



LigoWave

LigoPTMP

User Guide

Revision 1.0
June 7, 2017

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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 implementing 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 of the requirements of 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 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 followed 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 the 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 the installation, setup, configuration, and management of the LigoPTMP 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, the LigoPTMP device obtains the IP address from the DHCP server. Follow the steps to access a device on different OS:

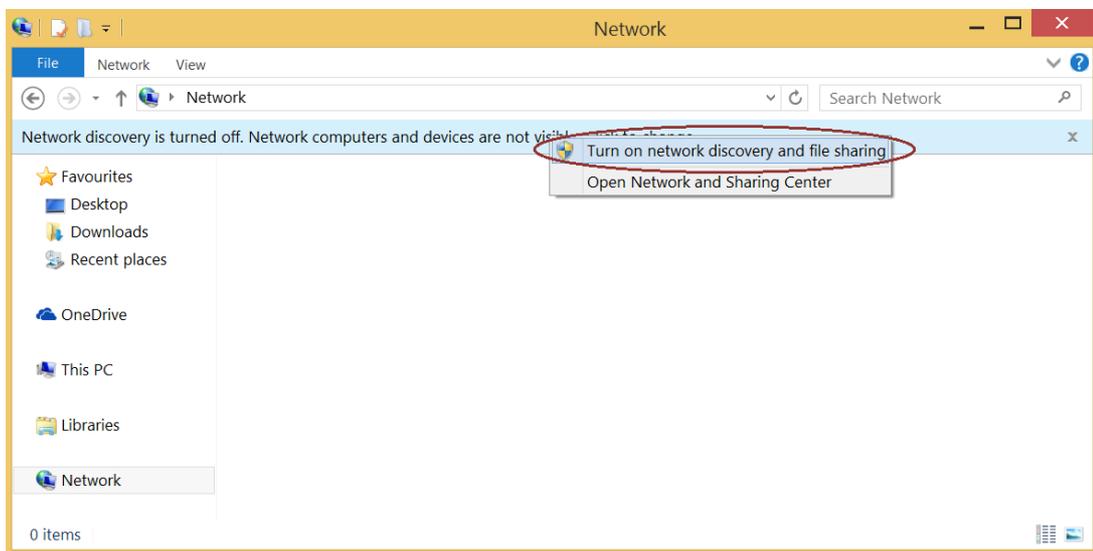


In case the LigoPTMP device is unable to obtain IP address from a DHCP server, it reverts to the default static IP 192.168.2.66.

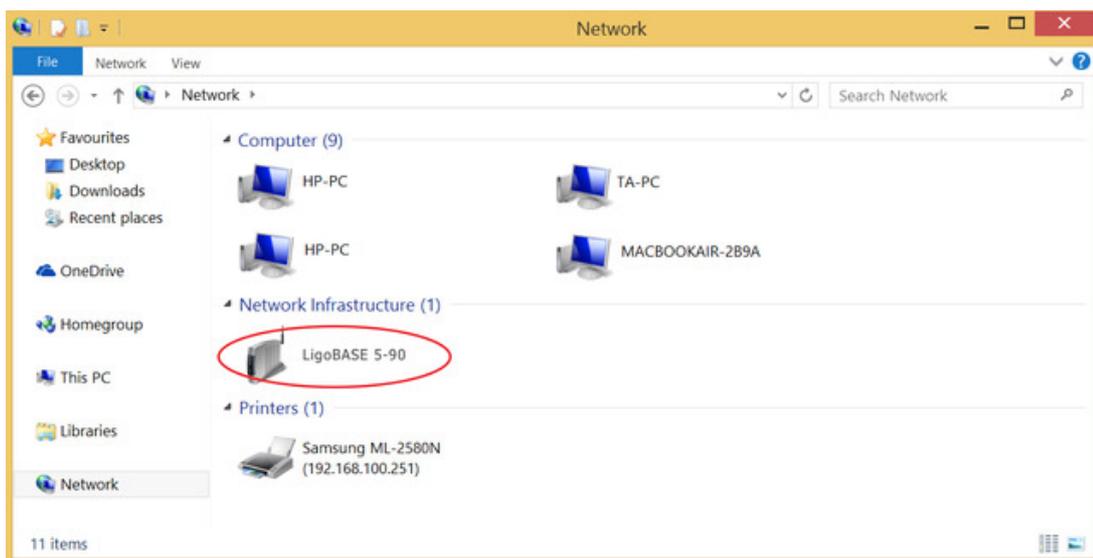
Windows OS

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

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



Step 3: Find the required LigoPTMP device icon:

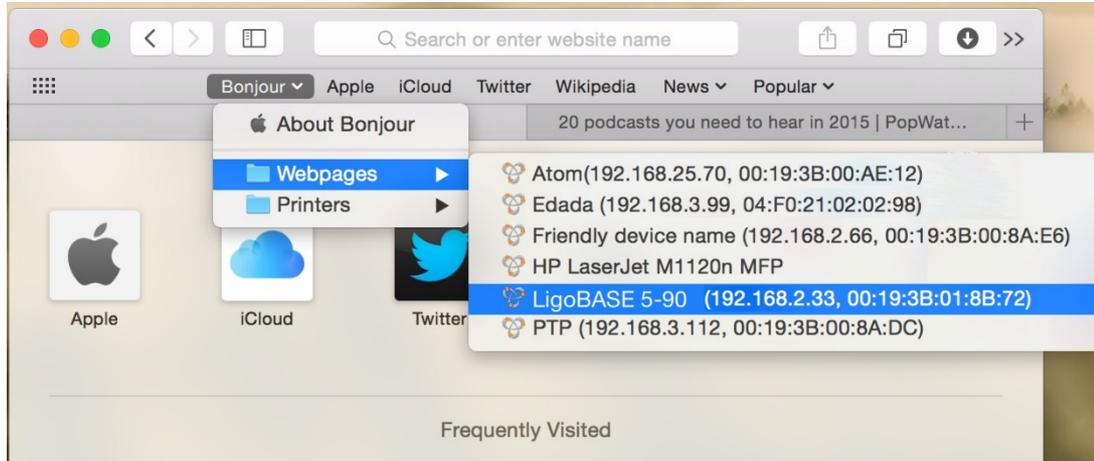


Step 4. Double-click on the device icon. You will be redirected to the device's webpage automatically.

MAC OS

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

Step 2: Run the Safari **Bonjour** application, click on **Bonjour/Webpages** in the Favorites bar (may need to be enabled in the Safari settings) and find the required LigoPTMP device name:



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

Linux (Ubuntu)

