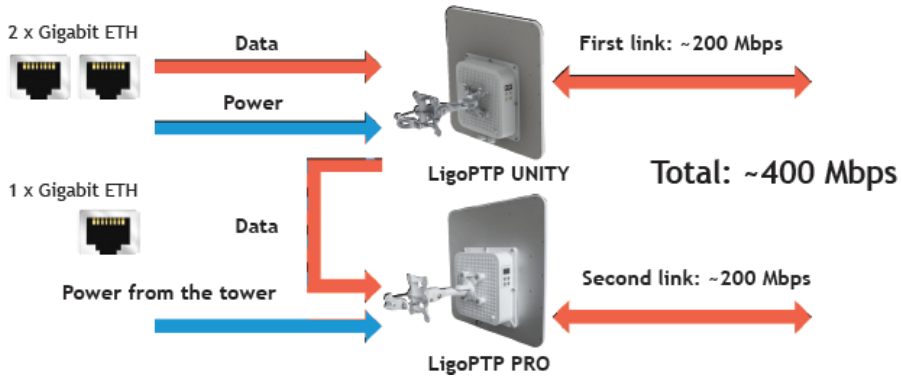
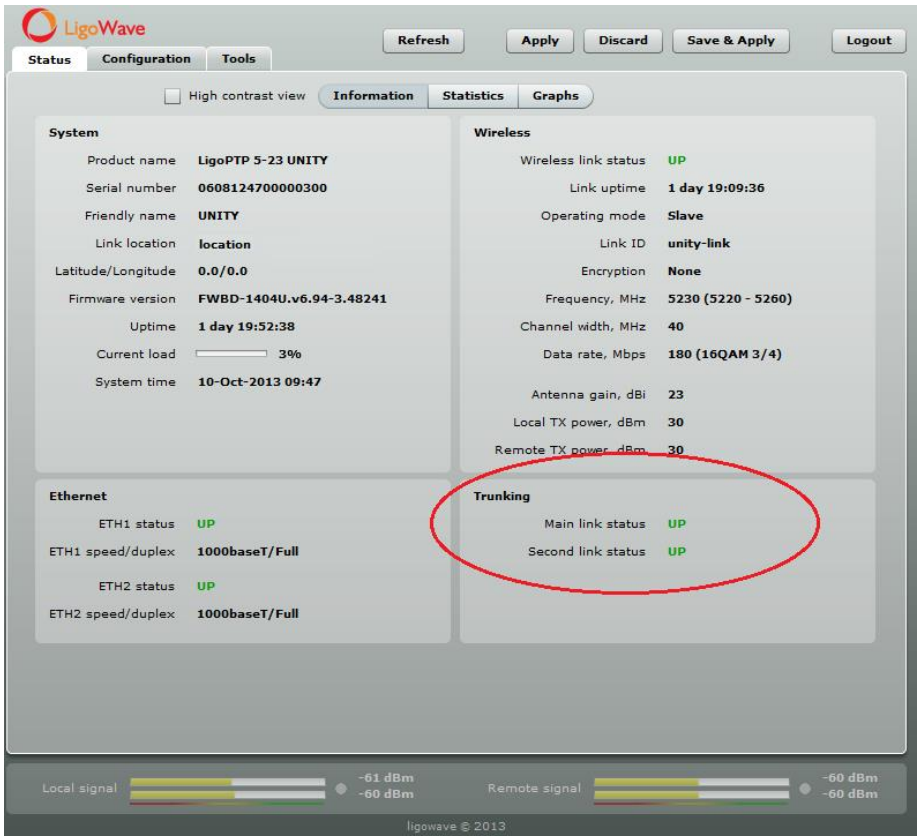


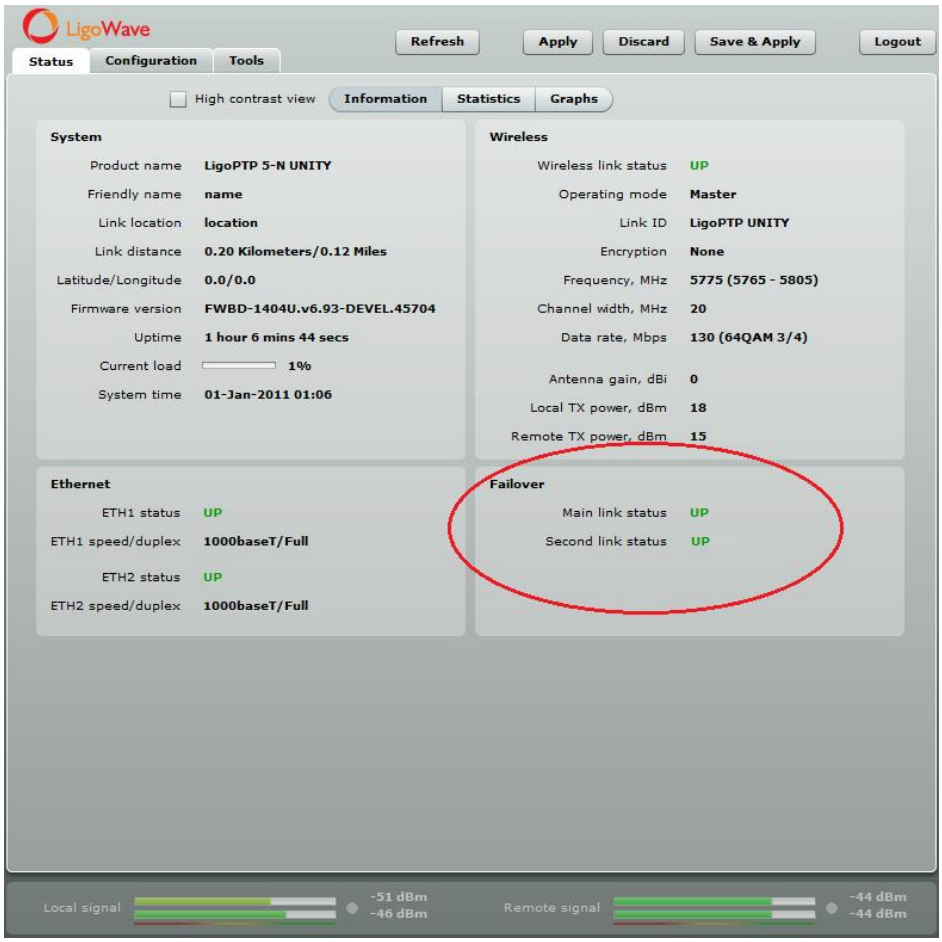
Figure 29 - Network mode: Trunking

If the LigoPTP UNITY operates in Trunking network mode, the Status page additionally contains the trunking state:



- **Failover** - a special mode used with a second link as in Link Aggregation. The difference is, only one wireless link is active at the same time. If one link fails, the other starts operating as backup link.

If the LigoPTP UNITY operates in Failover network mode, the Status page additionally contains the failover state:



- **2nd Link Configuration** - a special mode used for second link configuration. When LigoPTP UNITY operates in Link aggregation or Link failover mode, second link (e.g. LigoPTP PRO) cannot be accessed via IP for management or monitoring purposes. Therefore in this special mode the second link can be accesses via IP.

IP Settings

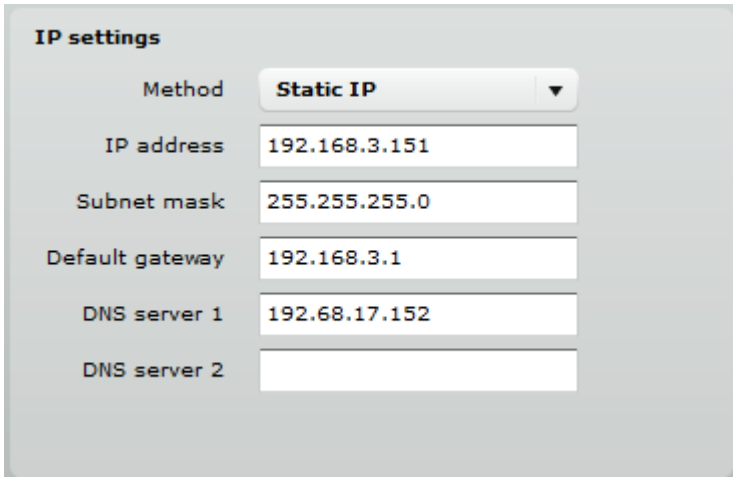


Figure 30 - IP Settings

Method – specify IP configuration mode:

- **Static IP** – choose to specify static IP of the device.
- **Dynamic IP** – choose to use dynamic IP given by the DHCP server (running DHCP server is required).

IP address – specify the device IP address [digit and dots]. When shipped from the factory or reset to factory settings, device defaults to a static IP address of 192.168.2.66.

Subnet mask – specify the device subnet mask [digit and dots]. When shipped from the factory or reset to factory settings, the device defaults to a subnet mask of 255.255.255.0.

Default gateway – specify the IP address of the device gateway [digit and dots]. When shipped from the factory or reset to factory settings, the device defaults to a gateway IP address of 192.168.2.1.

DNS server 1 – specify the IP address of the primary DNS server [digit and dots]. The DNS (Domain Name Service) service translates Internet host names into their IP addresses.

DNS server 2 – specify the IP address of the secondary DNS server.

Ethernet Settings

Figure 31 - Ethernet Settings

ETH auto negotiation – select the auto negotiation which advertise and negotiate Ethernet link duplex configuration (half/full) for the highest possible data rates.

ETH configuration – configures the Ethernet link speed of the Ethernet port.

- **10M**
- **10M/100M**
- **10M/100M/1000M**

Management VLAN Settings

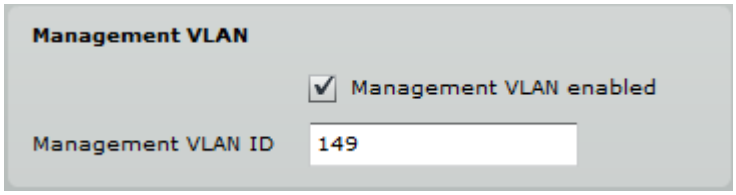


Figure 32 – Management VLAN Settings

Management VLAN enabled – select to enable management VLAN. If management VLAN is enabled, all traffic received by the device must by tagged with the management VLAN ID to access the network. All non-tagged traffic will be dropped, thus reducing the risk of unauthorized access.

Management VLAN ID – specify the management VLAN ID [2-4094].

