Infinite Possibilities

Enterprise Grade PTP and PTMP Solution

User Manual

ENTERPRISE GRADE POINT-TO-POINT AND POINT-TO-MULTIPOINT SOLUTION

This document helps you to understand the product features, configuration, login and logout process of UBR through Graphical User Interface (GUI). This manual guides you through the installation process and the entire software user set.

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HFCL Limited delivers innovative, customized and competitive products and latest solutions in the high technology telecommunications infrastructure sector, thereby enabling its customers to stay ahead of their peers in technology and network efficiency.

The company's core specialization lies in manufacturing and providing a wide range of turnkey solutions. HFCL Limited has implemented several Greenfield projects (setting up CDMA & GSM networks, satellite communications, wireless spectrum management and DWDM optical transmission network), rolled out over 100,000 kilometres of OFC network, implemented over 25,000 2G/3G cell sites, provided high security applications to Defence and has developed expertise in the areas of Railways, Homeland Security and Smart cities.

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1 About this Document

1.1 Purpose

This document helps you to understand and provides information to familiarize you with the product features, installation process and the entire software user set.

1.2 References

Following documents can be referred:

1. EMS User Manual

1.3 Intended Audience

The intended audiences for this document are:

- Network Administrators
- System Administrators
- Product managers
- System Integration and Verification team at HFCL Limited

1.4 Document Conventions

The different conventions used in this document are explained in the following table:

Convention	Description
Note	Note provides information about important features or instructions. This appears with a background.
Caution	This alerts you to potential damage to a program, device, or system. This appears with a background.
Warning	This alerts you to potential injury or fatality. It may also alert you to potential electrical hazards. This appears with a background.
`Courier new font`	`File and directory names are represented in Courier New font.`
Bold font	Any option that needs to be selected or typed in the user interface is represented using bold font.
<home_directory>	Command variables, the values of which you must supply.
cd$HOME	A command that you must enter in a Command Line Interface (CLI) exactly as written. This appears with a background.

1.5 Terms and Abbreviations

The different terms and abbreviations used in this document are explained in the following table:

Terms/Abbreviation	Expansion
AP	Access Point
BLE	Bluetooth Low Energy
CLI	Command-Line Interface
COS	Class Of Service
CPU	Central Processing Unit
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DSCP	Differentiated Services Code Point
EMS	Element Management System
GI	Guard Interval
GPS	Global Positioning System
GUI	Graphic User Interface
HAL	Hardware Abstraction Layer
HTTP	Hypertext Transfer Protocol
IEEE	Institute Of Electrical And Electronics Engineers
IP	Internet Protocol
IPV4	Internet Protocol Version 4
IPV6	Internet Protocol Version 6
KBPS	Kilobits Per Second
L2TP	Layer 2 Tunneling Protocol
L2VPN	Layer 2 Virtual Private Network
LAN	Local Area Network
LED	Light-Emitting Diode
LMAC	Lower Media Access Control

MAC	Media Access Control
Mbps	Megabits Per Second
MCS	Modulation And Coding Scheme
MIMO	Multiple-Input And Multiple-Output
MPEG	Moving Picture Experts Group
MTU	Maximum Transmission Unit
NTP	Network Time Protocol
OSD	On Screen Display
P2MP	Point-To-Multipoint
P2P	Point-To-Point
PCP	Priority Code Point
PoE	Power Over Ethernet
PTZ	Pan, Tilt, Zoom
QAM	Quadrature Amplitude Modulation
QOS	Quality Of Service
RFID	Radio Frequency Identification
RJ	Registered Jack
RSSI	Elative Received Signal Strength
Rx	Reception
SNMP	Simple Network Management Protocol
SNR	Signal-To-Noise Ratio
SSH	Secure Shell
STA	Station
TDMA	Time-Division Multiple Access
Tx	Transmission
U-BOOT	Universal Boot-Loader
UBR	Unlicensed Band Radio
UID	User Id