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

Step 2: Open terminal application GNOME Terminal (or Konsole for Kubuntu) and type the 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 LigoBASE 5-90 (192.168.2.33, 00:19:3B:01:8B:72) 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 LigoBASE 5-90 (192.168.2.33, 00:19:3B:01:8B:72) Web Site local
hostname = [LigoBASE 5-90 -008ADA.local]
address = [192.168.2.33]
port = [80]
txt = []
```

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

First access to Web management interface

Follow the steps for first connection to the LigoPTMP device's Web management interface:

Step 1. Start your Web browser.

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

The screenshot shows the LigoWave web management interface. At the top, there is a progress bar with five steps: START (selected), DEVICE SETUP, CONFIGURATION, DISCOVERY, and FINISH. Below the progress bar, the product name is 'LigoBase 5-90' and the serial number is '0B1B16130000A6B'. The firmware version is 'PTMP.MA-1.v7.55.42728 (Update)' and the MAC address is '00:19:3B:09:E2:71'.

The main content area is titled 'START' and includes a 'UI Language' dropdown menu set to 'English'. Below this is a 'User agreement' section with the following text:

- The correct country code must be selected before using the equipment to meet the regulatory requirements for authorized channels, channel width, output power, Dynamic Frequency Selection (DFS) and Automatic Transmit Power Control (ATPC).
- Installer or equipment owner takes all responsibility for proper product usage according to the regulatory rules.
- Vendor or distributor/reseller is not responsible for illegal wireless equipment operation.

 There is a checkbox labeled 'I have read and agree' which is checked. Below the agreement is an 'Operating country' dropdown menu set to 'United States'. There is a '5 GHz Antenna gain, dBi' input field with the value '16'. At the bottom, there is a 'Usage scenario' dropdown menu set to 'Point to Multipoint (PTMP)'. A 'Next' button is located in the bottom right corner.



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's web management interface. The device is now ready for configuration.

Remote wireless Web management interface access



Only the **LigoBase** (Master) units have the remote wireless management mode.

This is the easiest way to access the newly installed LigoBase device Web management interface.

Step 1. Click and hold the multifunction button for 3s, which is located on the back panel of the LigoBase unit to switch the device to remote wireless management mode (it will be switched off automatically in 5 minutes of wireless inactivity). The blue **MNG** LED should be on, meaning that the wireless management mode is enabled.

Step 2. Scan for wireless devices using your phone/tablet and choose the LigoBase wireless network name, which is LigoWave-mng-AABBCC (whereby AABBCC are the last three bytes of the particular LigoBase MAC address).



Step 3. Launch the browser application and type the default LigoBase IP address 192.168.111.1 in the address field.

Step 4. The setup wizard screen of the Web management interface appears. The LigoBase is now ready for configuration.

LigoPTMP Link Guided Setup

The LigoPTMP series multipoint system consists of two types of units: a Master (LigoBase series) and at least one Slave (LigoSU series units).

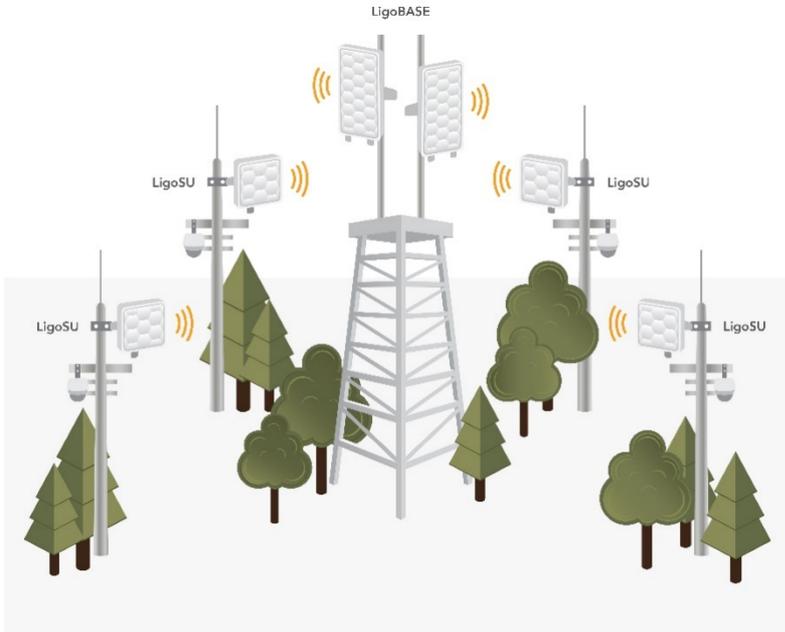


Figure 1: the LigoPTMP system

If the radio settings of the LigoPTMP Master and Slave units are met (and the units are properly aligned upon installation), the wireless link will automatically establish itself and the traffic will begin to pass between the Master and the Slaves.



Before installing the PTMP link on the field, it is recommended to configure the devices in the office.

After the first login to the LigoPTMP unit's Web management interface, the setup wizard provides simplified options to help you quickly get your LigoPTMP link up and running.

Click the **Guided setup** button to start the LigoPTMP unit's installation:

Product name: LigoBase 5-90 Serial number: 0B1B16130000A6B
Firmware version: PTMP.MA-1.v7.55.41097 (Update) MAC address: 00:19:3B:09:E2:71

START

UI Language: English

User agreement
The correct country code must be selected before using the equipment to meet the regulatory requirements for authorized channels, channel width, output power, Dynamic Frequency Selection (DFS) and Automatic Transmit Power Control (ATPC).
Installer or equipment owner takes all responsibility for proper product usage according to the regulatory rules.
Vendor or distributor/reseller is not responsible for illegal wireless equipment operation.

I have read and agree

Operating country: United States

5 GHz Antenna gain, dBi: 16

Due to FCC rules regarding the maximum EIRP please choose device usage scenario.
Usage scenario: Point to Multipoint (PTMP)

Next

Figure 2: the LigoPTMP guided setup



To set up the LigoPTMP unit manually, you can cancel this wizard at any time (not recommended).

Master’s guided setup

Follow the steps to set up the LigoBase unit—the Master unit of the LigoPTMP link. With this wizard, the administrator is able to set up the Master unit as well as scan the air, find the Slave units, and assign the required settings, thus creating the LigoPTMP link.

Step 1. Open the LigoBase Web management interface, accept the user agreement, choose the **Operating country** and click **Next**:

LigoWave

START

Product name: LigoBase 5-90 Serial number: 0B1B161300000A6B
Firmware version: PTMP.MA-1.v7.55.41097 (Update) MAC address: 00:19:3B:09:E2:71

START

UI Language: English

User agreement

The correct country code must be selected before using the equipment to meet the regulatory requirements for authorized channels, channel width, output power, Dynamic Frequency Selection (DFS) and Automatic Transmit Power Control (ATPC).
Installer or equipment owner takes all responsibility for proper product usage according to the regulatory rules.
Vendor or distributor/reseller is not responsible for illegal wireless equipment operation.

I have read and agree

Operating country: United States

5 GHz Antenna gain, dBi: 16

Due to FCC rules regarding the maximum EIRP please choose device usage scenario.
Usage scenario: Point to Multipoint (PTMP)

Next

Step 2. Choose the **Guided** device setup mode and click **Next**:

LigoWave

START DEVICE SETUP CONFIGURATION DISCOVERY FINISH

Product name: LigoBase 5-90 Serial number: 0B1B161300000A6B
Firmware version: PTMP.MA-1.v7.55.42728 MAC address: 00:19:3B:09:E2:71

DEVICE SETUP

Please choose the configuration method for the current device:

Manual setup Guided setup Load from file

< Back Next >

Step 3. Specify the essential parameters of the Master unit and click **Next**:



Note that **Security** → **Password** is for securing the connection between LigoPTMP units as well as the password to log in to the Web management interface. This password must match on Master and Slave units.

LigoWave

START DEVICE SETUP **CONFIGURATION** DISCOVERY FINISH

Product name: LigoBase 5-90 Serial number: 0B1B16130000A6B
Firmware version: PTMP.MA-1.v7.55.42728 MAC address: 00:19:3B:09:E2:71

MASTER - SETUP

Friendly name: LigoBase 5-90 Contact information: Contact
Location: Location

Security

Password: *****

IMPORTANT: this password is used to manage all devices on the same wireless network and is also used to generate wireless connection security passphrase. On all devices in same wireless network it must be the same otherwise wireless link will not work.

Radio settings

Link ID: LigoPTMP link Channel selection: Auto / 40 MHz

Network settings

IP method: Dynamic

DHCP IP fallback

IP address: 192.168.2.66
Subnet mask: 255.255.255.0
Default gateway: 192.168.2.1

< Back Next >

Step 4. Connect the Slave units to the network unit as shown in the pictures below (choose one of the given connection options) and wait until the Slave units appear in the list of devices discovered by the Master at the bottom of the page:

LigoWave

START — DEVICE SETUP — CONFIGURATION — **DISCOVERY** — FINISH

Product name: LigoBase 5-90 Serial number: 0B1B161300000A6B
Firmware version: PTMP.MA-1.v7.55.42728 MAC address: 00:19:3B:09:E2:71

MASTER - DISCOVER DEVICES

To configure Slave devices automatically connect them as shown on the pictures below and wait until they appear in the list. List is updated automatically. Select Slave device and set its parameters. When finished or want to skip this step press Next button.

Wireless

Multiple LigoSU units can be connected to the LigoBASE

Wired

Multiple LigoSU units can be connected to the LigoBASE

Discovered devices: Waiting for slave devices

<input type="checkbox"/>	LigoSU 5-N	SN: 0C281613000009AA	MAC: 00:19:3B:09:E1:56	Media: cable
<input type="checkbox"/>	LigoSU 5-N	SN: 0C28161300000944	MAC: 00:19:3B:09:E0:8A	Media: cable

If all of your devices have connected, proceed to the next step.

[Back](#) [Apply configuration](#)



Note that **Discovered devices** list displays remote LigoPTMP devices having the default settings only. Devices that have already been configured will not be included in the list.

Step 5. Select the discovered Slave units under the list of discovered devices, assign the following parameters and click **Apply**:

Discovered devices: 2 Waiting for slave devices

<input checked="" type="checkbox"/>	LigoSU 5-N	SN: 0C281613000009AA	MAC: 00:19:3B:09:E1:56	Media: cable
Friendly name: <input type="text" value="Friendly device name"/>		IP address: Dynamic		
Location: <input type="text" value="Some location description"/>				

<input checked="" type="checkbox"/>	LigoSU 5-N	SN: 0C28161300000944	MAC: 00:19:3B:09:E0:8A	Media: cable
Friendly name: <input type="text" value="Friendly device name"/>		IP address: Dynamic		
Location: <input type="text" value="Some location description"/>		Antenna gain, dBi: <input type="text" value="23"/>		

If all of your devices have connected, proceed to the next step.

Step 6. Click **Apply configuration** and review the LigoPTMP link's assigned settings:

○ START ○ DEVICE SETUP ○ CONFIGURATION ○ DISCOVERY ○ **FINISH**

Product name: LigoBase 5-90 Serial number: 0B1B161300000A6B
Firmware version: PTMP.MA-1.v7.55.42728 MAC address: 00:19:3B:09:E2:71

FINISH

Password: LigoWave-link@@1 Operating country: US

Device

Operating mode: MASTER Friendly name: LigoBase 5-90
Location: Location

Radio

Link ID: LigoPTMP link Frequency, MHz: Auto
Channel width, MHz: 40

Network

IP method: Dynamic

Slave devices

Product name: LigoSU 5-N Serial number: 0C281613000009AA MAC address: 00:19:3B:09:E1:56	Friendly name: Friendly device name Location: Some location description
Product name: LigoSU 5-N Serial number: 0C28161300000944 MAC address: 00:19:3B:09:E0:8A Antenna gain, dBi: 23	Friendly name: Friendly device name Location: Some location description

You have successfully configured Your device.

Step 7. The LigoPTMP link is successfully configured. Check the parameters of the established LigoPTMP link on the **Status** → **Information** page:

The screenshot shows the LigoWave management interface. At the top, there are navigation icons and status indicators for ETH1 (100BaseT/full) and ETH2 (Disconnected). A red circle highlights the '2 stations' indicator. The main content area is titled 'INFORMATION' and contains several sections:

- General Information:** Product name: LigoBase 5-90, Serial number: 0B1B16130000A6B, Firmware version: PTMP.MA-1.v7.55.42728 (Update), System uptime: 26 min. 49 sec. Operating country: US (PTMP scenario), Friendly name: LigoBase 5-90, Device location: Location, Latitude/Longitude: 0 / 0, Height AGL, m: 0.
- Radio Section:** Operating mode: MASTER (circled in red), Max Tx data rate, Mbps: 400 (256-QAM 5/6), Frequency, MHz: 5735 (5725-5765), Channel width, MHz: 40, Tx power, dBm: 20, Antenna gain, dBi: 16, Noise level, dBm: -95/-95.
- Link ID:** LigoPTMP link (circled in red).
- Link Table:** A table with columns for Remote device, Link status, Tx power, dBm, Tx/Rx data rate, Mbps, Noise level, dBm, Signal level, dBm (Remote site), and Signal level, dBm (Local site). Two links are listed, both with 'UP' status.
- Network Section:** IP method: Dynamic, MAC address: 00:19:3B:09:E2:71, IP address: 192.168.3.203, Subnet mask: 255.255.255.0, Default gateway: 192.168.3.1, DNS server 1: 192.168.200.1, DNS server 2: 8.8.8.8, IPv6 method: Disabled.



The LigoPTMP unit is now running, but may require additional configuration to conform to your network’s operational requirements. Refer to the next chapter *LigoPTMP Configuration* in this manual for the information you need to complete the configuration.

Slave’s guided setup

Follow the steps in case you want to add new a Slave unit to the PTMP network. With this wizard, the administrator is able to set up the Slave unit to scan the air, find and connect the Master unit, thus creating the LigoPTMP link.

Step 1. Open the LigoSU Web management interface, accept the user agreement, choose the **Operating country** and click **Next**:

LigoWave

START ○ DEVICE SETUP ○ CONFIGURATION ○ FINISH

Product name: LigoSU 5-N Serial number: 0C28161300009AA
Firmware version: PTMP.QA-1.v7.55.40720 (Update) MAC address: 00:19:3B:09:E1:56

START

UI Language: English

User agreement

The correct country code must be selected before using the equipment to meet the regulatory requirements for authorized channels, channel width, output power, Dynamic Frequency Selection (DFS) and Automatic Transmit Power Control (ATPC).

Installer or equipment owner takes all responsibility for proper product usage according to the regulatory rules.

Vendor or distributor/reseller is not responsible for illegal wireless equipment operation.

I have read and agree

Operating country: United States

5 GHz Antenna gain, dBi: 20

Due to FCC rules regarding the maximum EIRP please choose device usage scenario.

Usage scenario: Point to Multipoint (PTMP)

Next

Step 2. Choose the **Guided** device setup mode and click **Next**:

LigoWave

○ START ○ **DEVICE SETUP** ○ CONFIGURATION ○ FINISH

Product name: LigoSU 5-N Serial number: 0C28161300009AA
Firmware version: PTMP.QA-1.v7.55.40720 MAC address: 00:19:3B:09:E1:56

DEVICE SETUP

Please choose the configuration method for the current device:

Manual setup **Guided setup** Load from file

< Back Next >

Step 3. Specify the essential parameters of the Slave unit: scan for the Master unit by using the already existing PTMP Link name and specify the PTMP link's password:

Product name: LigoSU 5-N Serial number: 0C28161300009AA
Firmware version: PTMP.QA-1.v7.55.40720 MAC address: 00:19:3B:09:E1:56

SLAVE - SETUP

Friendly name: LigoSU 5-20 Contact information: Contact
Location: Location

Security
Password: *****

IMPORTANT: this password is used to manage all devices on the same wireless network and is also used to generate wireless connection security passphrase. On all devices in same wireless network it must be the same otherwise wireless link will not work.

Radio settings
Link ID: LigoPTMP Channel width, MHz: 40

Network settings
IP method: Dynamic
DHCP IP fallback
IP address: 192.168.2.66
Subnet mask: 255.255.255.0
Default gateway: 192.168.2.1

SEARCH LINK ID

Enter keyword to filter results

Link ID	MAC	Signal, dBm	Frequency, MHz
LigoPTMP link	00:19:3B:09:E2:71	-36	5745

Last updated: 2017-06-05 17:41:43

Select Cancel

Apply configuration

i Note that **Security** → **Password** is for securing the connection between LigoPTMP units as well as the password to log in to the Web management interface. This password must match on Slave and Master units.

i Use the search button next to **Link ID** to conveniently scan for the Master device.

Step 4. Click **Finish** to enable the newly assigned settings for the Slave unit.



○ START ○ DEVICE SETUP ○ CONFIGURATION ○ FINISH

Product name: LigoSU 5-N

Firmware version: PTMP.QA-1.v7.55.40720

Serial number: 0C281613000009AA

MAC address: 00:19:3B:09:E1:56

FINISH

Password: LigoWave-link@@1

Device

Operating mode: SLAVE

Radio

Link ID: LigoPTMP link

Network

IP method: Dynamic

Operating country: US

Friendly name: LigoSU 5-20
Location: Location

Frequency, MHz: Auto
Channel width, MHz: 40

You have successfully configured Your device.

Finish

Step 5. After the setup process is successfully finished, you will be redirected to the Status | Information page. Check the parameters of the established LigoPTMP link:



ⓘ ⚙️ 🔧 📄

🔒 Ethernet: Disconnected Link quality (95 %)

ⓘ

INFORMATION

🔄

Product name: LigoSU 5-N

Serial number: 0C281613000009AA

Firmware version: PTMP.QA-1.v7.55.40720 (Update)

System uptime: 30 min. 33 sec.

Operating country: US (PTMP scenario)

Friendly name: LigoSU 5-20

Device location: Location

Latitude/Longitude: 0 / 0

Height AGL, m: 0

Radio

Operating mode: SLAVE

Max Tx data rate, Mbps: 400 (256-QAM 5/6)

Frequency, MHz: 5735 (5725-5765)

Channel width, MHz: 40

Link ID: LigoPTMP link

Tx power, dBm: 16

Antenna gain, dBi: 20

Noise level, dBm: -95/-95

		Remote site				Local site
Remote device	Link status	Tx power, dBm	Tx/Rx data rate, Mbps	Noise level, dBm	Signal level, dBm	Signal level, dBm
LigoBase 5-90 00:19:3B:09:E2:71	UP 11 min. 12 sec.	20	360/400	-95/-95	<div style="display: flex; justify-content: space-between;"><div style="width: 47%;"></div><div style="width: 47%;"></div></div> <div style="display: flex; justify-content: space-between;"><div style="width: 43%;"></div><div style="width: 43%;"></div></div>	<div style="display: flex; justify-content: space-between;"><div style="width: 41%;"></div><div style="width: 41%;"></div></div> <div style="display: flex; justify-content: space-between;"><div style="width: 43%;"></div><div style="width: 43%;"></div></div>

Network

IP method: Dynamic

MAC address: 00:19:3B:09:E1:56

IP address: 192.168.3.191

Subnet mask: 255.255.255.0

Default gateway: 192.168.3.1

DNS server 1: 192.168.200.1

DNS server 2: 8.8.8.8

IPv6 method: Disabled



The LigoPTMP unit is now running, but may require additional configuration to conform to your network's operational requirements. Refer to the next chapter *LigoPTMP Configuration* in this manual for the information you need to complete the configuration.

LigoPTMP Configuration

Applying and saving configuration changes

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



-  **Save changes** – if pressed, the new configuration settings are applied instantly and written to the permanent device memory.