Radio

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

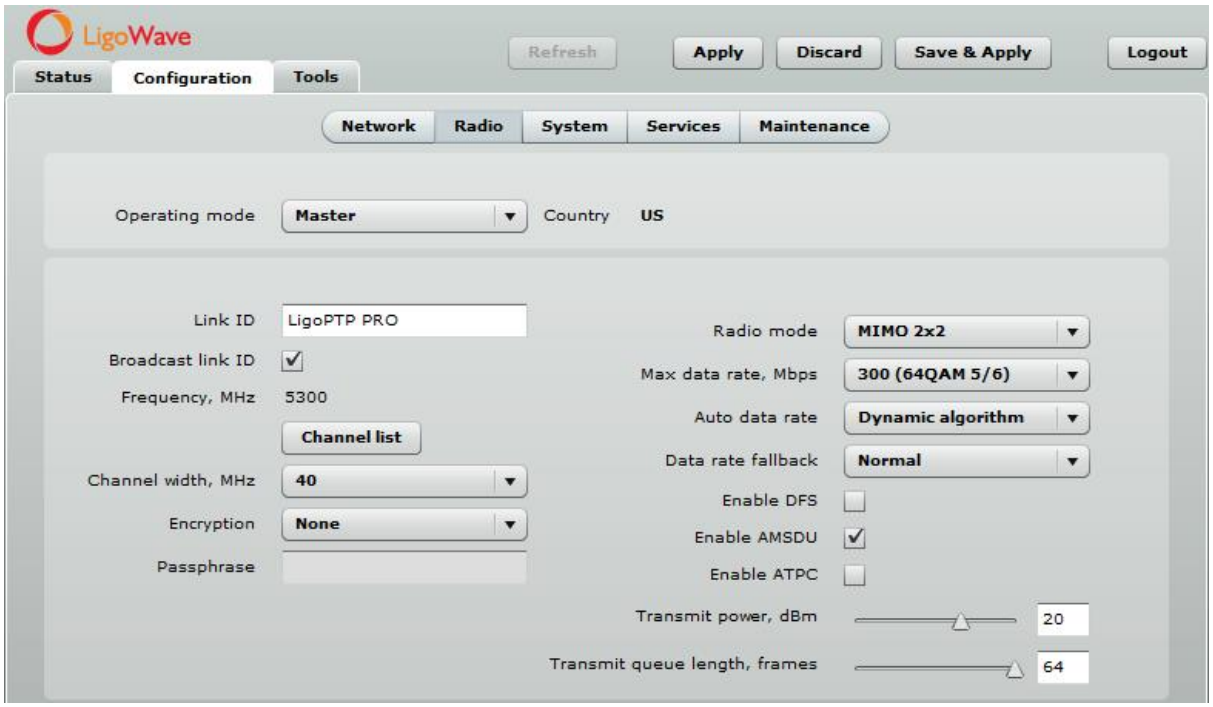


Figure 33 – Radio Settings

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

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

Link ID – specify known network name of the remote device to establish a PTP link.

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

Broadcast link ID – enables or disables the broadcasting of the link ID.

Frequency – displays the channel at which the PTP unit is operating, or indicates that autochannel function is used.

Channel list – select the channel(s) at which the PTP unit will operate. If more than one channel is selected, then autochannel feature will be enabled. Automatic channel selection allows PTP 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:

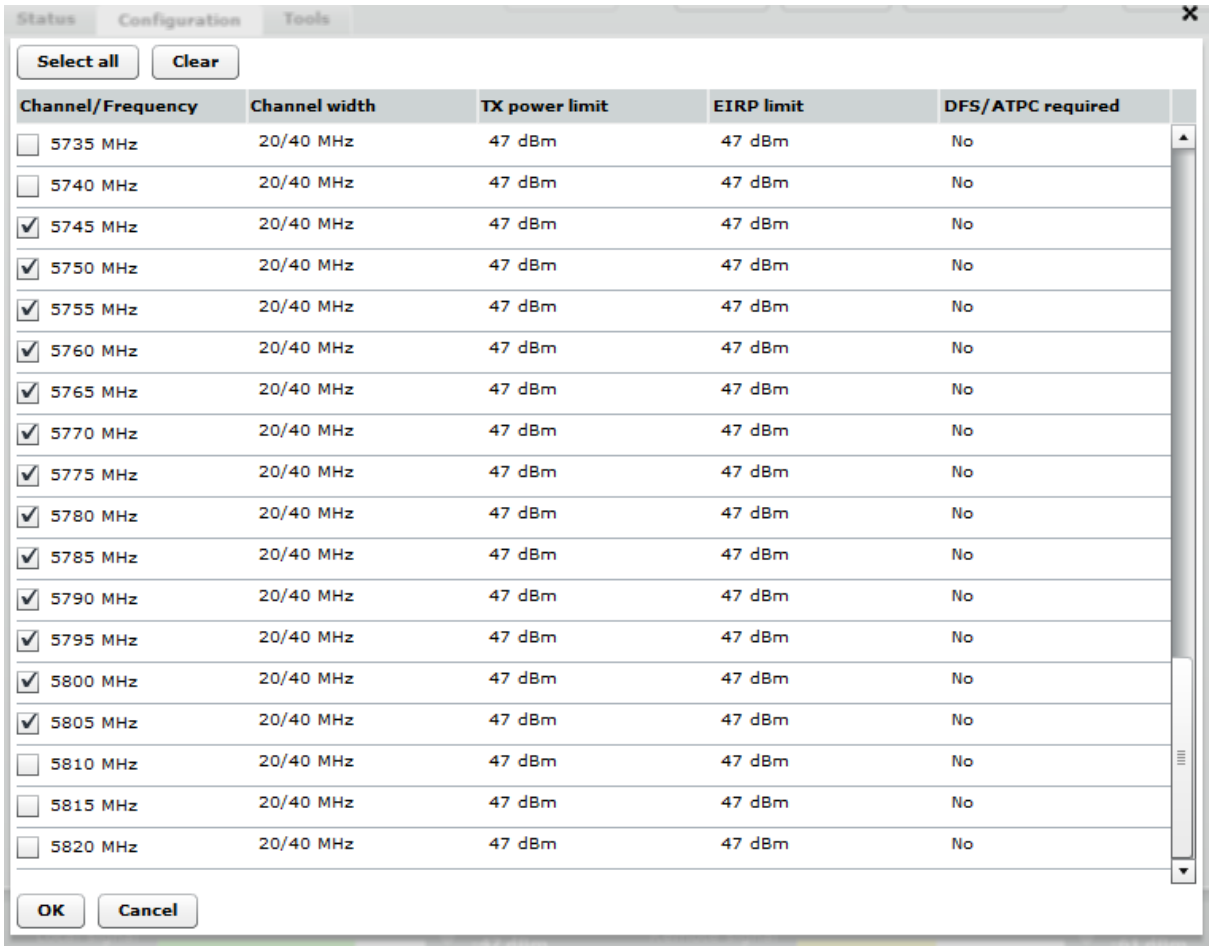


Figure 34 – The Frequency Selection (Autochannel)

Channel width – choose the channel width in MHz [20/40]. The default channel bandwidth for 802.11 radio is 20MHz. The 802.11n allow channel bonding in such way the total channel width becomes 40MHz.

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

Encryption – select the security level for the PTP link:

- **None** – means no security on link.
- **AES** – means encryption with passphrase.

Passphrase – specify passphrase of the AES security [8-63 characters]. This parameter appears and is mandatory when AES security is chosen.

Radio mode – choose the PTP unit antenna operating mode:

- **SISO** – single input single output. The device will use only one antenna for data transfer. The antenna will be chosen automatically.
- **MIMO** – multiple input multiple output. The device will use two antennas for data transfer (two simultaneous streams). In this mode the link capacity doubles if compared to SISO mode.

Max data rate, Mbps – choose the data rates in Mbps at which PTP should transmit packets. PTP will attempt to transmit data at the highest data rate set. If there will be an interference encountered, the device will step down according the selected method (**Auto data rate** and **Data rate fallback** settings below) to the next highest rate that allows data transmission.

Auto data rate - select the algorithm at which the PTP will choose the proper data rates in case the signal degrades:

- **Fixed algorithm** - with this method the PTP will start transmitting data with the specified **Max data rate** and step down gradually until the best data rate of the transmission will be reached.
- **Dynamic algorithm** - with this method the PTP will start transmitting data with automatically calculated data rate by specific algorithm and step down to the next automatically calculated data rate until the best data rate of the data packet transmission will be reached.

Data rate fallback – choose the data rate fallback method: normal or aggressive.

- **Normal** - the PTP will start transmitting data at the highest data rate and then decreases it until the best rate of the transmission will be reached.
- **Aggressive** - with this method selected, the data rate will be decreasing down faster and more aggressive: the PTP will start transmitting data at the highest data rate and renegotiate down every two data rate until the best rate of the transmission will be reached, even changing the radio mode from MIMO to SISO.

Enable DFS – select to enable radar detection. With enabled DFS, PTP unit monitors the operating frequency for radar signals. If radar signals are detected on the channel, the PTP unit randomly selects a different channel.

If the PTP unit is operating on channel where DFS is required (check on the **Channel list** table), the **DFS** option automatically will be enabled.

Enable AMSDU – enable the AMSDU packet aggregation. If enabled, the maximum size of the

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

Transmit 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.

Transmit queue length– specify the maximum number of frames in transmitting queue [1-64].

QoS

LigoPTP UNITY devices 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.