UTP	Unshielded Twisted Pair
VAP	Virtual Access Point
VGA	Video Graphic Adapter
VLAN	Virtual Local Area Network
WAN	Wide Area Network
WDS	Wireless Distribution System
WIDS	Wireless Intrusion Detection System
WLC	Wireless Lan Controller
WPA	Wi-Fi Protected Access

2 Product Overview

Thank you for choosing the IO's Unlicensed Band Radio (UBR). Enterprise Grade point-to-point and point-to-multipoint solution is optimally designed to support low to medium capacity enterprise applications in unlicensed 5 GHz spectrum for short and long range links. Its high precision integrated GPS sync technology allows reuse of the same channel at collocated sites thereby delivering maximum capacity in minimum spectrum

The UBR Configuration is controlled through CLI, UBR GUI and EMS.

3 Federal Communication Commission Certified

These equipment are tested and found to comply with the limits for a Class A 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.

These 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 these 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:

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

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. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement:

These equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. These equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

These devices complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. These devices may not cause harmful interference
2. These devices must accept any interference received, including interference that may cause undesired operation.

3.1 2x2 UBR with integrated/external antennas

The UBR has two factory fitted variants: one with integrated antennas and the other with connectors for external antennas.

Figure 1: UBR with integrated/external antennas - Specifications & Highlights-1

FEATURES	UBR 2x2 (ion4l/ion4le)
Power Supply	IEEE 802.3af PoE
Power Consumption (max)	12 W
Antenna Type	Integrated directional antenna or External antenna with dual pole polarization
Integrated 1588v2 Grandmaster Clock	N/A
Ethernet support/ Ports/Interface	1 X 10/100/1000BASE-T Ethernet
Management	Standalone (via GUI) or through appliance-based EMS or cloud-based
Operating Range	10-12 km
Operating Altitude	3050 meter
Enclosure Type	Two-piece enclosure with UV protected ABS + PC top and bottom body, and aluminium heat sink at bottom
Enclosure Dimensions	185 x 170 x 65 mm
Weight	0.775 kg
Operating Temperature	-15°C to 60°C
Humidity	5 to 95% (non-condensing)
Certifications	FCC Class A, CE, IP 67

Figure 2: UBR with integrated/external antennas - Specifications & Highlights-2

1. Ion4l: 2x2:2 Unlicensed Band Radio (UBR) with mounting bracket (Integrated Antenna)
2. Ion4le: 2x2:2 Unlicensed Band Radio (UBR) with mounting bracket (External Antenna)

4 Hardware Setup

4.1 System Requirements

Before installing the UBR, make sure that your system includes the following:

1. 10/100/1000 Mbps local area network device such as a hub or switch**.**
2. The Category 5 UTP straight-through Ethernet cable with RJ-45 connector included in the package, or one like it**.**
3. We can power up the device through PoE adapter which should be 803at/af compliant. A 100–240 V, 50–60 Hz AC power source.
4. A web browser to configure the devices.

4.2 Packaging Content

Your package contains the following items.

1. 2x2 UBR with integrated antennas or options for external antennas.
2. Mounting kit
3. Quick Start Guide with cabling and UBR setup instructions. If any parts are incorrect, missing, or damaged, contact HFCL Limited customer care support.

5 Getting to Know the IO UBR

5.1 2x2 UBR - Front / Side View

A basic overview of the front/side view of the 2x2 UBR is given below:

Figure 3: Front/side view of the 2x2 UBR

Information displayed in the above figure is detailed in the table below:

Table 1: List of information displayed in front/side view of the 2x2 UBR

Callout	Name	Description
1.	Link LED	This LED will blink in Red color once the link has been established
2.	Alarms LED	This LED will blink in Yellow color when alarms are raised in the device
3.	Power LED	This LED will blink in Green color to notify the user that device is powered ON
4.	PoE/LAN port	This port works as both PoE power and LAN as well (power/traffic)
5.	External antenna connectors	Total 2 n-type antenna connectors