-  **Test changes** – if pressed, the device will start operating under the newly-set configuration settings for 3 minutes. During this test time, the administrator is able to monitor whether the device is working properly, and then save changes. In the case that wrong settings were chosen (or even after faulty settings the administrator loses connection with the device), the device will automatically revert back the configuration to the previous 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 once the action button is used, all changes will be applied.

Status

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



Figure 3: the main menu of the Web management interface



Information

Use the Status Information menu to check the current status of the LigoPTMP unit and the 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 LigoPTMP unit. The page is divided into four main categories: System, Radio, Links and Network. The System section displays the identification information of the LigoPTMP unit. The Radio section presents main wireless settings. The Link table describes the connectivity parameters of the LigoPTMP links with the remote units. The Network section displays a short summary about the network configuration (IPv4 and IPv6).

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

INFORMATION



Product name: LigoBase 5-90
 Serial number: 0B1B16130000A6B
 Firmware version: PTMP.MA-1.v7.55.41097 (Update)
 System uptime: 22 hours 56 min. 0 sec.

Operating country: LT
 Friendly name: LigoBase 5-90
 Device location: Location
 Latitude/Longitude: 0 / 0
 Height AGL, m: 0

Radio

Operating mode: MASTER
 Max Tx data rate, Mbps: 400 (256-QAM 5/6)
 Frequency, MHz: 5165 (5155-5195)
 Channel width, MHz: 40

Tx power, dBm: 7 (adjusted by local regulations)
 Antenna gain, dBi: 16
 Noise level, dBm: -95/-95

Link ID: LigoPTMP link

Remote site						Local site
Remote device	Link status	Tx power, dBm	Tx/Rx data rate, Mbps	Noise level, dBm	Signal level, dBm	Signal level, dBm
LigoSU 5-N 00:19:3B:09:E0:8A	UP 1 hour 32 min. 36 sec.	26	400/400	-95/-95	-42 -45	-22 -23
LigoSU 5-20 00:19:3B:09:E1:56	UP 1 hour 32 min. 46 sec.	3	360/360	-95/-95	-54 -56	-64 -58

Network

IP method: Dynamic
 MAC address: 00:19:3B:09:E2:71
 IP address: 192.168.3.203
 Subnet mask: 255.255.255.0
 Default gateway: 192.168.3.1
 DNS server 1: 192.168.200.1
 DNS server 2: 8.8.8.8

IPv6 method: Disabled

Figure 4: the device information page



If the LigoPTMP unit is operating as the Master device, the Link table allows to manage the configuration of the remote devices (Slaves). Click on the active link (friendly name of the remote device) and the dialog box containing the Slave's settings will be loaded:

MANAGE REMOTE DEVICE

Serial number: 0C28161300000944
 MAC address: 00:19:3B:09:E0:8A
 Firmware version: PTMP.QA-1.v7.55.41096 (Update)
 System uptime: 2 days 0:37:24

System settings

Radio settings

Tx power, dBm: 25

Enable ATPC:

Network settings

Traffic speed limit settings



Statistics

The Statistics page displays detailed statistics of the PTMP link performance. The Statistics page is divided into two sections: the Interfaces and the W-Jet (propriety wireless protocol) statistics.

STATISTICS

Interfaces

Interface	Tx data	Rx data	Tx packets	Rx packets	Tx errors	Rx errors
Wireless	537.82 MiB	71.86 MiB	1.94 M	1.00 M	108.33 k	6.91 k
ETH1	20.33 MiB	39.10 MiB	148.57 k	260.52 k	0	0
ETH2	0	0	0	0	0	0

Note: data is collected since last device reboot

W-Jet

MAC address	IP address	Tx frames	Rx frames	Tx retry frames, %
00:19:3B:09:51:FA (Local)	192.168.3.146	1.78 M	1.00 M	0
00:19:3B:09:E0:8A (Remote)	192.168.3.171	550.14 k	1.38 M	0
00:19:3B:09:E1:56 (Remote)	192.168.3.191	452.17 k	781.63 k	0

Figure 5: interface counters

Interfaces

This table contains detailed statistics of Ethernet and Wireless interfaces:

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

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

TX packets – displays the total number of packets sent via the Ethernet or Wireless interface of the PTMP link.

RX packets – displays the total number of packets received via the Ethernet or Wireless interface of the PTMP link.

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

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

W-JET V

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

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

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

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

RX frames – the number of received 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 diagrams are displayed in real time. They can also be displayed on an hourly, daily, weekly, or monthly basis.



Point the mouse cursor at the diagram line and you will get the numeric value of the particular statistic.

The **Signal level** diagram displays the signal change of the PTMP links (choose one or all Master-Slave links) during the chosen period:

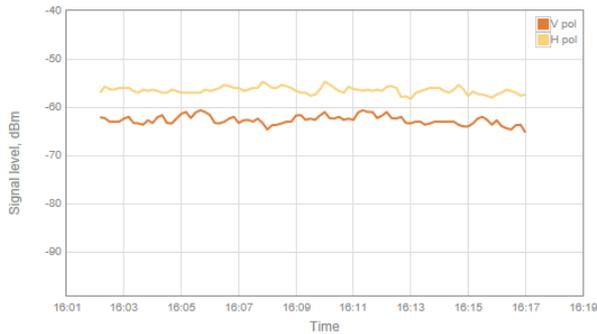
GRAPHS

Note: data is collected since last device reboot

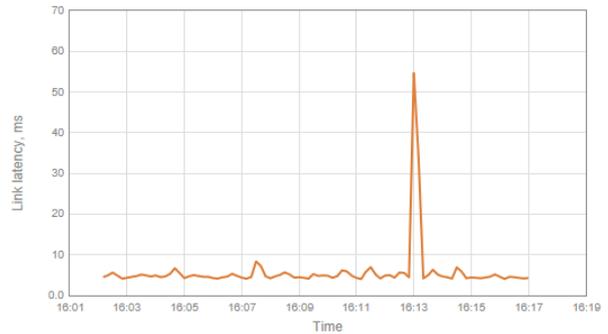
Instant Hour Day Month

LigoSU 5-20 x LigoSU 5-N x |

LigoSU 5-20 Signal level (last 15 min)



LigoSU 5-20 Link latency (last 15 min)



LigoSU 5-N Signal level (last 15 min)



LigoSU 5-N Link latency (last 15 min)

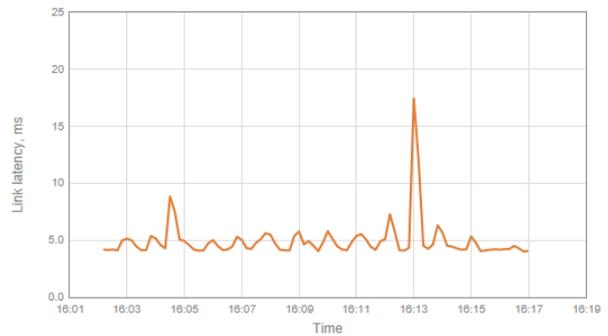
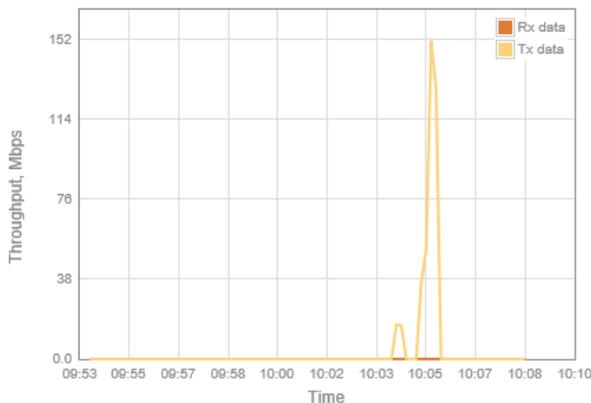


Figure 6: signal level graph

Data throughput shows a graphical depiction of the Wireless and Ethernet interface throughput statistics of the PTMP link in the last 15 minutes.

Packets per seconds (PPS) displays a graphical depiction of the Wireless and Ethernet interface PPS of the PTMP link in the last 15 minutes.

Wireless data throughput (last 15 min)



Wireless packets per second (last 15 min)

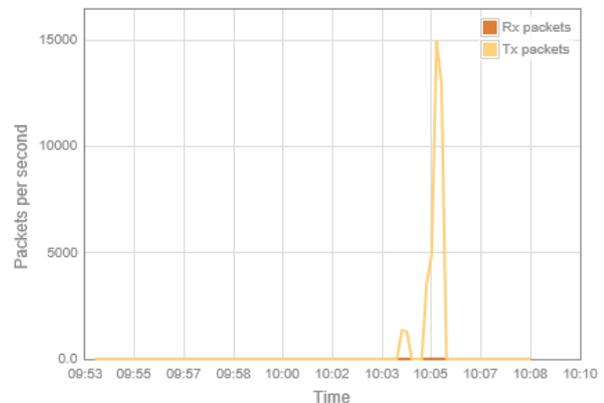


Figure 7: data throughput and PPS (wireless interface) graphs

The **CPU load** diagram displays the device CPU load during the appropriate time.

The **Memory** diagram displays the graph of the device’s memory usage:

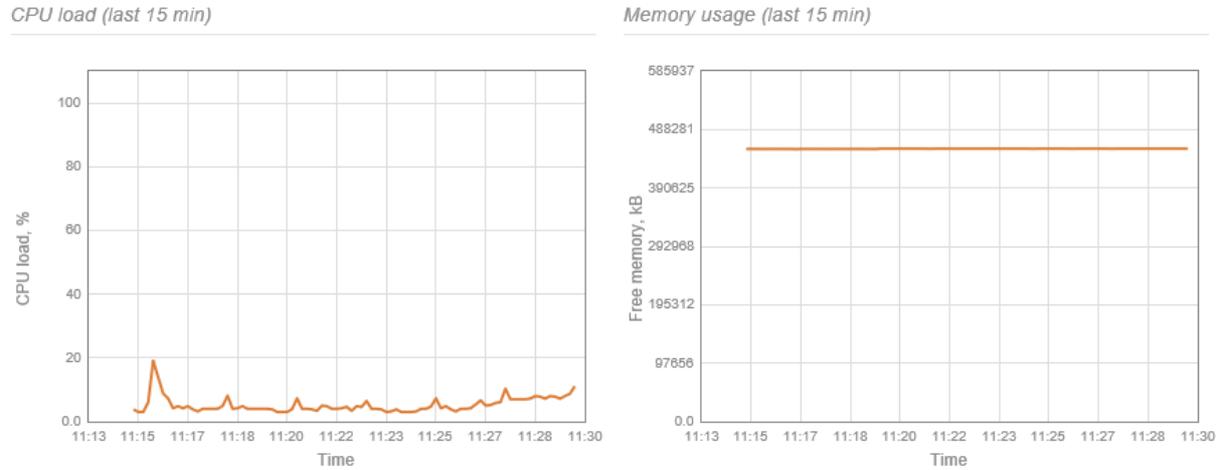


Figure 8: CPU load and memory usage graphs

Settings



Figure 9: Web management interface

Radio configuration

-  Before manually changing the Radio settings, verify that your settings will comply with the local government regulations. It is the responsibility of the end-users to always ensure that the installation complies with the local radio regulations.
-  Wireless security is hardware-accelerated using AES-128 encryption in all LigoPTMP units. The passphrase of the wireless link security can be changed in the **Settings** → **System** → **Security** page, under **Password**.

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

WIRELESS

Operating mode: Operating country:

Radio settings

Link ID: Broadcast link ID:

Channel selection: Max data rate, Mbps: 400 (256-QAM 5/6)

Tx power, dBm: Spatial data streams:

Enable ATPC:

Figure 10: radio settings

Operating mode – specify the role of the operating device to create a PTMP link:

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

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

Link ID – specify the name of the wireless network, for LigoPTMP link identification.



To establish a PTMP link, both units (Master and Slave) of a link must have the same exact **Link ID**.

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

Channel width (MHz):

<input checked="" type="checkbox"/>	Channel	TX limit, dBm	EIRP limit, dBm	DFS/ATPC required
<input checked="" type="checkbox"/>	31 (5155 MHz)	30	53	No
<input checked="" type="checkbox"/>	32 (5160 MHz)	30	53	No
<input checked="" type="checkbox"/>	33 (5165 MHz)	30	53	No
<input checked="" type="checkbox"/>	34 (5170 MHz)	30	53	No
<input checked="" type="checkbox"/>	35 (5175 MHz)	30	53	No
<input checked="" type="checkbox"/>	36 (5180 MHz)	30	53	No
<input checked="" type="checkbox"/>	37 (5185 MHz)	30	53	No
<input checked="" type="checkbox"/>	38 (5190 MHz)	30	53	No
<input checked="" type="checkbox"/>	39 (5195 MHz)	30	53	No
<input checked="" type="checkbox"/>	40 (5200 MHz)	30	53	No

Figure 11: channel selection

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



The Slave operation mode only has channel width selection. Slave units are automatically assigned the channel from the Master unit.

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



If the unit is operating as a **Slave**, there is a possibility to automatically scan for a LigoPTMP Master's Link ID:

Link ID:  Scan results will appear in the Search SSID table.

Tx power – set the device's radio transmit power for data transmission. The larger the distance, the higher the required transmit power. To set the 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, the LigoPTMP radio will continuously communicate with the remote unit's radio in order to automatically adjust to the optimal transmit power.

Max data rate, Mbps – choose the LigoPTMP packet transmit data rates in Mbps. LigoPTMP will attempt to transmit data at the highest data rate set and if there is interference, the device will automatically readjust to the next lower data rate automatically.

Spatial data streams – select the spatial data streaming method of the PTMP link.



Network configuration

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

IPv4 Configuration

NETWORK CONFIGURATION

IPv4 settings