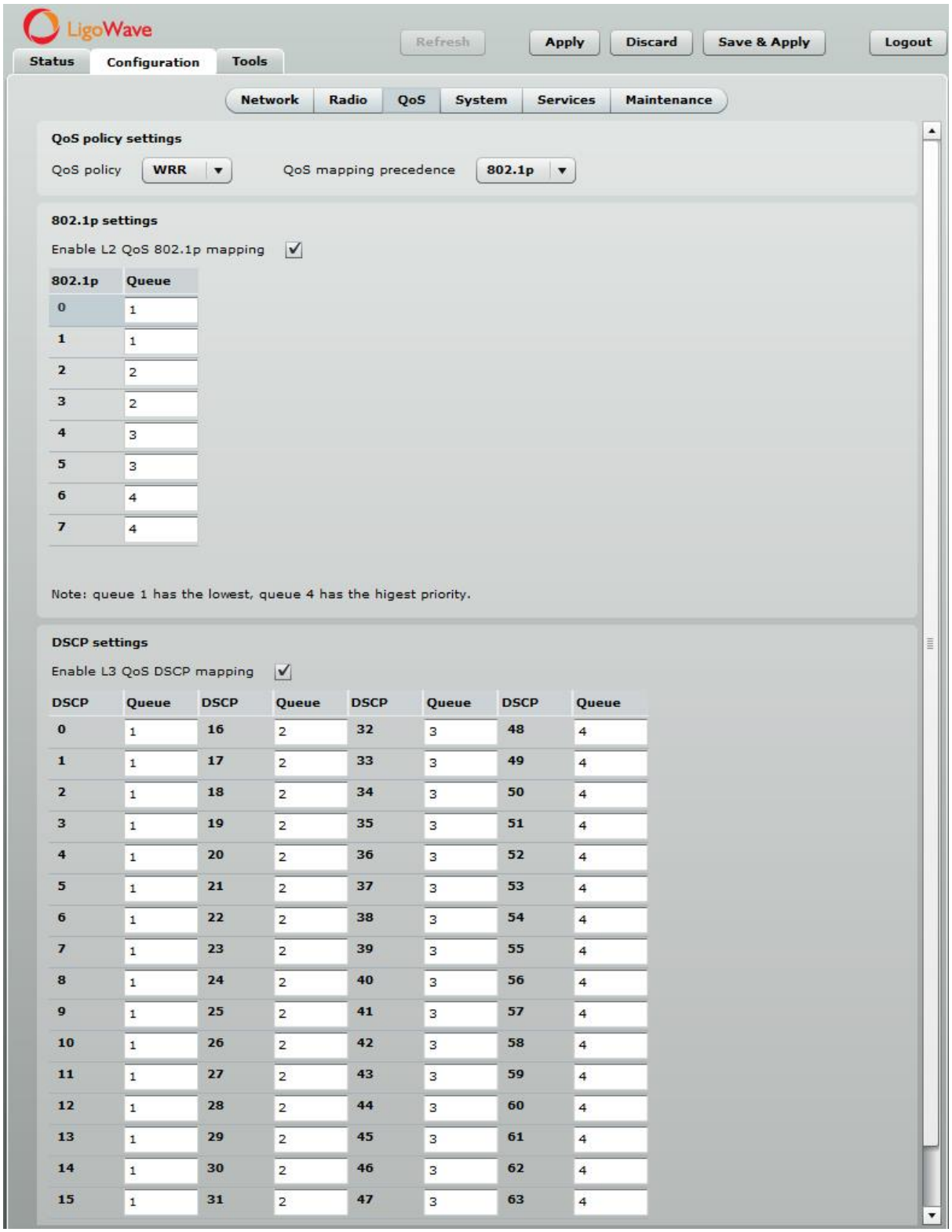


Figure 35 - QOS Configuration

QoS policy settings will be activated only if 802.1p and/or DSCP is enabled.

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.

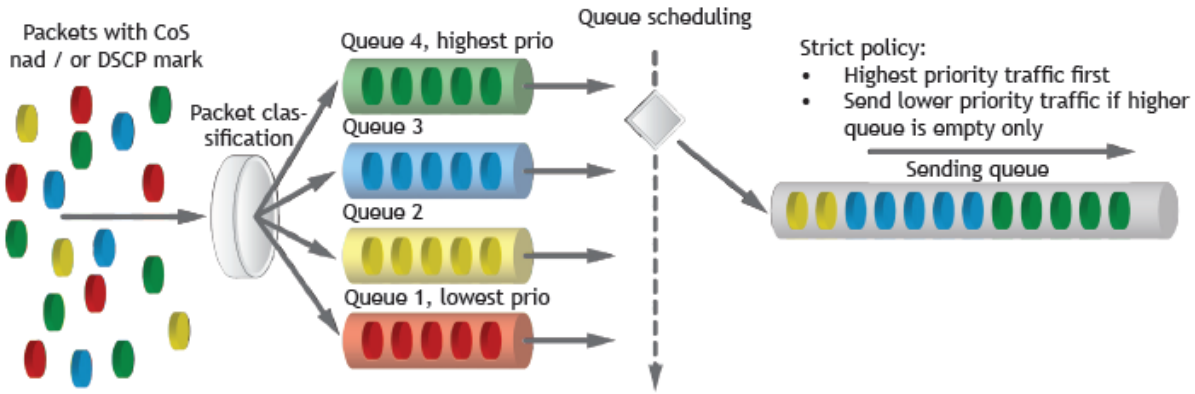


Figure 36 - QOS Policy: Strict

- **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.

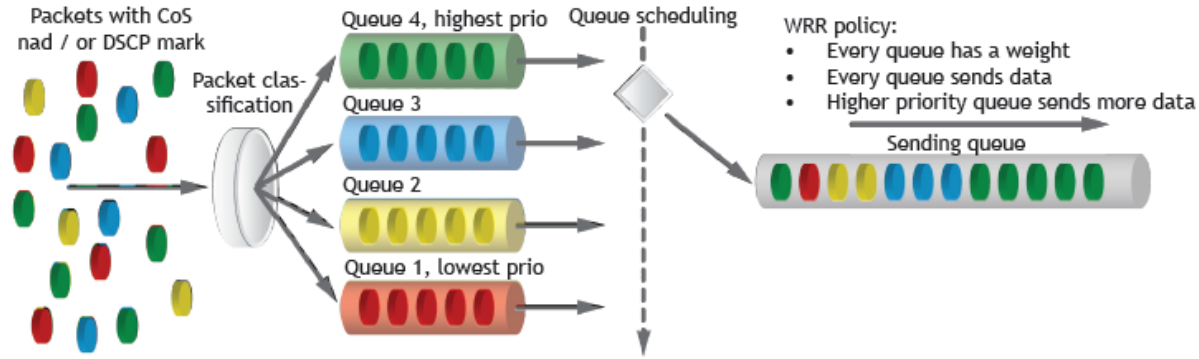


Figure 37 - QOS Policy: WRR

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.

System

The System page is subdivided into 4 sections:

- **Link settings** – to specify PTP link settings.
- **System date** – to setup system date and time of the PTP unit.
- **Administrative account** – to change administrator's password.
- **System log** – to configure logging of the system messages.

Link Settings

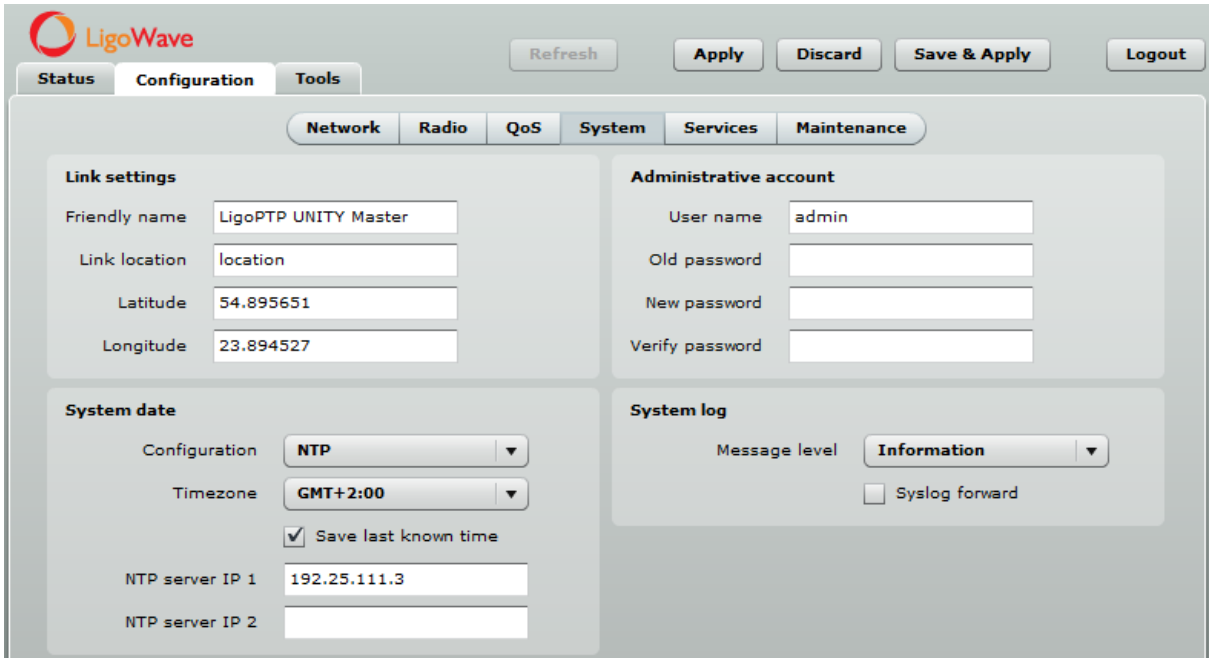


Figure 38 – Link Settings

Friendly name – specify name of the PTP link that is used to identify the unit on the network [maximum 255 ASCII characters].

Link location – describe the location of the PTP unit [maximum 255 ASCII characters].

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

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

System Date

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 PTP unit.

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 timezone and enter NTP server in order to use the NTP service:

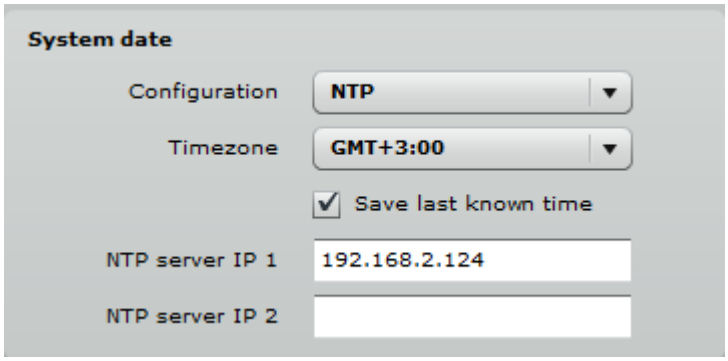


Figure 39 – System Date: NTP Configuration

Configuration – choose the system clock configuration mode [NTP/Manual].

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

Save last known time – select to recall the timestamp that was saved on last reboot. When NTP is enabled, this option will set system clock to last reboot time if no NTP servers are available.

NTP server – specify the trusted NTP server IP or hostname for synchronizing time with [IP address].

To adjust the clock settings manually, choose the configuration mode as **Manual** and specify the following settings:

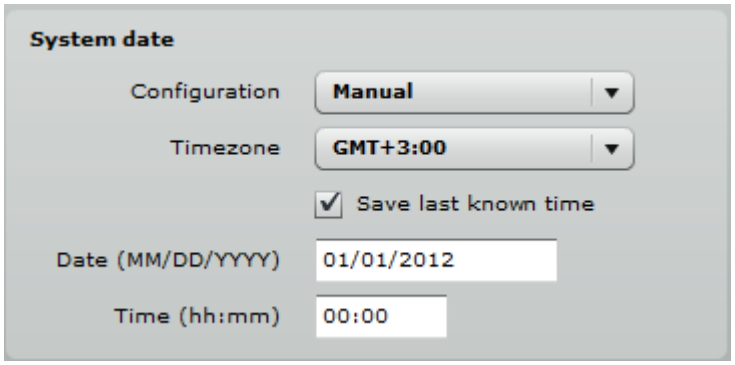


Figure 40 – System date: Manual Clock Configuration

Configuration – choose the system clock configuration mode [NTP/Manual].