5.2 2x2 UBR - Back View

A basic back side overview of the 2x2 UBR is given below:

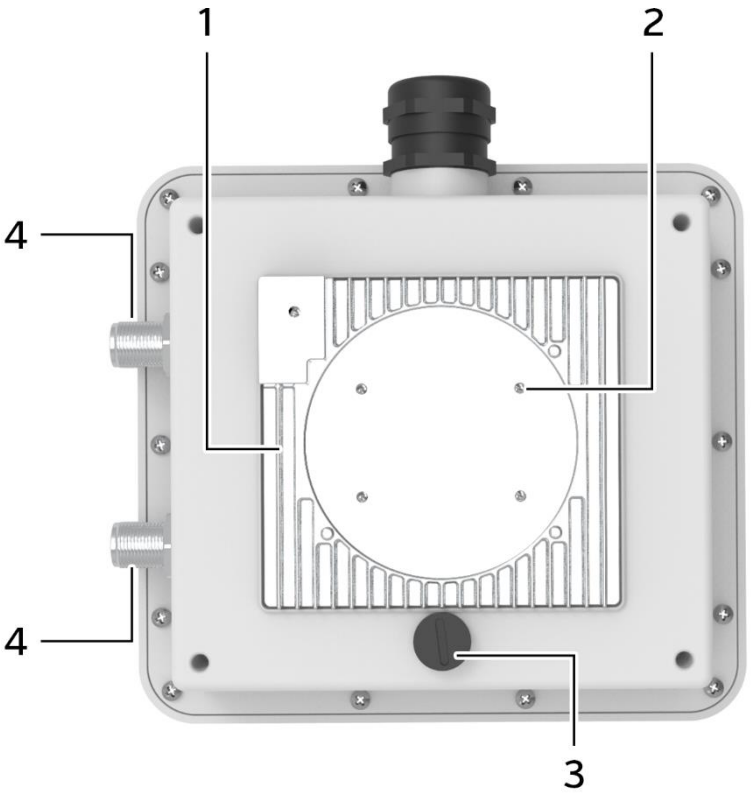

Figure 4: Back view of the 2x2 UBR

Information displayed in the above figure is detailed in the table below:

Table 2: List of information displayed in back view of the 2x2 UBR

Callout	Name	Description
1.	Thermal Plate (Heat Transfer)	It helps in heat transfer from the board environment to Ambient.
2.	Mounting holes	Mounting bracket is attached through these holes in case of pole and wall mounting of the UBR
3.	Humidity controller cap	Cap to control the humidity
4.	External antenna connectors	Total 2 n-type antenna connectors

Note: The Reset button is inside the 2x2 UBR device located below the humidity controller cap. Turn the humidity controller cap in counter clock wise and remove it from the access point. It serves two functions:

1. Restart: Press and release the Reset button quickly.
2. Restore to Factory Default Settings: Press and hold the Reset button for more than five seconds.

6 Initial Setup

Observe the following safety precautions and avoid damage to the UBR:

1. Do not power the device during installation.
2. Do not subject the device to high temperatures.
3. Keep away from high voltage cables.
4. Disconnect the device before cleaning it.
5. Do not wipe the device with a damp cloth.
6. Do not wash the device with liquid.
7. Do not open the enclosure when the UBR is working.
8. Fasten the device tightly.

UBR: Power up the device using power over ethernet.

Figure 5: Basic overview of the device power up

7 Connect to the UBR

Follow the steps mentioned below and connect to the UBR through GUI:

1. Configure a computer with a 1-domain static IP address e.g. 192.168.1.198 and a subnet mask of 255.255.255.0.
2. For help configuring a static IP address on your computer, check the instructions or online help that came with that computer.
3. Connect the Ethernet cable to the computer.
4. Connect the other end of the Ethernet cable to the PoE/LAN port on the UBR.
5. Connect the UBR's PoE supported ethernet port (eth0) to PoE injector or PoE switch. Device will be powered On.
6. Open a web browser and enter the "UBR static IP address" in the address bar. The default static IP address is set to 192.168.1.1.
7. A login screen will appear.