IP method:	Static <input type="checkbox"/>	DNS server 1:	<input type="text"/>
IP address:	10.0.94.140	DNS server 2:	<input type="text"/>
Subnet mask:	255.255.255.0		
Default gateway:	10.0.94.200		

IPv6 settings

IPv6:

Advanced settings

Figure 12: 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 the 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 to the LigoPTMP unit. If the DHCP server is not available, the device will try to get an IP. If it has no success, it will use a pre-configured fallback IP address. The fallback IP settings can be changed to custom values.

IP address – specify IP address for the LigoPTMP unit.

Subnet mask – specify a subnet mask for the device.

Default gateway – specify a gateway IP address for device.

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

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

IPv6 Configuration

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

NETWORK CONFIGURATION

IPv4 settings

IP method:	Static <input type="checkbox"/>	DNS server 1:	<input type="text"/>
IP address:	10.0.94.10	DNS server 2:	<input type="text"/>
Subnet mask:	255.255.255.0		
Default gateway:	10.0.94.200		

IPv6 settings

IPv6:	<input checked="" type="checkbox"/>		
IPv6 method:	Static <input type="checkbox"/>	IPv6 DNS server 1:	<input type="text"/>
IPv6 address:	fc00::c0:a8:2:42	IPv6 DNS server 2:	<input type="text"/>
IPv6 prefix length:	64		
IPv6 default gateway:	fc00::c0:a8:2:1		

Advanced settings

Figure 13: network configuration: IPv6

IPv6 method – specify the 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 the IPv6 address.
- **Dynamic stateful IP** – the DHCPv6 clients require an 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 the default gateway.
 - **IPv6 DNS server** – specify the Domain Naming Server IPv6 addresses.

Advanced Settings

Advanced settings

Management VLAN ID:	2 <input type="checkbox"/>	Enable STP:	<input type="checkbox"/>
---------------------	----------------------------	-------------	--------------------------

Management VLAN – enable VLAN tagging for management traffic. Access to the LigoPTMP unit for management purposes can be further limited using VLAN tagging. By defining Management VLAN, the 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 to the LigoPTMP network interface, only management frames that match the configured VLAN ID will be accepted by the device.



When you specify a new management VLAN, your connection to the device is 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.

Enable STP – select to enable the Spanning Tree Protocol (STP), which helps to avoid and eliminate network loops.



Traffic Management

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

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

Ethernet Traffic Control

Configure the Ethernet traffic control on both Ethernet ports:

TRAFFIC MANAGEMENT

Traffic control on Ethernet ports

Enable speed limit: Incoming speed, Mbps

Note: speed limit is applied on both ports ETH1 + ETH2

Figure 14: traffic control on Ethernet ports

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

Incoming speed – use the slider, or specify manually the maximum speed in Mbps of the incoming traffic.

QoS



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

LigoPTMP units support L2 (802.1p) and L3 (DSCP) QoS. In layer 2, QoS data is prioritized according to the VLANs, while in layer 3, it is prioritized according to the IP addresses. Both types of QoS can run together or independently and traffic can be mapped to 4 different queues for each type, implementing 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 a higher PPS rate. The maximum capacity for each of the queues is calculated dynamically according to the wireless link.

QoS

Policy:
 Precedence:

Enable L2 802.1p:

802.1p Queue	802.1p Queue	802.1p Queue	802.1p Queue
0 <input type="text" value="1"/> <input type="button" value="v"/>	2 <input type="text" value="2"/> <input type="button" value="v"/>	4 <input type="text" value="3"/> <input type="button" value="v"/>	6 <input type="text" value="4"/> <input type="button" value="v"/>
1 <input type="text" value="1"/> <input type="button" value="v"/>	3 <input type="text" value="2"/> <input type="button" value="v"/>	5 <input type="text" value="3"/> <input type="button" value="v"/>	7 <input type="text" value="4"/> <input type="button" value="v"/>

Enable L3 DSCP:

DSCP Queue	DSCP Queue	DSCP Queue	DSCP Queue
0 <input type="text" value="1"/> <input type="button" value="v"/>	16 <input type="text" value="2"/> <input type="button" value="v"/>	32 <input type="text" value="3"/> <input type="button" value="v"/>	48 <input type="text" value="4"/> <input type="button" value="v"/>
1 <input type="text" value="1"/> <input type="button" value="v"/>	17 <input type="text" value="2"/> <input type="button" value="v"/>	33 <input type="text" value="3"/> <input type="button" value="v"/>	49 <input type="text" value="4"/> <input type="button" value="v"/>
2 <input type="text" value="1"/> <input type="button" value="v"/>	18 <input type="text" value="2"/> <input type="button" value="v"/>	34 <input type="text" value="3"/> <input type="button" value="v"/>	50 <input type="text" value="4"/> <input type="button" value="v"/>
3 <input type="text" value="1"/> <input type="button" value="v"/>	19 <input type="text" value="2"/> <input type="button" value="v"/>	35 <input type="text" value="3"/> <input type="button" value="v"/>	51 <input type="text" value="4"/> <input type="button" value="v"/>
4 <input type="text" value="1"/> <input type="button" value="v"/>	20 <input type="text" value="2"/> <input type="button" value="v"/>	36 <input type="text" value="3"/> <input type="button" value="v"/>	52 <input type="text" value="4"/> <input type="button" value="v"/>
5 <input type="text" value="1"/> <input type="button" value="v"/>	21 <input type="text" value="2"/> <input type="button" value="v"/>	37 <input type="text" value="3"/> <input type="button" value="v"/>	53 <input type="text" value="4"/> <input type="button" value="v"/>
6 <input type="text" value="1"/> <input type="button" value="v"/>	22 <input type="text" value="2"/> <input type="button" value="v"/>	38 <input type="text" value="3"/> <input type="button" value="v"/>	54 <input type="text" value="4"/> <input type="button" value="v"/>
7 <input type="text" value="1"/> <input type="button" value="v"/>	23 <input type="text" value="2"/> <input type="button" value="v"/>	39 <input type="text" value="3"/> <input type="button" value="v"/>	55 <input type="text" value="4"/> <input type="button" value="v"/>
8 <input type="text" value="1"/> <input type="button" value="v"/>	24 <input type="text" value="2"/> <input type="button" value="v"/>	40 <input type="text" value="3"/> <input type="button" value="v"/>	56 <input type="text" value="4"/> <input type="button" value="v"/>
9 <input type="text" value="1"/> <input type="button" value="v"/>	25 <input type="text" value="2"/> <input type="button" value="v"/>	41 <input type="text" value="3"/> <input type="button" value="v"/>	57 <input type="text" value="4"/> <input type="button" value="v"/>
10 <input type="text" value="1"/> <input type="button" value="v"/>	26 <input type="text" value="2"/> <input type="button" value="v"/>	42 <input type="text" value="3"/> <input type="button" value="v"/>	58 <input type="text" value="4"/> <input type="button" value="v"/>
11 <input type="text" value="1"/> <input type="button" value="v"/>	27 <input type="text" value="2"/> <input type="button" value="v"/>	43 <input type="text" value="3"/> <input type="button" value="v"/>	59 <input type="text" value="4"/> <input type="button" value="v"/>
12 <input type="text" value="1"/> <input type="button" value="v"/>	28 <input type="text" value="2"/> <input type="button" value="v"/>	44 <input type="text" value="3"/> <input type="button" value="v"/>	60 <input type="text" value="4"/> <input type="button" value="v"/>
13 <input type="text" value="1"/> <input type="button" value="v"/>	29 <input type="text" value="2"/> <input type="button" value="v"/>	45 <input type="text" value="3"/> <input type="button" value="v"/>	61 <input type="text" value="4"/> <input type="button" value="v"/>
14 <input type="text" value="1"/> <input type="button" value="v"/>	30 <input type="text" value="2"/> <input type="button" value="v"/>	46 <input type="text" value="3"/> <input type="button" value="v"/>	62 <input type="text" value="4"/> <input type="button" value="v"/>
15 <input type="text" value="1"/> <input type="button" value="v"/>	31 <input type="text" value="2"/> <input type="button" value="v"/>	47 <input type="text" value="3"/> <input type="button" value="v"/>	63 <input type="text" value="4"/> <input type="button" value="v"/>

Figure 15: QoS configuration

QoS policy – choose the Strict or WRR prioritization method:

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

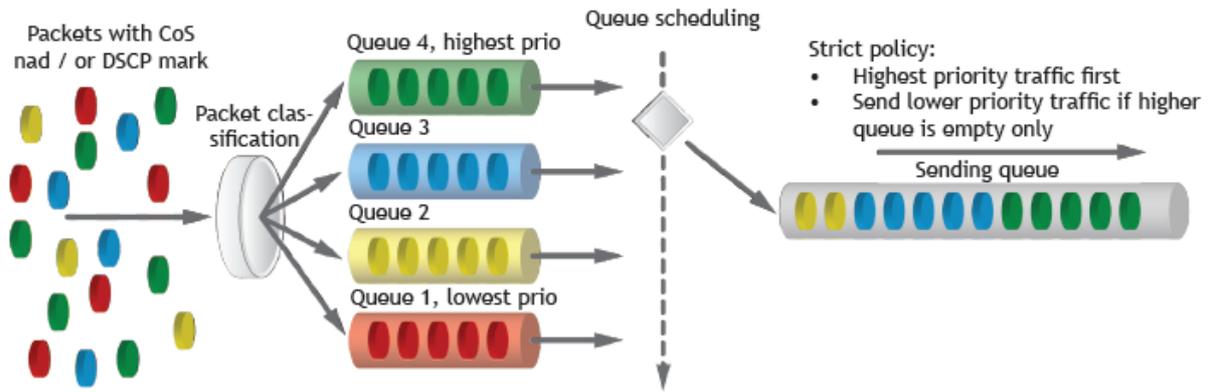


Figure 16: QoS policy: strict

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

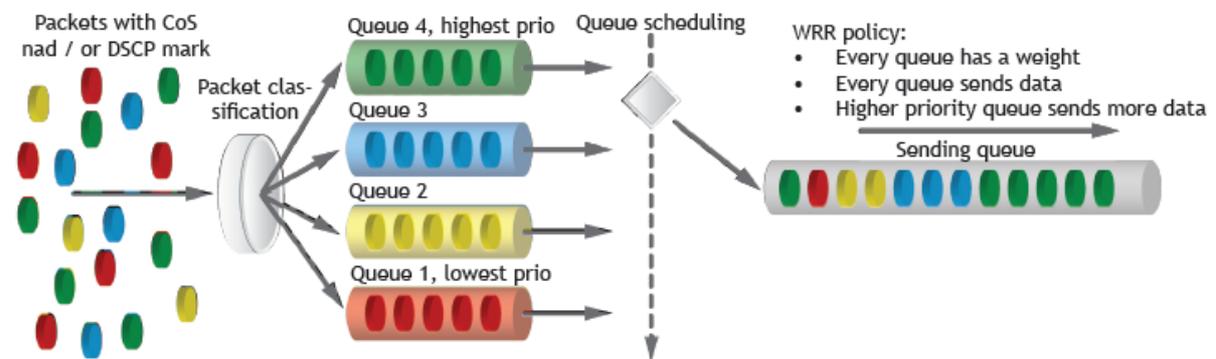


Figure 17: QoS policy: WRR

QoS mapping precedence – 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).



Queue 1 has the lowest and queue 4 has the highest priority.



Services

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

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