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

Save last known time – select to recall the timestamp that was saved on last reboot.

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

Time – specify the time in format hh:mm.

If the device hardware has no internal clock, the configured manual time will be reset to the specified date and time after each device reboot.

Administrative Account

We recommend changing the default administrator password as soon as possible.

The Administrative Account menu is for changing the administrator's credentials.

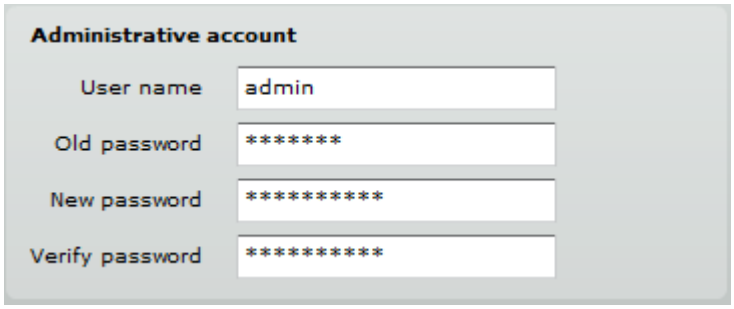


Figure 41 – Changing the Administrator's Password

User name – enter new administrators username

Old password – enter the old administrator password.

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 device to factory default settings. Default administrator login settings are:
User Name: **admin**
Password: **admin01**

System Log

Use the Configuration | System menu to configure device to save log messages to the local or remote server using standard syslog facility:

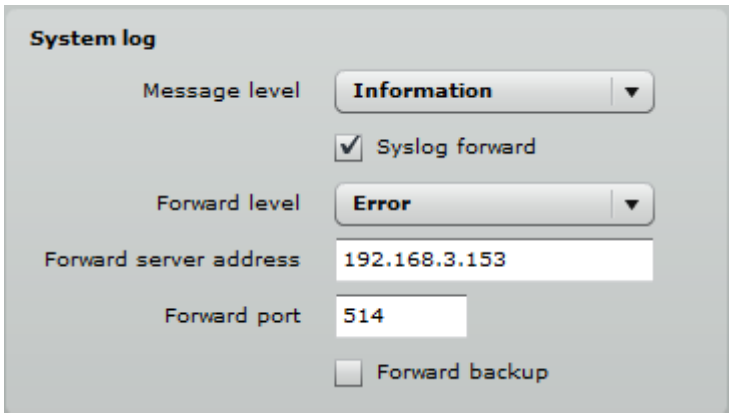


Figure 42 – System Log Configuration

Message level – specify system's message tracing level. The level determines the importance of the message and the volume of messages generated by the PTP unitThe levels are in increased importance order [emergency, alert, critical, error, warning, notice, information, debug]. Default: info.

The PTP unit can be configured to send system log messages to a remote server:

Syslog forward – select to enable remote system logging.

Forward server – specify the remote host IP address or hostname where syslog messages will be sent.

Forward port – specify the port to which syslog messages will be forwarded [0-65535]. Default: 514.

Forward message level – specify the message level that will be send to the remote syslog server. The level determines the importance of the message and the volume of messages generated by the PTP unit. The levels are in order of increasing importance [emergency/alert/critical/error/warning/notice/information/debug]. Default: information.

Forward backup – select to enable remote syslog logging backup.

Backup server – specify the backup host IP address or hostname where syslog messages will be send to.

Backup port – specify the port to which syslog messages will be forwarded [0-65535]. Default: 514.

To view logged system messages locally, navigate to the menu *Maintenance*

Services

The Services page is divided into 3 sections:

- **HTTP setting**s – to setup HTTP port on the LigoPTP UNITY.
- **SSH settings** – to setup SSH port on the LigoPTP UNITY.
- **SNMP configuration** – To enable SNMP and setup SNMP on the LigoPTP UNITY.
- **WNMS configuration** – to enable and setup WNMS agent on the LigoPTP UNITY unit.
- **System alerts** – to enable and configure system alerts on the LigoPTP UNITY.

HTTP Settings

Use this menu to control HTTP connection on the LigoPTP UNITY unit's web management:

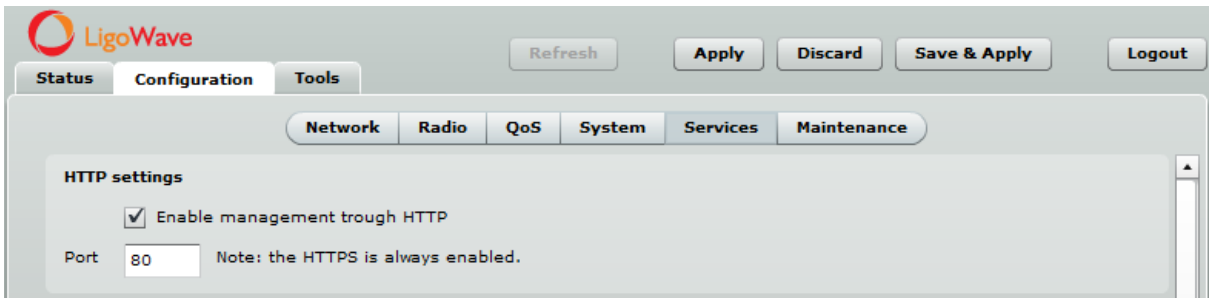


Figure 43 – HTTP Settings Configuration

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

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

SSH Settings

Use this menu to manage access to the LigoPTP UNITY unit via SSH port::

Figure 44 – SSH Settings Configuration

Enabled – enable or disable SSH access to device.

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

SNMP Configuration

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

To communicate with SNMP manager you must configure SNMP communities and identifiers on both ends (manager and agent).

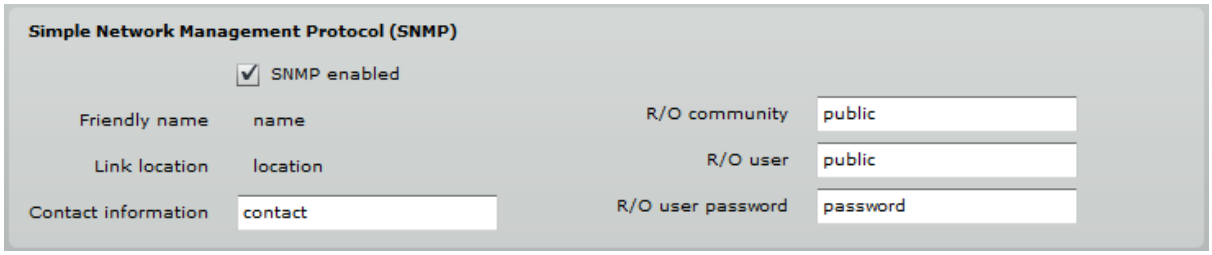


Figure 45 – SNMP Settings Configuration

Enable SNMP – specify the SNMP service status.

Friendly name – displays name of the PTP unit that will be used to identify the unit. This name has the same value as Friendly name in the *Link Settings*.

Link location – displays the physical location of the device. This name has the same value as Link location in the *Link Settings*.

Contact information – specify the identification of the contact person for this managed device, together with information on how to contact this person.

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

R/O user – specify the user name for read-only SNMPv3 access [string]. The read-only community allows a manager to read values, but denies any attempt to change values.

R/O user password– specify the password for read-only SNMPv3 access [string].

WNMS Configuration

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

Figure 46 – WNMS Agent Configuration

Enable WNMS – select to enable WNMS agent settings.

Server/Collector URL – specify the URL of the WNMS server that heartbeat notifications will be sent to.

Test – click to test is the indicated WNMS server's address reachable or not.

System Alerts

The PTP unit is able to send external alerts when there are system errors. The alerts can be sent via SNMP Traps or/and SMTP notifications.

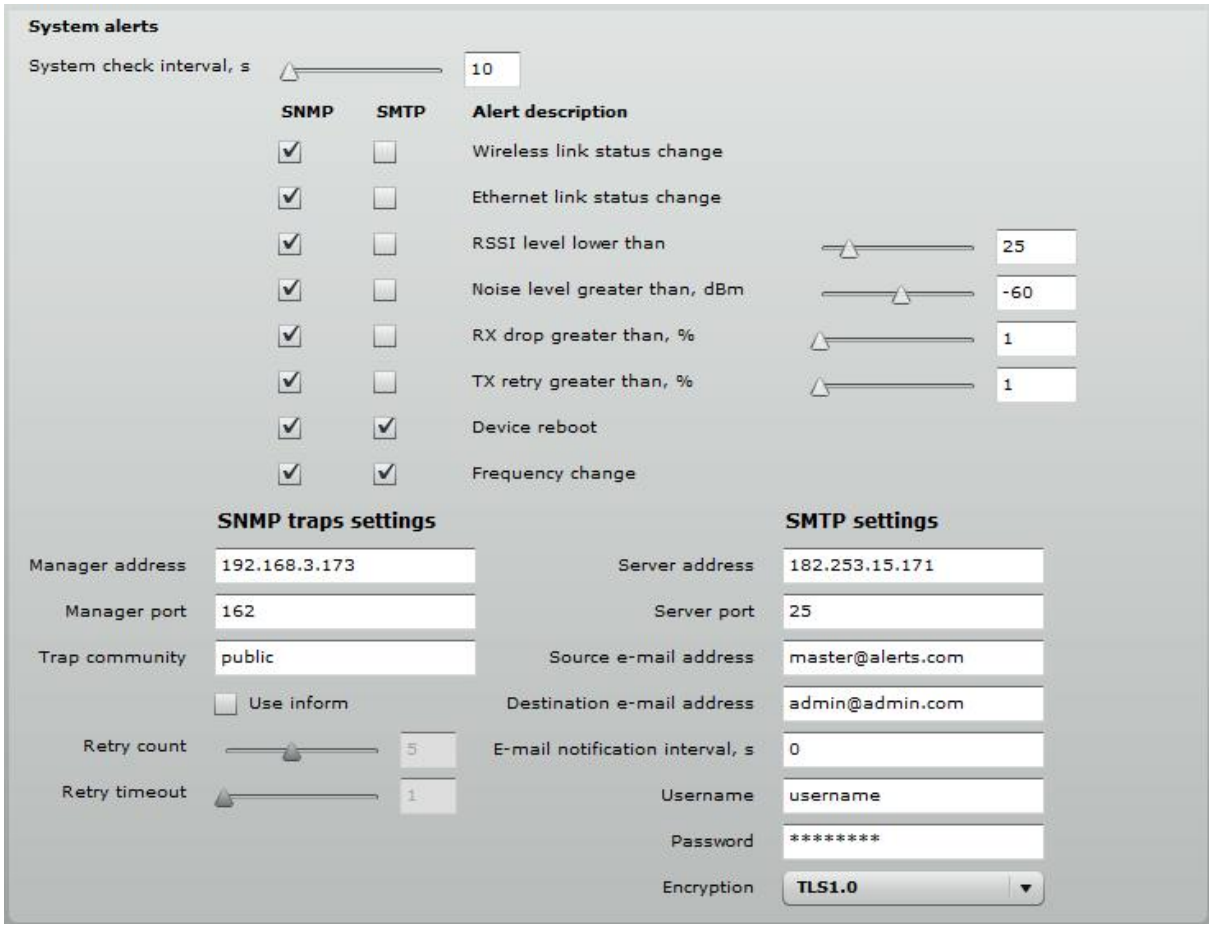


Figure 47 – System Alerts Configuration

System check interval, s – specify interval in seconds at which the device will send notifications of unexpected system behavior.

System alerts:

- **Wireless link status change** – system will send notification on Wireless link status change.
- **Ethernet link status change** – system will send notification on Ethernet link status change.
- **RSSI level lower than** – system will send notification when RSSI reach value lower than specified. Default: 25.
- **Noise level greater than** – system will send notification when signal noise will reach value greater than specified. Default: -60 dBm.
- **RX drop greater than** – system will send notification when the specified percent of RX dropped packets becomes higher than specified value.
- **TX retry greater than** – system will send notification when the specified percent of TX retries becomes higher than specified value.
- **Device reboot** – system will send notification about unexpected or administrator initiated device reboot.
- **Frequency change** – system will send notification on DFS channel change.

SNMP Traps Settings

Manager address – specify the IP address or hostname of Trap receiver.

Manager port – specify the port number of the Trap receiver. Default port number is 162.

Trap community – specify the SNMP community string. This community string acts as password between SNMP manager and PTP unit. by default Trap community string is "public".

Use inform – select to wait for an acknowledgment from SNMP manager that trap was received.

Retry count – specifies maximum number of times to resend an inform request [1-10]. Default: 5.

Retry timeout – specifies number in seconds to wait for an acknowledgment before resending request [1-10]. Default: 1.

SMTP Settings

Server address - specify the IP address or hostname of the networked SMTP server.

Server port - specify the SMTP Port Number is the port number used by the networked SMTP server. By default the port number is 25.

Source e-mail - specify the e-mail address that will be used by the LigoPTP UNITY unit.

Destination e-mail - specify the e-mail address where the LigoPTP UNITY unit will send the alert messages.

E-mail notification interval - specify interval in seconds at which the e-mail notification will be sent from the LigoPTP UNITY unit [0-86400]. If 0 specified, then device will send an e-mail notification immediately after unexpected system behavior.

Username - provide the user name required to access the SMTP server.

Password - provide the password required to access the SMTP server.

Encryption - select the encryption method of SMTP authentication: none, TLS 1.0 or SSL 3.0

Maintenance

Use Maintenance menu for device firmware update, reboot, reset device to factory defaults, troubleshooting file download, view system log messages and control OLED.

System Functions

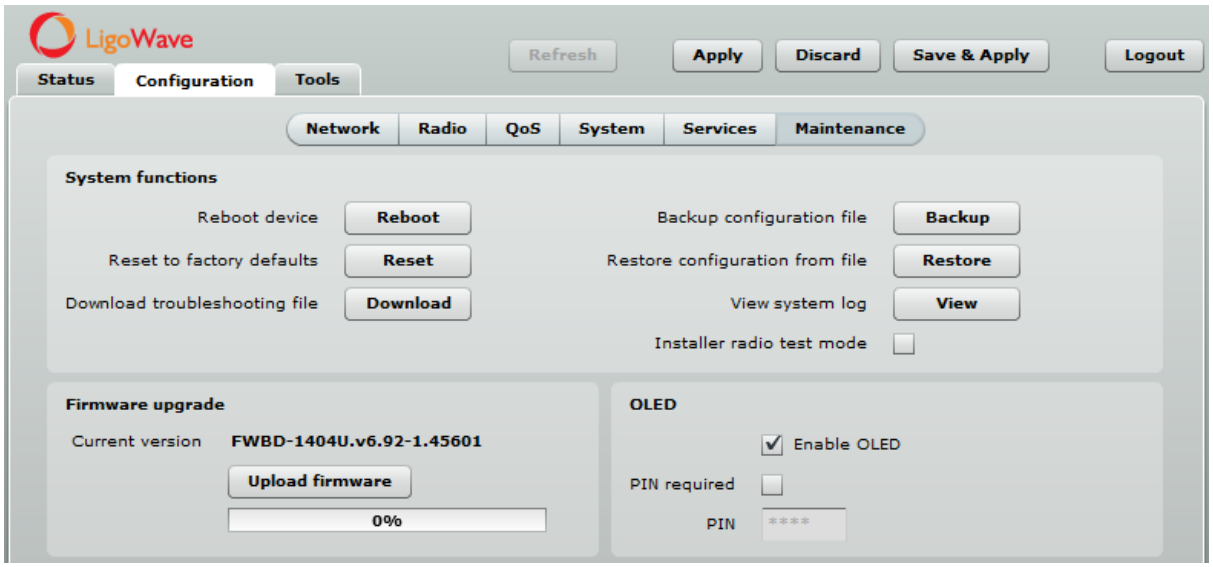


Figure 48 – Main System Functions

Reboot device – reboot device with the last saved configuration.

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

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

Download troubleshooting file – click to download the troubleshooting file. The troubleshooting file contains valuable information about device configuration, routes, log files, command outputs, etc. When using the **troubleshooting file,** the 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.

Backup configuration file - 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 manually configure each device through the web interface..

Restore configuration from file - click to upload an existing configuration file to the device.

View system log – click to view current trace messages. The Syslog 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. The syslog capability can help operators to locate misconfiguration and system errors.

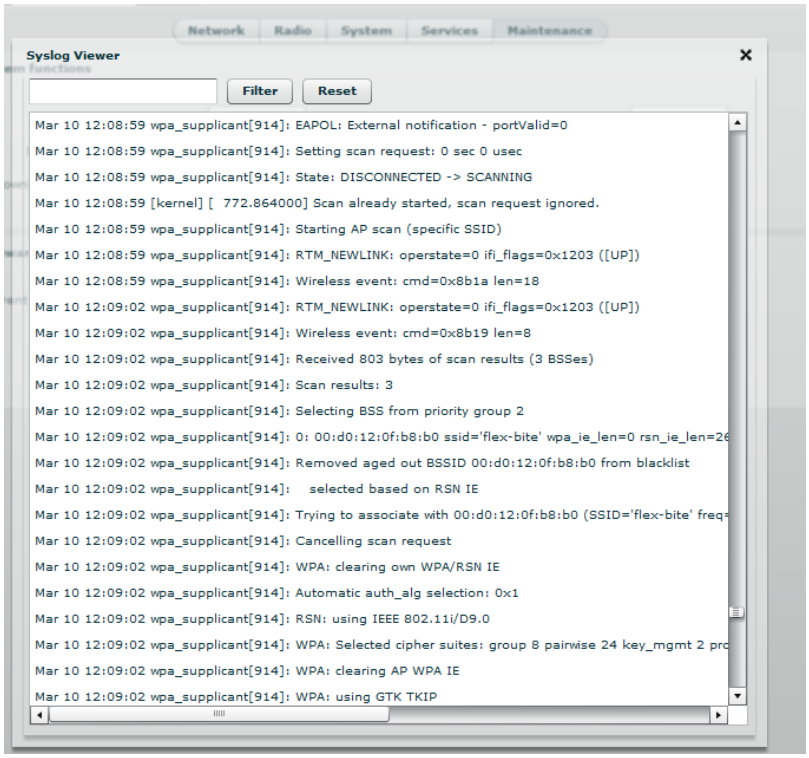


Figure 49 – System Log Viewer

Filter – filter content of the system messages by entering required words or symbols.

To change level of the system messages displayed in the Syslog viewer use menu *System Log.*

Installer radio test mode – select to enable Installer radio test mode. If enabled, responsibility for the compliance of the PTP unit performance with the regulatory rules must be taken by the installer.

OLED Control

Use this section under Maintenance tab to control status or assign a PIN code for the PTP unit's OLED:

Figure 50 – OLED Control

Enable OLED – select to enable or disable OLED on the PTP unit.

PIN required – select to enable or disable OLED protection with PIN.

PIN – enter 4 digits for OLED protection.

Firmware Upgrade

To update your device firmware use the **Firmware upgrade** section under the **Maintenance** menu, select the firmware file and click the **Upload** button:

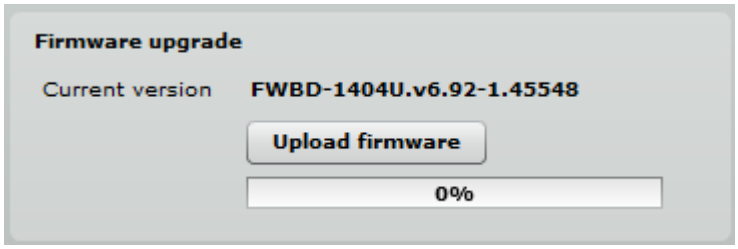


Figure 51 – Firmware Upload on the System

Current version – displays version of the current firmware.

Upload firmware – click the button to select the new firmware image for uploading it to the device..

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

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

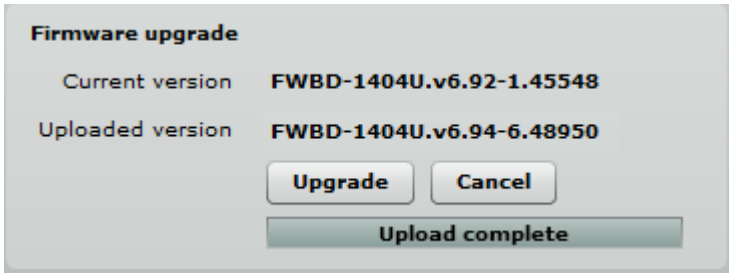


Figure 52 – Firmware Upgrade

Upgrade – 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 update process as the device could be damaged.

Tools

Use the Tools menu to use the following device applications:

- **Site survey** – to view the list of wireless networks in the surrounding area.
- **Antenna alignment** – to align device antenna.
- **Link test** – to check quality of the established PTP link.
- **Spectrum analyzer** – to choose the best available frequency/channel for the unit operation.

Antenna Alignment

The antenna alignment test measures signal quality between the Master and Slave units. 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 in the antenna alignment test window as you adjust the antenna.

The Antenna Alignment test results appear when you click the **Start** button and finishes when you click the **Stop** button.