SERVICES

☒ Date & time

☒ Management

☒ Wireless management interface

☒ System alerts

☒ SNMP

☒ WNMS

Figure 18: services menu

Date & time

Use this section to automatically manage the system time and date on the device 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 set time server. Choose NTP from the configuration menu, select your location's time zone and enter the NTP server in order to use the NTP service.

☒ Date & time

Enable NTP:

Timezone: UTC ▼

NTP server 1:

Date: 30/01/2015

NTP server 2:

Time: 06:03

Test NTP servers:

Figure 19: Date & time: NTP configuration

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

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

NTP server – specify a trusted NTP server's IP or hostname to synchronize the time.

Test NTP servers – click this button to check whether the specified servers respond successfully.

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

☒ Date & time

Enable NTP:

Timezone: UTC ▼

Date (DD/MM/YYYY):

Time (HH:MM):

Figure 20: Date & time: manual configuration

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

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

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

Time – specify the time in the HH:MM format.

Management

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

Management



The screenshot shows the Management configuration interface. It features two toggle switches: 'Enable HTTP' (checked) and 'Enable SSH' (checked). Below these are two input fields: 'HTTP port' with the value '80' and 'SSH port' with the value '22'.

Figure 21: remote management configuration

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

HTTP port – specify the HTTP port. The standard HTTP port is 80.



The HTTPS protocol is always enabled.

Enable SSH – enable or disable SSH access to the device.

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

Wireless management interface



Only LigoBase (Master) devices have the possibility of remote wireless management.

Configure the additional management interface for easy access to the device's Web management interface having newly installed (or rebooted) the LigoBase unit. After power-on, the LigoBase unit will switch to the remote wireless management mode.



The LigoBase unit's remote wireless management interface is accessible only through HTTPS and SSH via IP: 192.168.111.1.

Wireless management interface



The screenshot shows the Wireless management interface configuration. It includes a toggle switch for 'Enable interface' (checked), an 'Activity interval, min:' slider set to 10, an 'SSID' input field containing 'LigoPTMP-mng-09E271', and a 'Security' dropdown menu set to 'Open'.

Figure 22: Management interface configuration

SSID – assign the SSID to the remote wireless management interface. The default SSID is LigoPTMP-mng-AABBCC (whereby AABBCC are the last three bytes of the particular LigoBase MAC address).

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

Passphrase – specify the passphrase for WPA/WPA2 personal security. With security enabled, the wireless client can access LigoBase’s management interface by providing this passphrase only.

Activity interval – specify the interval of remote wireless management interface activity. If no users log into the LigoBase Web management interface, the remote wireless access mode will be switched off automatically after a specified period of inactivity (default: 5 minutes).

System alerts

LigoPTMP devices can send external alerts via SNMP traps when specific system errors occur.

System alerts

Enable system alerts:

System check interval, s:

Wireless link status change:

Ethernet link status change:

RSSI level lower than:

Device reboot:

System uptime:

Uptime send interval, min:

Noise level greater than, dBm:

RX drop greater than, %:

TX retry greater than, %:

Ping delay, ms:

Ping host/IP address:

Figure 23: the configuration of system alerts

Enable alerts – select to enable alert notifications in the system.

System check interval, s – specify the interval in seconds for the device to send notifications regarding unexpected system behavior.

System alerts:

Wireless link status change – the system will send notifications regarding Wireless link status changes.

Ethernet link status change – the system will send notifications regarding Ethernet link status changes.

RSSI level lower than – the system will send notifications when the RSSI reaches a value lower than what is specified. The default is 60.

Device reboot – the system will send notifications about unexpected or administrator initiated device reboots.

System uptime – the system will send the device uptime within the specified interval.

Noise level greater than – the system will send notifications when signal noise reaches a value greater than what is specified. The default is -60 dBm.

RX drop greater than – the system will send notifications when the percentage of RX dropped packets is higher than the specified value. The default is 250 packets per seconds.

TX retry greater than – the system will send notifications when the percentage of TX retries is higher than the specified value. The default is 250 packets per seconds.

Ping delay – the device will ping a specified host and if the ping reply is greater than the specified interval in ms, system alerts will be sent.

SNMP traps settings must be configured for proper system alert operation:

SNMP traps settings

Manager host/IP address:

Manager port:

Trap community:

Use inform:

Retry count:

Retry timeout, s:

Figure 24 – SNMP Traps Settings

Manager host/IP address – specify the IP address or hostname of SNMP 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 a password between the SNMP manager and the device. By default, the Trap community string is "public".

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

Retry count – specifies the maximum number of times to resend an inform request [1-10]. The default is 5.

Retry timeout – specifies the number in seconds to wait for an acknowledgment before resending a request [1-10]. The default is 5.

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 an SNMP agent.

SNMP

Enable SNMP:

SNMP v1

R/O community:

Figure 25: 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 the LigoPTMP unit manager to read values, but denies any attempt to change the values.

WNMS

The 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.

WNMS

Enable WNMS agent:

Server/Collector URL:

Test connection:

Enable WNMS agent – select to enable the WNMS agent.

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

Test connection – click this button to check whether the specified server responds successfully.



System configuration

The System menu is further divided into three sections: device settings, security, and advanced settings.

Device settings

Friendly name:	<input type="text" value="LigoBase 5-90"/>	Latitude:	<input type="text" value="0"/>
Location:	<input type="text" value="Location"/>	Longitude:	<input type="text" value="0"/>
Contact information:	<input type="text" value="administrator@company.com"/>	Height AGL, m:	<input type="text" value="0"/>

Figure 26: device settings

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

Location – describe the location of the LigoPTMP unit.

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

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

Latitude – specify the latitude coordinates of the device [specific decimal format, e.g. 23.891058].

Both coordinates help to indicate an accurate location of the device.

Height AGL – specify the altitude above ground level in meters.

Security



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

Security

Public status page:

Allow reset to defaults:

(Hardware button behaviour)

Figure 27: security settings

Public status page – enable or disable the permission for logged out users to view the Status page of the LigoPTMP device.

Allow reset to default – use the slider to enable or disable the reset of the LigoPTMP unit using the external hardware reset button.

Password – click the button to change the password that is used to manage access to the LigoPTMP unit and the LigoPTMP wireless link connection between the master and slaves.

SET PASSWORD

IMPORTANT: this password is used to manage all devices on the same wireless network and is also used to generate wireless connection security passphrase. On all devices in same wireless network it must be the same otherwise wireless link will not work.

New password

Verify password

Figure 28: – LigoPTMP link password change



Hardware accelerated AES-128 encryption is used for user access to the device and the LigoPTMP wireless link between both ends of the links (Master-Slaves).

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 device’s Web management in case you forget the administrator password is to reset the unit to default factory settings.

Advanced settings

⊟ Advanced settings

LED: <input type="text" value="Auto Off"/> <input type="button" value="v"/>	ETH1 port speed: <input type="text" value="Auto"/> <input type="button" value="v"/>
LED timeout, min: <input type="range" value="10"/> <input type="text" value="10"/>	ETH2 port: <input checked="" type="checkbox"/> <input type="button" value=" "/>