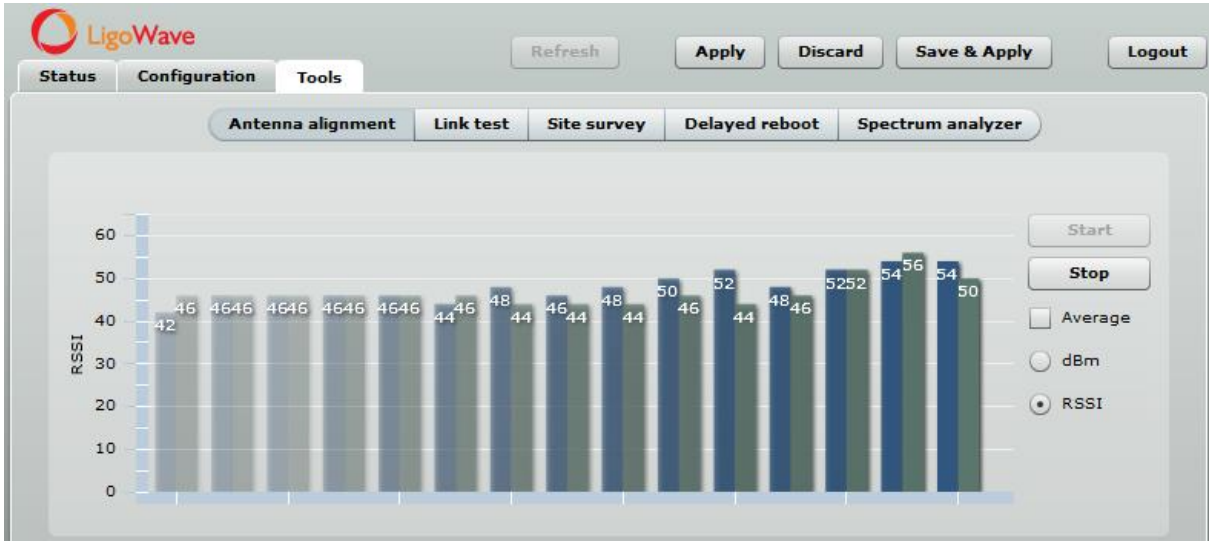


Figure 53 – Antenna Alignment Tool

Average – if this option selected, the graph will display the average RSSI of both antennas.

Link Test

We recommend 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 UNITY link. This tool tests the throughput at selected packet sizes and iterations. Link test can be run from either the Remote unit or Local unit. Results represent the maximum, minimum and average value of the performed test.

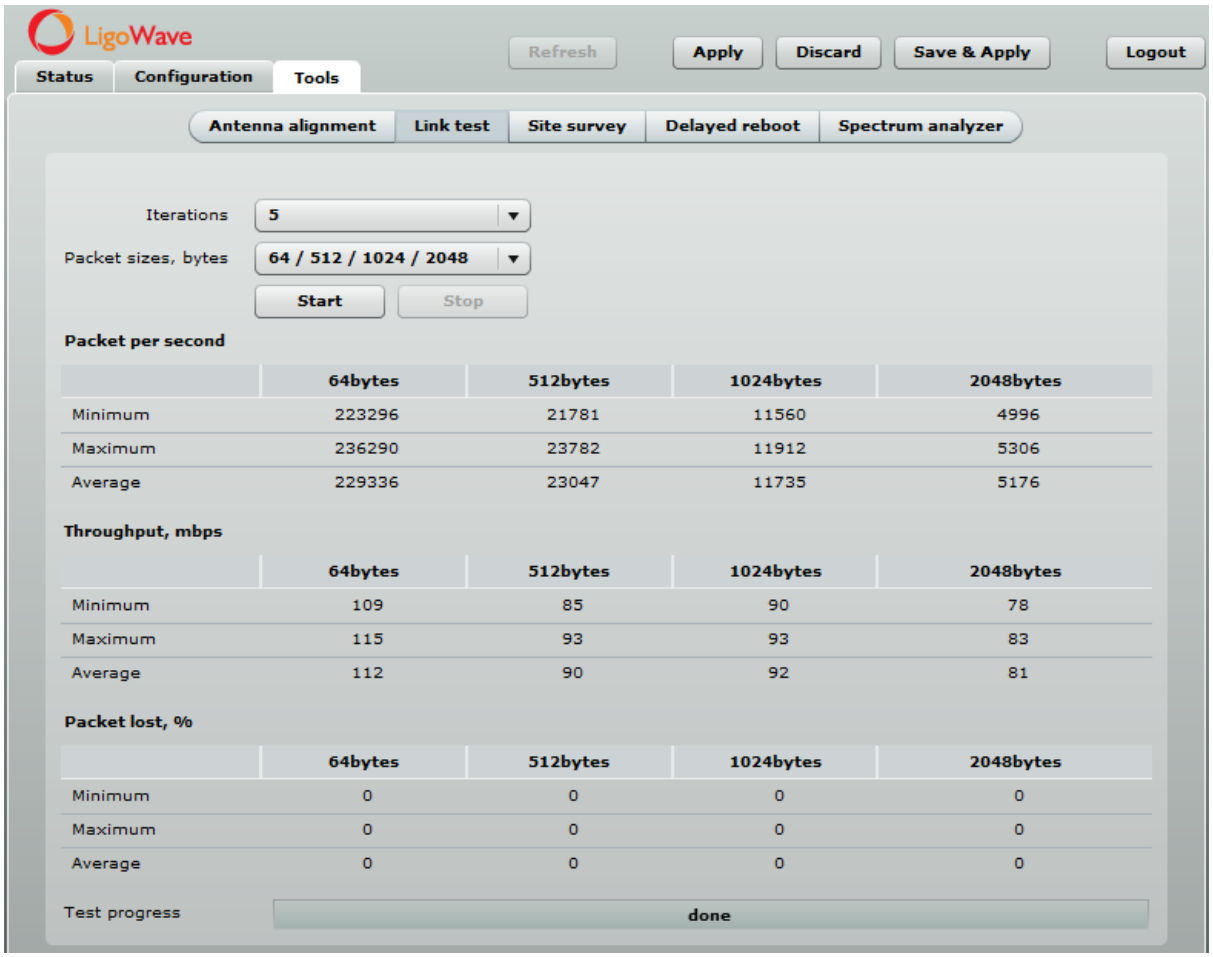


Figure 54 – Link Test Tool

Iterations – specify number of test iterations.

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

Start – click to start the throughput test.

Stop – click to stop the throughput test.

Site Survey

The **Site Survey** test shows overview information for wireless networks in a local geographic area.

Using this test, an administrator can scan for working access points, check their operating frequency, encryption, see signal/noise levels and view whether device has enabled W-Jet or not. This feature may be used by the administrator find unused wireless channel so that PTP unit would not interference with adjacent working devices thus getting best possible performance.

Note that Site Survey function can take several minutes to perform.

To perform the Site Survey test, click the **Start scan** button:

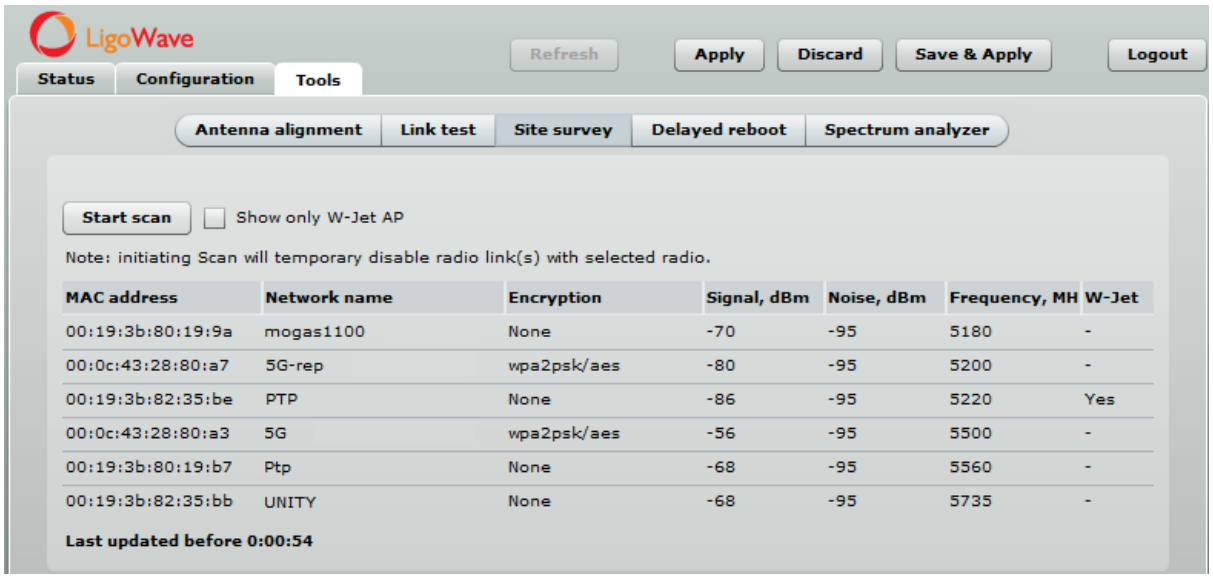


Figure 55 – Site Survey Tool

Start scan – click to perform the Site Survey test.

Show only W-Jet AP – select this option to sort Site Survey results.

Delayed Reboot

This tool is extremely useful while tuning radio settings – once you defined hypothetical radio parameters and set them with **Apply** button (not written to the permanent memory), device starts operating with the new settings, and in case the LigoPTP UNITY link fails, device will be rebooted in specified minutes, thus the old settings will be set back.

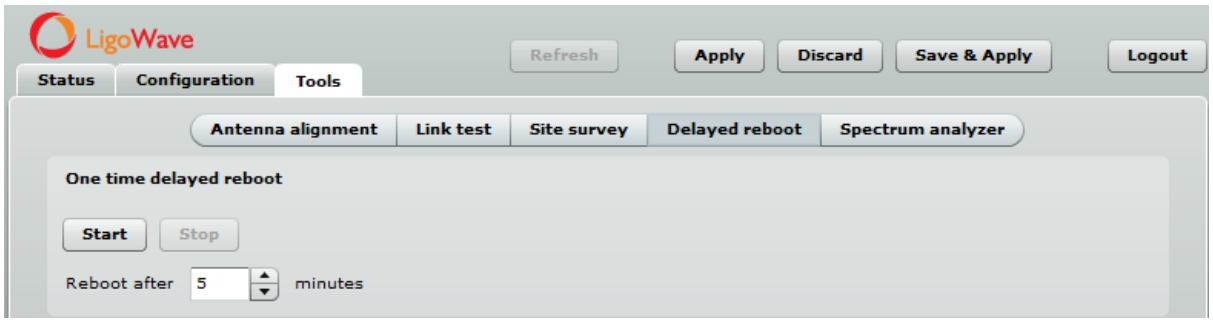


Figure 56 – Delayed Reboot Tool

Reboot after – specify time in minutes, after which the device will be rebooted.

Start/Stop – click to start or stop delayed reboot tool.

Spectrum Analyzer

The **Spectrum analyzer** test displays detailed information about signal level of each LigoPTP UNITY 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.

Do not use the Spectrum analyzer on the remote unit of the link, as the connection to the device will be lost during the test.

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

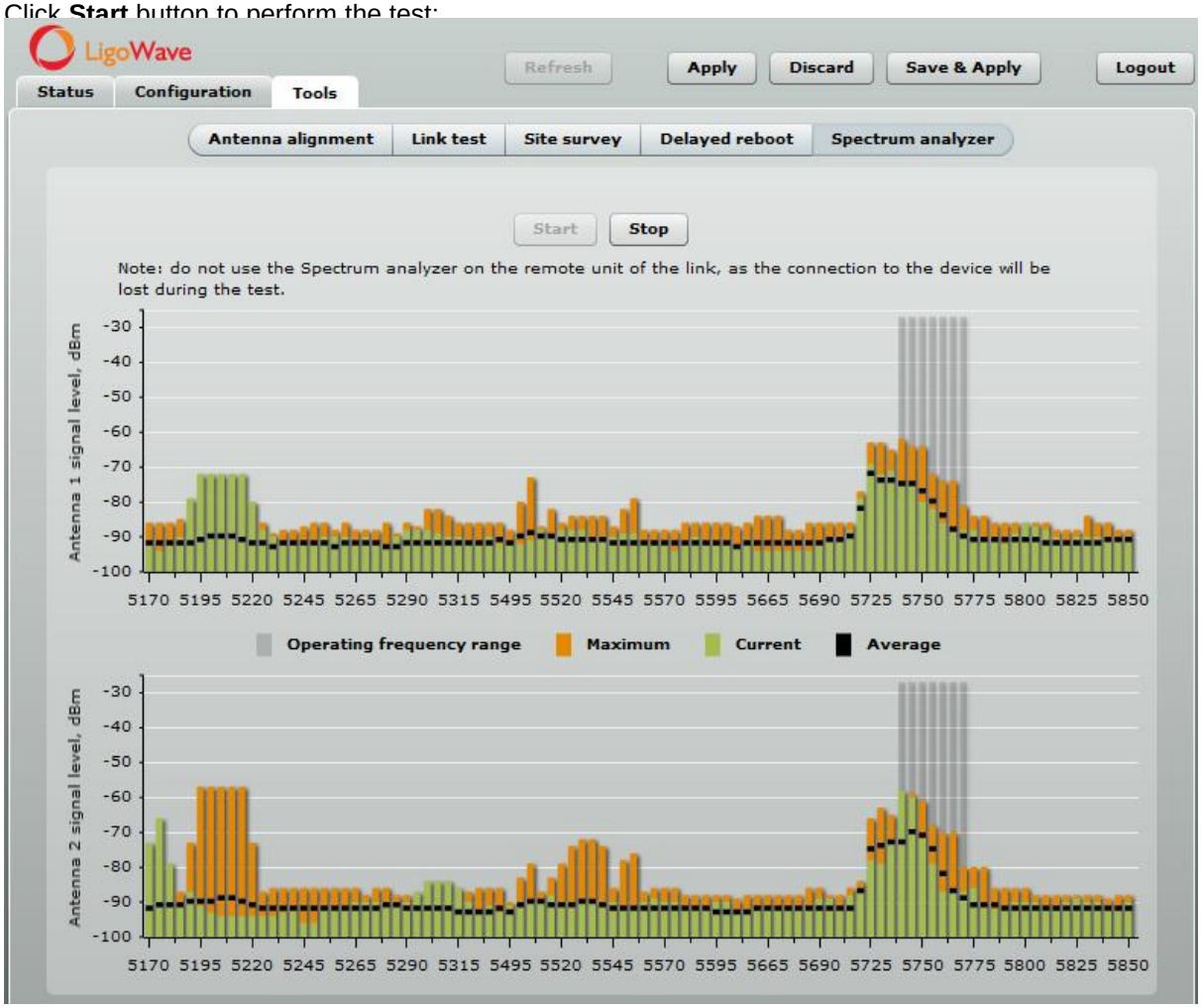


Figure 57 – Spectrum Analyzer

Operating frequency range – displays the channel frequency range at which the LigoPTP UNITY unit is operating currently.

Maximum – color indicates the maximum achieved signal level on the appropriate frequency.

Current – color indicates the current signal level on the appropriate frequency.

Average – indicates average of the signal level on the appropriate frequency.

Logout

Click the **Logout** link on the top right corner of the main menu to leave the Web management interface:

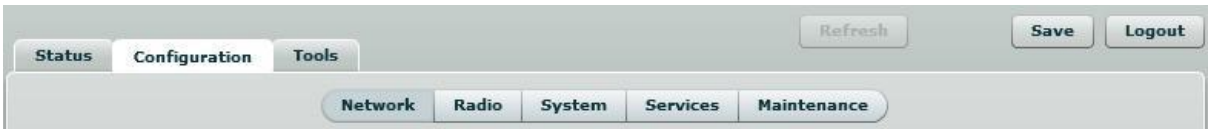


Figure 58 – Logout Page

Logout – click to leave the PTP unit Web management.

When the **Logout** button is clicked, the administrator is redirected to the login page of the PTP unit.

OLED Control

This chapter provides information about OLED Control. Please note that this description applies for units with integrated OLED only.

OLED States

During power up the LigoPTP UNITY unit will display its state in OLED screen:

Loading... – string being printed from the OLED display control board to indicate the moment device was powered.

Booting... – string being printed from kernel and must appear as quickly as possible after powering up the device.

Locked… – string appears after OLED has been locked and has been awakened from sleep mode Press and hold SET button for 3 seconds to unlock the OLED. After 3 seconds the OLED notifies to release SET button, otherwise it locks again.

Sleep mode – the OLED display will be locked and the OLED screen will be turned off automatically after 5 minutes of inactivity. Press any key to activate OLED.

OLED Usage

There are 4 buttons on OLED. Two of them (MODE and SET) are functional keys; the other two keys are for navigation purpose.

Figure 59 – OLED Display

MODE – used for menu navigation.

SET – executes the particular action.

E.g. navigate to "Link test" menu using the arrow key, then press SET (S) key to enter the second level menu – throughput options by packet size. Change packet size using the MODE (M) button to 512 bytes and press the SET (S) key to execute throughput test action.

OLED Menu Structure

The 2 level OLED menu contains such functionality:

- Lock
- Alignment
- Link test
  - packet size 64
  - packet size 512
  - packet size 1024
  - packet size 2048

- Statistics
  - Wireless
  - W-Jet
  - Ethernet
  - Device status
  - IP
- Reset to defaults
- Reboot

BACK menu item, located at the end of each sub-menu, returns you to the first level menu. Use an arrow keys to navigate on the Back menu and then press SET (S) key.

The following diagram represents OLED menu structure and navigation:

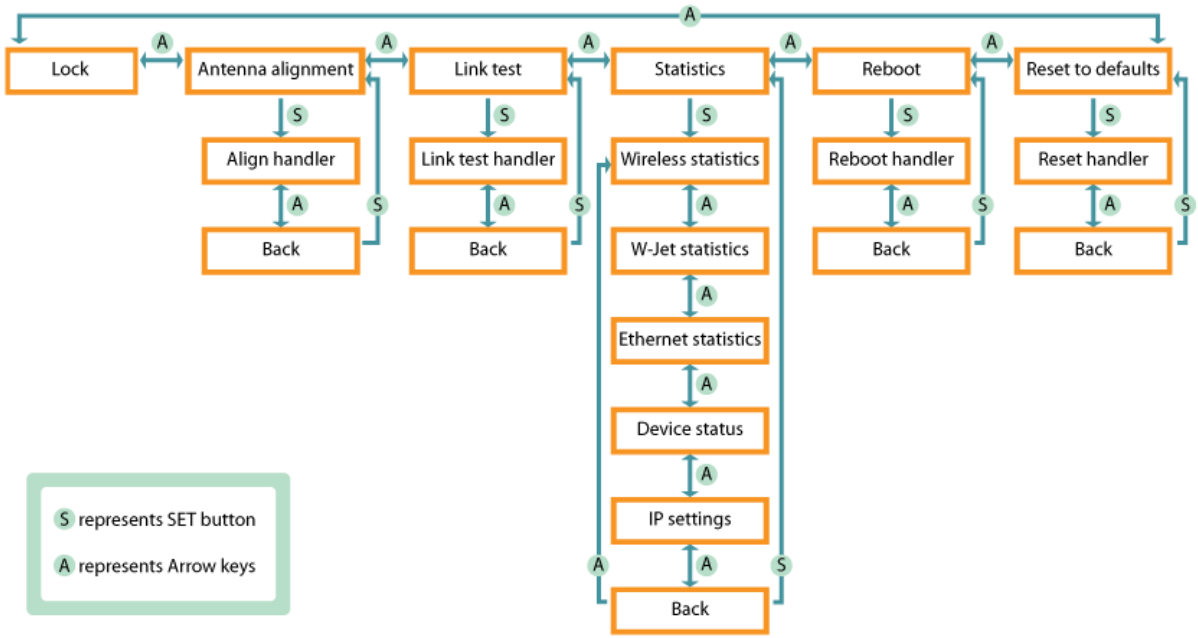


Figure 60 – Structure of the OLED Menu

OLED Functionality

If OLED is OFF it might be in a Sleep mode (press any key to wake-up) or disabled (refer at the corresponding section

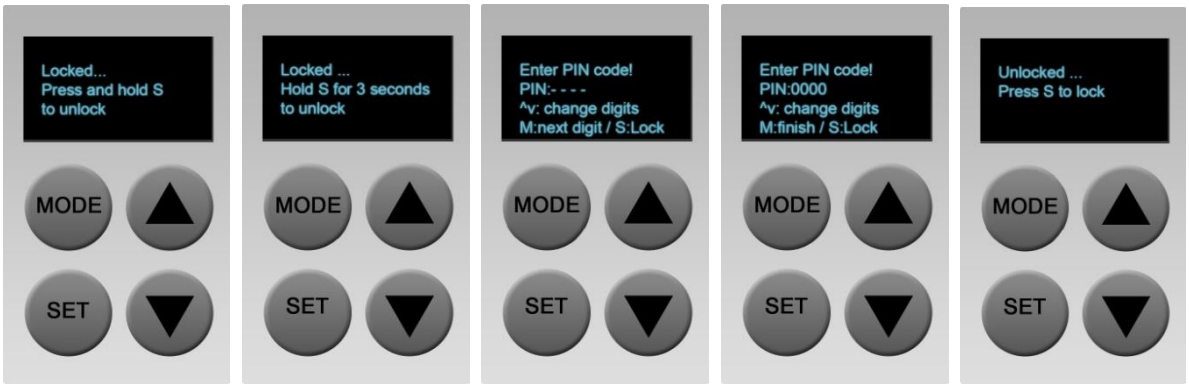
OLED Control on how to enable and set PIN code on PTP unit).