	ETH2 port speed: <input type="text" value="Auto"/> <input type="button" value="v"/>
	PoE passthrough to ETH2: <input type="range" value="x"/>

⊟ *Advanced settings*

LED settings

LED: ▾

LED timeout, min:

Ethernet settings

Interface	Mode	Speed, Mbps	Duplex	Autonegotiation
ETH1	Auto	10/100/1000	Full	Enabled
ETH2	Auto	10/100/1000	Full	Enabled

PoE passthrough to ETH2:

Figure 29: advanced LigoPTMP settings

LED – choose the operation mode of the LEDs that are located on the back panel of the LigoPTMP unit:

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

Ethernet settings – click on the required interface name and specify the ETH1 and/or ETH2 port settings: mode, speed, duplex mode, and auto-negotiation.

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

Tools

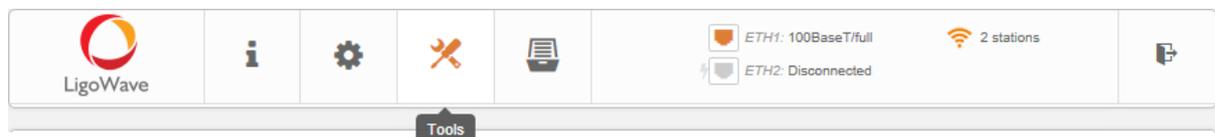


Figure 30: Web management interface



Site survey

The Site Survey tool shows the overview information for the wireless networks in a local geographic area as well as displays results received from the remote site scan. 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 graphically represented.

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

SITE SURVEY

Note: starting site survey scan may temporary disable wireless link.

Start

AP count: 39

Site	MAC address	Link ID	Protocol	Signal, dBm	Noise, dBm	Frequency, MHz	Bandwidth, MHz
local	00:19:3B:0C:50:6B	Guest Wi-Fi	--	-57	-95	5240	80
local	00:19:3B:0C:60:DE	Infinity andromeda	--	-53	-95	5520	80
local	02:19:3B:0C:61:44	tessst #3	--	-35	-95	5220	80
local	00:19:3B:02:B5:B1	Infinity	--	-50	-95	5180	40
local	12:19:3B:0C:61:44	UAM, HotSpot	--	-34	-95	5220	80
local	00:19:3B:82:21:35	5G-MiMo	--	-79	-95	5500	20
local	02:19:3B:0C:60:DE	--	--	-54	-95	5520	80
LigoSU 5-N	00:19:3B:09:E2:71	LigoPTMP link	W-Jet	-41	-95	5165	40
LigoSU 5-20	00:19:3B:09:E2:71	LigoPTMP link	W-Jet	-54	-95	5165	40
LigoSU 5-20	02:19:3B:C5:54:09	LigoWave	--	-67	-95	5200	80
LigoSU 5-20	12:19:3B:C5:54:09	LigoWave-5G-P	--	-67	-95	5200	80
LigoSU 5-20	00:19:3B:0C:50:6B	Guest Wi-Fi	--	-64	-95	5240	80
LigoSU 5-20	02:19:3B:0C:50:6B	LigoWave	--	-64	-95	5240	80
LigoSU 5-20	00:19:3B:0C:60:DE	Infinity andromeda	--	-57	-95	5520	80
LigoSU 5-20	00:19:3B:02:B5:B1	Infinity	--	-56	-95	5180	40
LigoSU 5-20	12:19:3B:0C:61:44	UAM, HotSpot	--	-47	-95	5220	80

Figure 31: Site Survey results

The Site Survey scan results are also displayed graphically:

Graphical site survey representation

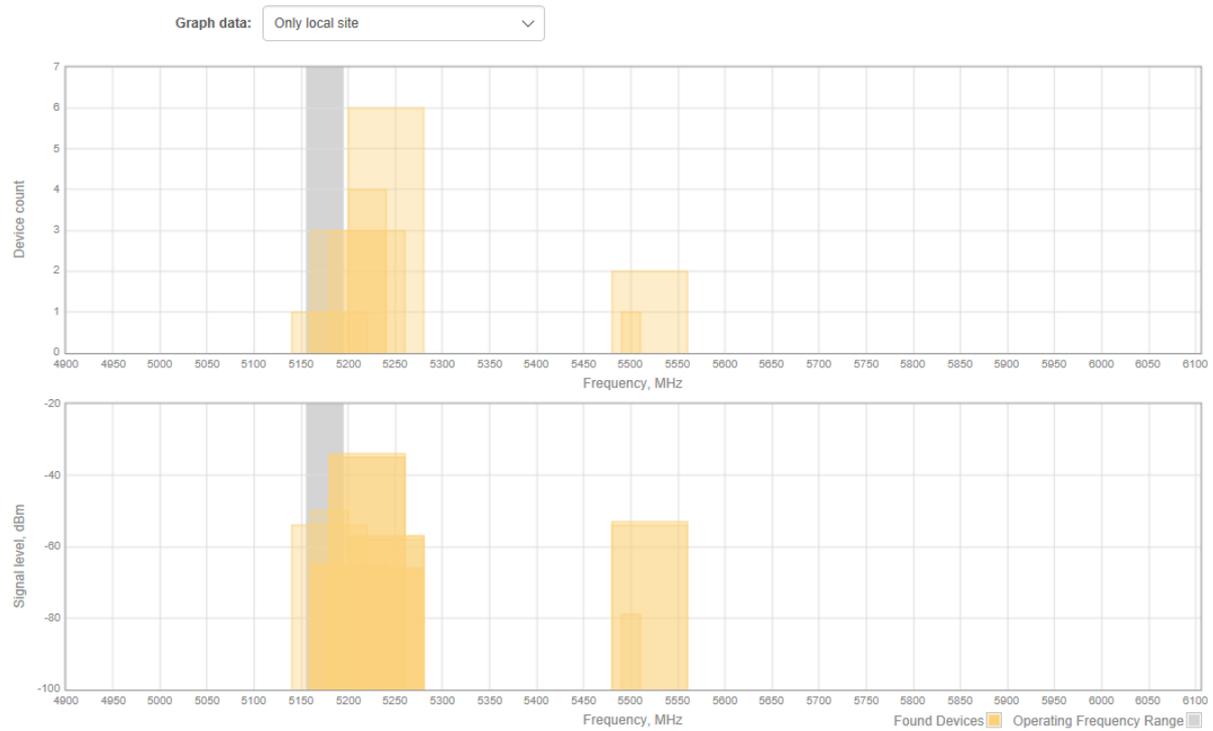


Figure 32: Site Survey results in graph form

Graph data – choose what data you wish to be displayed in the graphs: local, remote, or combined sites.



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



Antenna alignment

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

ANTENNA ALIGNMENT

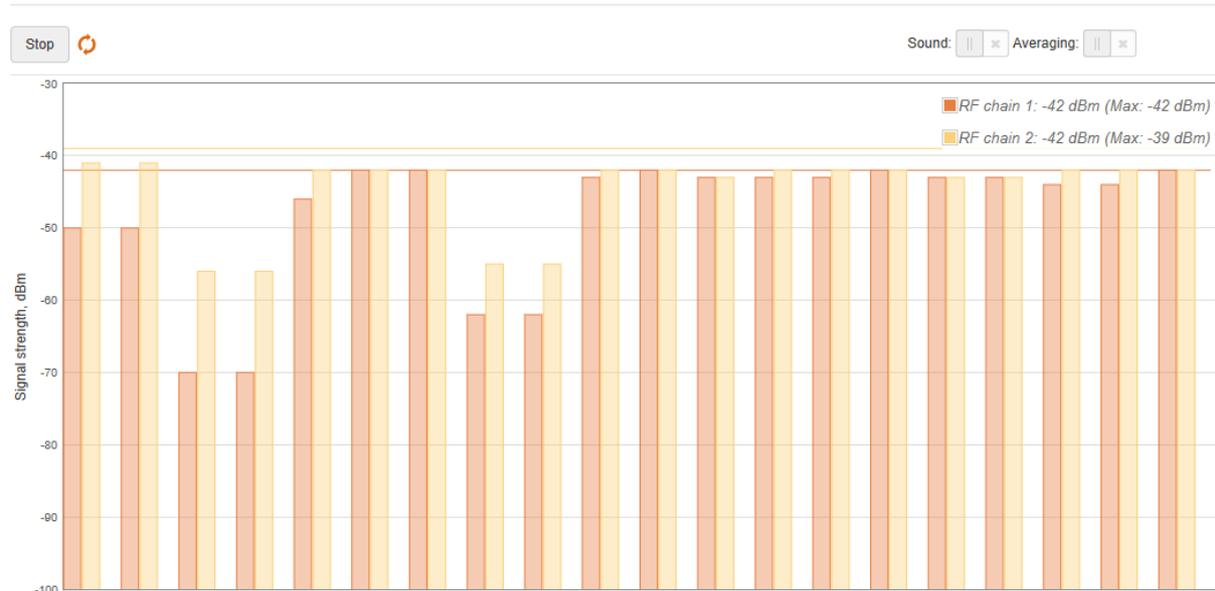


Figure 33: antenna alignment

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

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

Averaging – if this option is enabled, the graph will display the average signal strength of both antennas.

Link test



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

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

LINK TEST

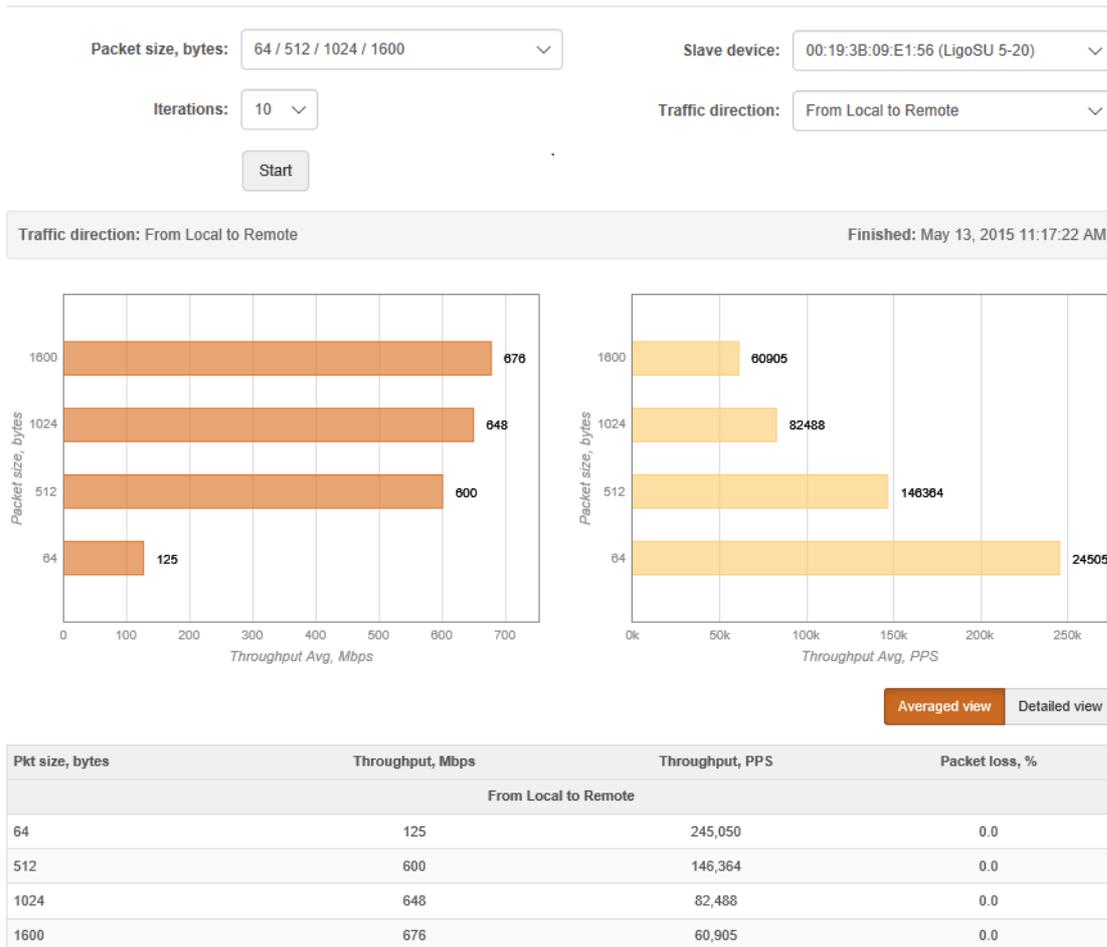


Figure 34: Link test results

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

Iterations – select the number of test iterations.

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

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

Traffic direction – select the direction of the traffic for the performed test.

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



Spectrum analyzer

The **Spectrum analyzer** test displays detailed information about the signal level of the LigoPTMP unit on each available frequency. This allows the administrator to choose the best available frequency/channel for the LigoPTMP link to operate on. The frequency list depends on the country, in which the unit is operating, and the chosen channel width.



The Spectrum analyzer will disable the wireless link.

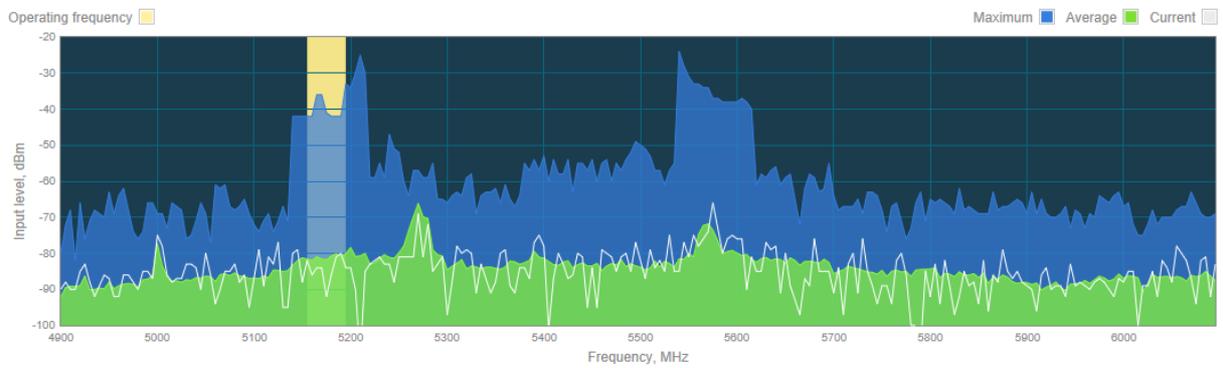
Click **Start** to perform the test:

SPECTRUM ANALYZER

Caution: starting spectrum analyzer will disable wireless link.



Spectrum realtime



Spectrograph

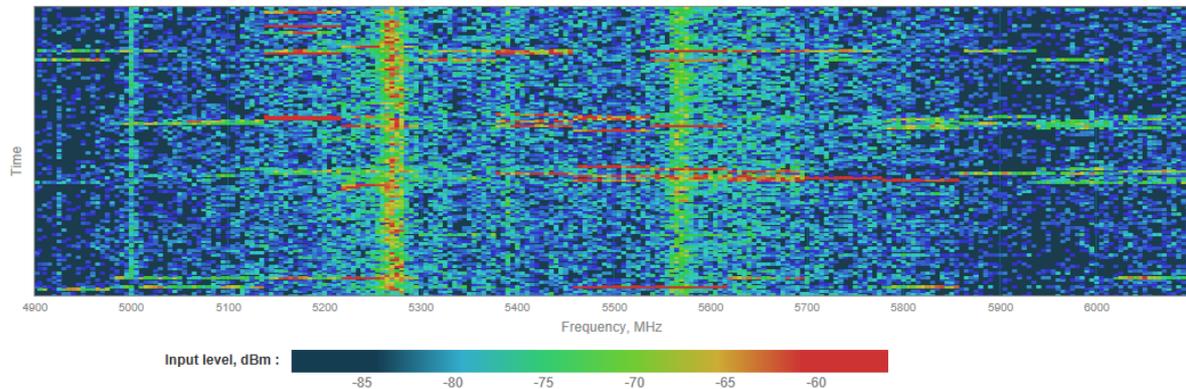


Figure 35: Spectrum analyzer results



The **yellow highlighted** column represents the operating frequency of the current LigoPTMP link.



Ping & Trace

Use the **Ping** tool to discover how long it takes for packets to reach the specified trusted host. The ping results are displayed numerically in the table and graphically in a diagram:

PING & TRACE

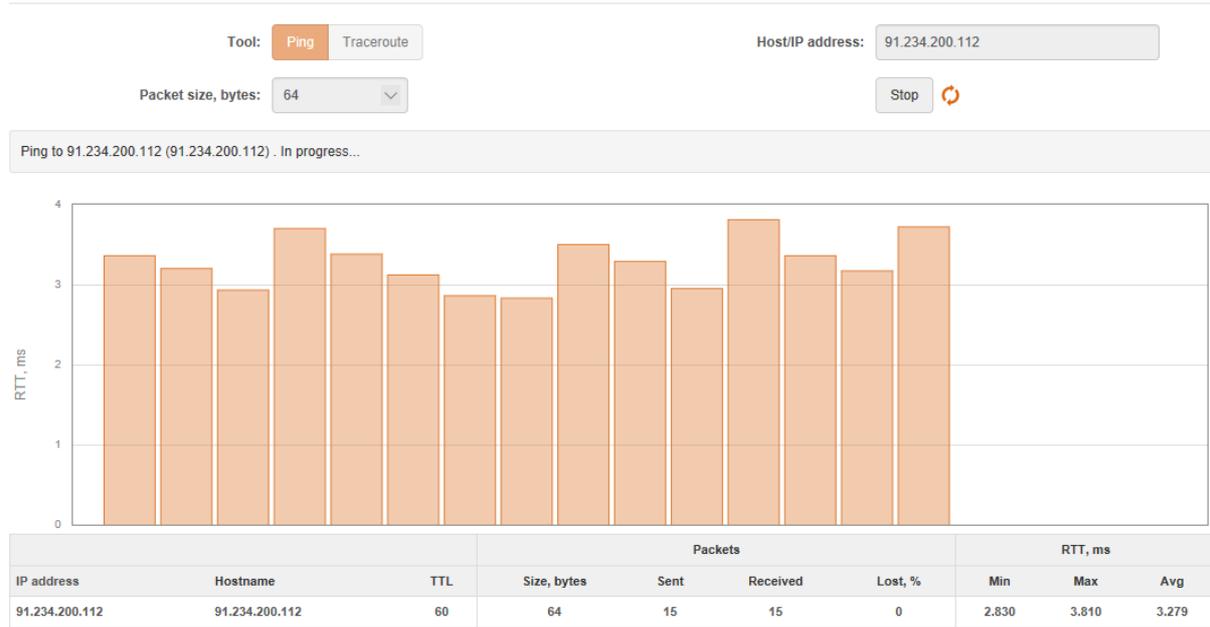


Figure 36: the Ping tool

Host/IP address – specify the host, to which Ping requests will be sent.

Packet size (bytes) – specify the size of the packet in bytes.

Start/Stop – click to start or stop the Ping tool.

Use the **Traceroute** tool to track the route of packets to the destination host from the LigoWave NFT unit. This is useful when trying to find out why the destination is unreachable, as you will be able to see where the connection fails.

PING & TRACE

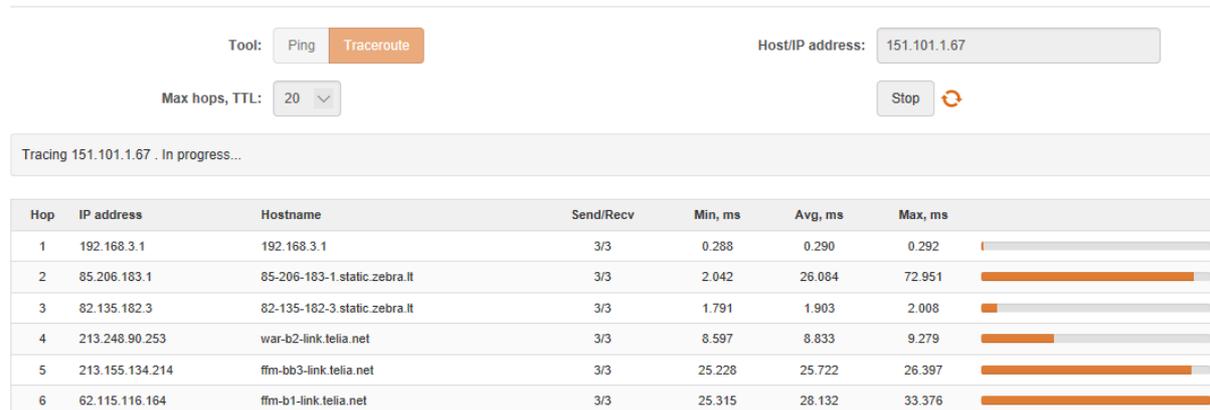


Figure 37: the Trace tool

Host/IP address – specify the hostname or IP address of the target host.

Max hops (TTL) – specify the maximum number of hops to search for target.

Start/Stop – click to start or stop the Trace tool.

Maintenance

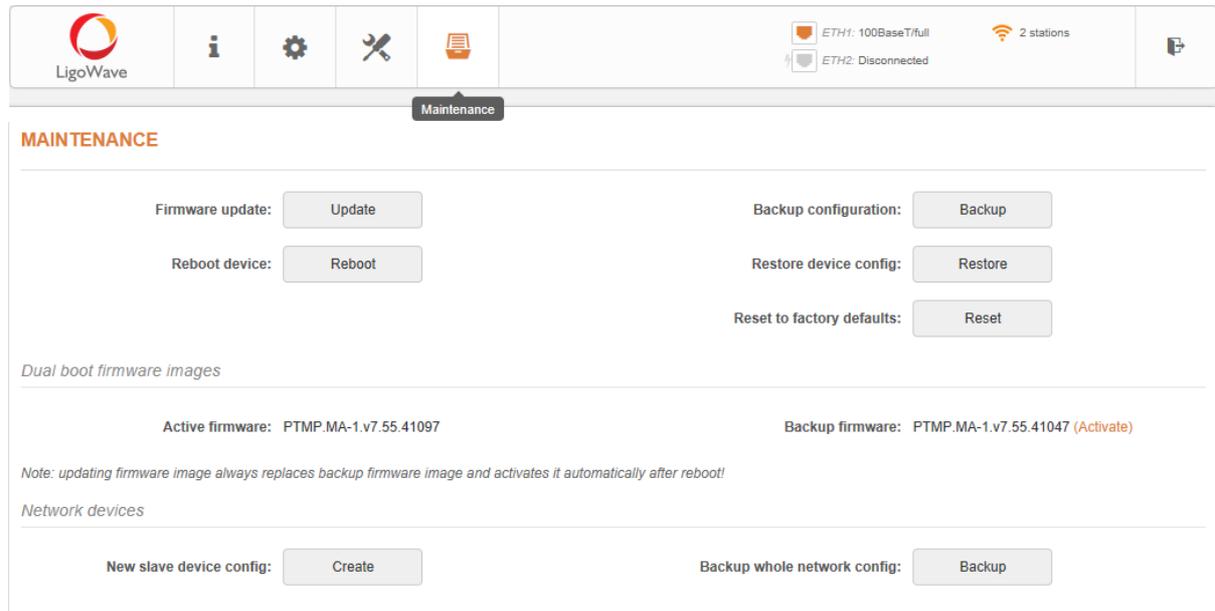


Figure 38: maintenance: system functions

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

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

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

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



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



All **LigoBase** devices have a physical multifunction button located on the back side of the device. This button allows to perform the following functions:

Activate LED indication – click once;

Switch to RSSI or Status indication – click once;

Enable Wi-Fi management radio – hold until 3 blue LEDs are on;

Reset device to factory defaults – hold until all blue LEDs start to blink.

Firmware upgrade



The LigoPTMP Master unit allows to update the firmware of the Slave units.



The firmware upgrade is compatible with all configuration settings. When the device is upgrading to newer version or same version builds, all of 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:

FIRMWARE UPDATE

Select a File to Upload

PTMP.MA-1.v7.55.42728.img Browse...

Device	Mode	Current version
LigoBase 5-90	Master	PTMP.MA-1.v7.55.41009
LigoSU 5-N	Slave	PTMP.QA-1.v7.55.41096
LigoSU 5-20	Slave	PTMP.QA-1.v7.55.40720

Upload Close

Figure 39: firmware upload

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

After the FW image is successfully uploaded, the dialog box will display table with the LigoPTMP link units. It is now available to choose which devices to upgrade. By default, all devices of the LigoPTMP link (Master and Slaves) are ready for a system firmware upgrade.

FIRMWARE UPDATE

Select a File to Upload

PTMP.MA-1.v7.55.42728.img Browse...

New firmware file uploaded: PTMP.MA-1.v7.55.42728

<input type="checkbox"/>	Device	Mode	Current version
<input checked="" type="checkbox"/>	LigoBase 5-90	Master	PTMP.MA-1.v7.55.41009
<input type="checkbox"/>	LigoSU 5-20	Slave	PTMP.QA-1.v7.55.40720
<input type="checkbox"/>	LigoSU 5-N	Slave	PTMP.QA-1.v7.55.41096

Update Close

Figure 40:firmware upgrade

Update – click to upgrade the device using 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 because the device could be damaged.

Dual boot firmware images

LigoPTMP units have dual-boot firmware, which is installed by the factory on each device. With a new firmware upgrade, the backup firmware is overwritten each time.

Dual boot firmware images

Active firmware: PTMP.MA-1.v7.55.41097

Backup firmware: PTMP.MA-1.v7.55.41047 (Activate)

*Note: updating firmware image always replaces backup firmware image and activates it automatically after reboot!**Figure 41: dual-boot firmware images*

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

Network device configuration management

Network devices

New slave device config: Backup whole network config:

Figure 42: network device configuration

Backup whole network configuration – click **Backup** to download the configuration files of the entire LigoPTMP link. The downloaded file will contain two configurations: Masters and Slaves.

New slave device configuration – click to set up and download a new configuration file for the Slave unit. After clicking **Create**, a dialog window with the Slave configuration parameters appears:

NEW SLAVE DEVICE CONFIGURATION

Friendly name:

Location:

Latitude:

Longitude:

Height AGL, m:

IPv4 settings

IP method: ▾

DHCP IP fallback

IP address:

Subnet mask:

Default gateway:

Figure 43: Slave device configuration setup

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



Support

The **troubleshooting file** contains valuable information about device configuration, log files, command outputs, etc. 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.

TROUBLESHOOTING

Troubleshooting file: Download

System Log

Read log