The short description of each menu screen is provided below.

Unlock the OLED

By default the OLED is locked to prevent an accidental OLED control. The OLED unlock procedure depends on either PIN code is enabled or not (refer at the corresponding section *OLED Control* on how to control OLED on PTP unit).

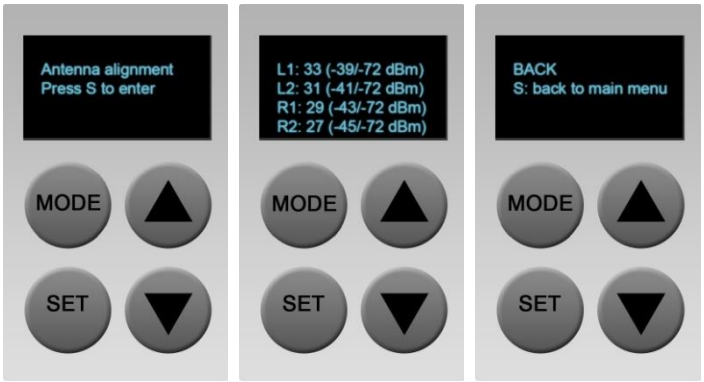
Press and hold SET (S) button for 3 seconds to unlock the OLED. After 3 seconds the OLED notifies to release SET button, and asks to enter a PIN code if required, otherwise it locks again. Use arrow keys to set a required number and confirm it by pressing MODE (M) key.



If the specified PIN code is incorrect, the user will be informed with the string "Wrong PIN".

Run Antenna Alignment

The Antenna alignment will show RSSI (Signal strength / Noise level dBm) in numbers of both sides (where L means Local and R means Remote unit) if link is established. In case the device has 2 antennas, the information of each of them will be displayed.



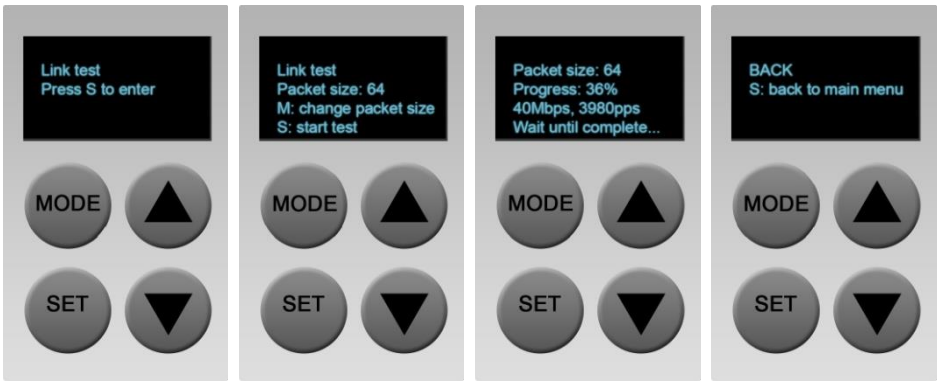
L1, L2 stands for local unit antenna 1 and antenna 2.

R1, R2 stands for remote unit antenna 1 and antenna 2.

To return to the upper level menu, use an arrow key to navigate to the Back menu and then press SET (S) key.

Run Link Test

This menu contains throughput test handlers that performs a link throughput test with the chosen packets size (64, 512, 1024, 2048 bytes). Press MODE (M) key to choose the packet size and SET (S) key to start the test. Running this test will take several seconds (progress in % is displayed while test results are loading).



If PTP link is not established, the Link test menu displays the corresponding message "PTP connection is lost".

To return to the upper level menu, use an arrow key to navigate to the Back menu and then press SET (S) key.

Statistics

The status menu consists of 5 submenus and the sixth Back menu to return to the upper level menu:

Wireless menu displays link wireless statistics: frequency, channel width, data rate at which the link communicates, and TX power of Local and Remote units (L/R).

If the statistics value length is high and can't fit into the OLED's display, the value shall be divided by 10^3, 10^6 or 10^9 and the additional letter K, M or G shall be added then (e.g. TX: 40K/234M)

If the PTP link is not established, no counters of the W-Jet statistics will be displayed, the string "---" will be shown instead (e.g. TX power: 20/--- dBm).

W-Jet menu displays Local and Remote (L/R) sides W-Jet statistics: TX (Tx packets), RX (Rx packets), Duplicated packets, and Retry count.

If the statistics value length is high and can't fit into the OLED's display, the value shall be divided by 10^3, 10^6 or 10^9 and the additional letter K, M or G shall be added then (e.g. TX: 40K/234M)

If the PTP link is not established, no counters of the W-Jet statistics will be displayed, the string "---" will be shown instead.

Ethernet menu displays Ethernet statistics. The statistics contains information about RX and TX throughput in Mbps, RX and TX packets per second (pps), RX and TX errors per second. The Ethernet configuration is displayed in the following format:

<speed>/<duplex> <AUTO|FIXED> <link-status>", where:

<speed> is either 10, 100, 1000 (if possible);

<duplex> is FD/HD (full or half duplex);

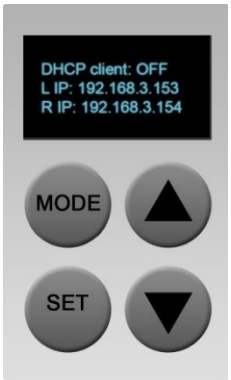
<AUTO|FIXED> is either AUTO (auto negotiating) or FIXED (auto negotiating is disabled)

<link status> is ether "UP" or "DOWN".

The rest statistics contains info: RX and TX throughput in Mbps, RX and TX pps (packets per second)

Device menu contains information about CPU load, Free memory and Firmware version:

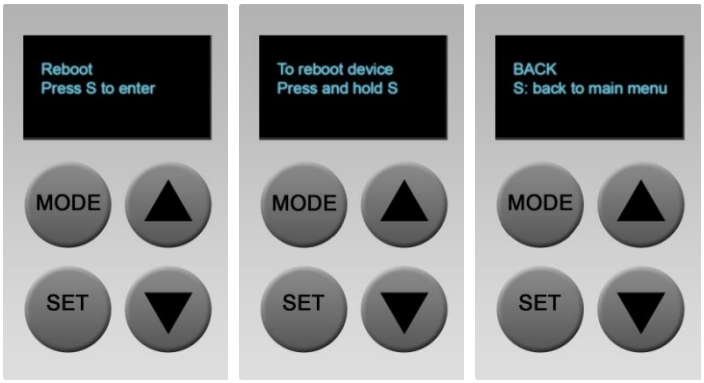
IP settings menu displays DHCP status and current IP addresses of Local and Remote units.



To return to the upper level menu, use an arrow key as a Back button and then press SET (S) key.

Reboot

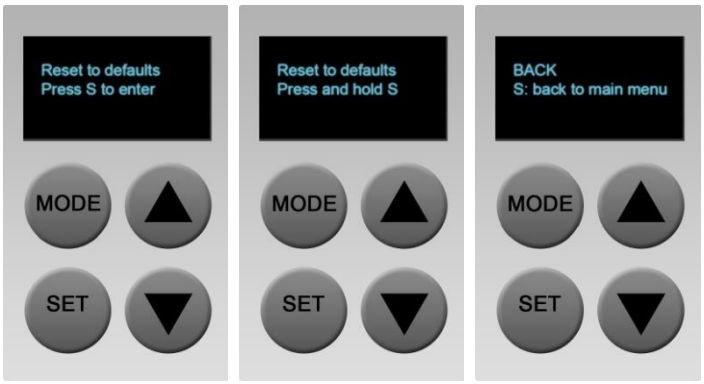
Use this menu to reboot the PTP unit after confirmation:



To return to the upper level menu, use an arrow key as a Back button and then press SET (S) key.

Reset to Defaults

Use this menu to reset PTP unit to factory defaults. Press SET key to start reset process.

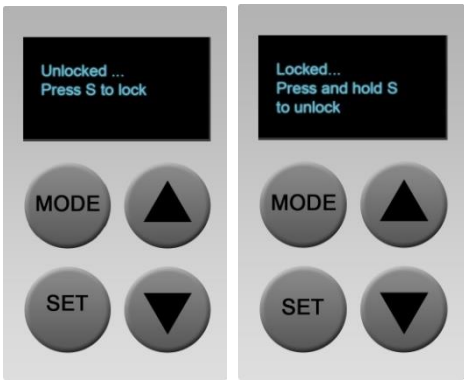


To return to the upper level menu, use an arrow key as a Back button and then press SET (S) key.

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

Lock the OLED

The OLED display will be locked and the OLED screen will be turned off automatically after 5 minutes of inactivity. To lock OLED display manually, use arrow keys to navigate on Unlocked menu and press SET (S) key.



Appendix

Resetting LigoPTP UNITY Unit to Factory Defaults

PTP units have the capability of being reset to defaults by pinging the device with a certain packet size when the radio is booting. During the startup of the device, when the drivers of the ethernet interfaces are loaded, the discovery daemon is started. The daemon suspends startup process for 3 seconds and waits for ICMP "`echo request`" packet of length 369 bytes. If the packet received, the daemon resets the device to default configuration.

It is recommended to connect PC to the device via switch, as depending on PC OS settings, the ARP table might be flushed during wired link status change (connecting the device that will be reset).

Steps to reset to default settings:

Step 1. Power off the device.

Step 2. Obtain the device MAC address.

Step 3. Connect a PC to the same physical subnet as the device.

Step 4. Execute 'arp -s' command to assign the IP address (IP address should be from the same subnet as PC) to the device MAC address:

```
arp -s <IP address to assign> <device MAC address>
```

Note that syntax of MAC address differs depending on OS:

- Linux OS: AA:BB:CC:DD:EE:FF
- Windows OS: AA-BB-CC-DD-EE-FF

Step 5. Start pinging the device:

For Linux users: ping <IP address> -s 369

For Windows users: ping <IP address> -l 369 -t -w 200

Step 6. Power up device and wait about 30sec or more (depending on device hardware).

Step 7. Stop pinging the device, and let the device boot as usual. The device should start up with factory default settings.