```

May 14 03:08:00 syslogd started: BusyBox v1.21.1
May 14 03:08:00 kernel: [ 3.124968] 5 cmdlinepart partitions found on MTD device armada-nand
May 14 03:08:00 kernel: [ 3.131345] 5 cmdlinepart partitions found on MTD device armada-nand
May 14 03:08:00 kernel: [ 3.137718] Creating 5 MTD partitions on "armada-nand":
May 14 03:08:00 kernel: [ 3.142963] 0x000000000000-0x000000380000 : "u-boot"
May 14 03:08:00 kernel: [ 3.148949] 0x000000380000-0x000000600000 : "u-boot-env"
May 14 03:08:00 kernel: [ 3.155211] 0x000000600000-0x000002e00000 : "firmware1"
May 14 03:08:00 kernel: [ 3.161399] 0x000002e00000-0x000005600000 : "firmware2"
May 14 03:08:00 kernel: [ 3.167605] 0x000005600000-0x000007f00000 : "data"
May 14 03:08:00 kernel: [ 3.173827] UBI: attaching mtd3 to ubi0
May 14 03:08:00 kernel: [ 3.177687] UBI: physical eraseblock size: 131072 bytes (128 KiB)
May 14 03:08:00 kernel: [ 3.183972] UBI: logical eraseblock size: 126976 bytes
May 14 03:08:00 kernel: [ 3.584336] o TX Queue support: 8 Queues * 532 Descriptors
May 14 03:08:00 kernel: [ 3.590010] o GSO supported
May 14 03:08:00 kernel: [ 3.592985] o GRO supported
May 14 03:08:00 kernel: [ 3.595961] o Receive checksum offload supported
May 14 03:08:00 kernel: [ 3.600764] o Transmit checksum offload supported
May 14 03:08:00 kernel: [ 3.605655] o Driver ERROR statistics enabled
May 14 03:08:00 kernel: [ 3.610197]
May 14 03:08:00 kernel: [ 3.611812] o Loading network interface(s)
May 14 03:08:00 kernel: [ 3.616103]
                    
```

Figure 44: troubleshooting file download

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

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