7.1 Login through GUI

This is the 1st screen of UBR GUI. It provides access to the users with valid login credentials only. The login credentials will determine the access rights of the user. For more details on access rights and respective roles refer to "User Management" section in this document.

A basic overview of the same is shown below:

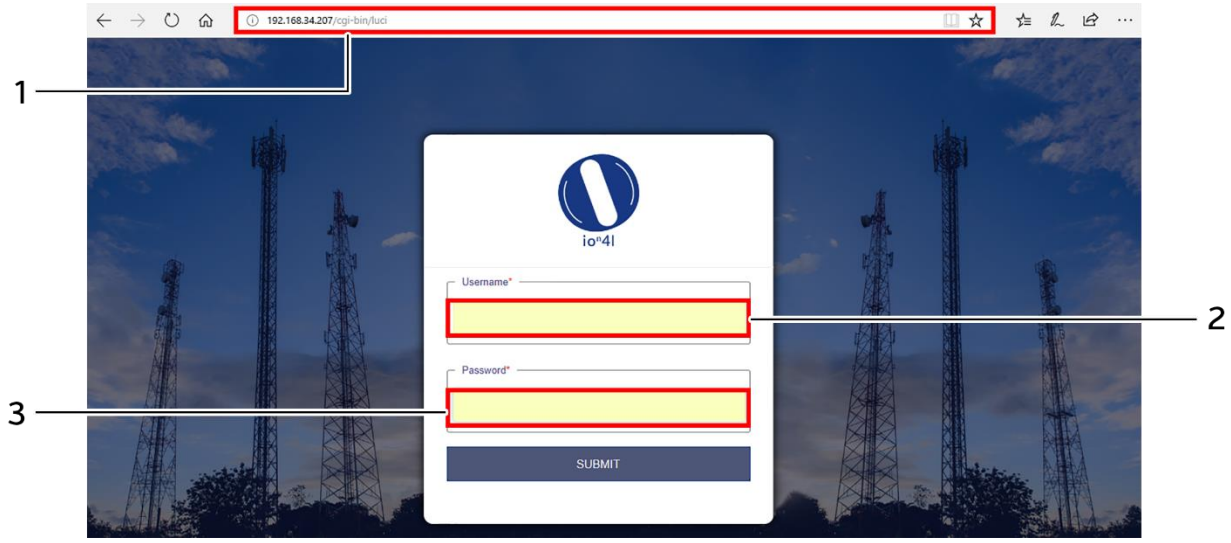

Figure 6: Basic overview of login screen

Follow the steps given below to login through GUI:

Table 3: List of actions to login through GUI

Callout	Name	Description
1.	Web browser	Open a web browser and enter the "UBR IP address" in the address bar
2.	User name	Enter the valid "User ID"
3.	Password	Enter the valid "Password"

Click on "Submit", a successful/authenticated login will take the user to Status Overview screen.

8 Screen toolbars

The toolbars on the screen are designed for the ease of user and to aid them in accessing information. Each toolbar has its own options, through which the user can perform various activities or can view various information.

There are two toolbars provided with each screen as listed below:

1. Overview toolbar on the top
2. Navigation toolbar on the left

8.1 Overview toolbar on the top

From this toolbar, the user can view or hide the backhaul network overview of the UBR at any point of time. The backhaul network overview is available in both tabular and graphical format.

The user can click on "Table/Graphic/All" option to view the backhaul network overview in tabular/graphical/all formats respectively. The user can click again on the same option to hide the same. The user can update the configuration of the respective UBR and can monitor the impact on the system from this toolbar without leaving the working screen.

A basic overview of the information displayed in the toolbar is given below:

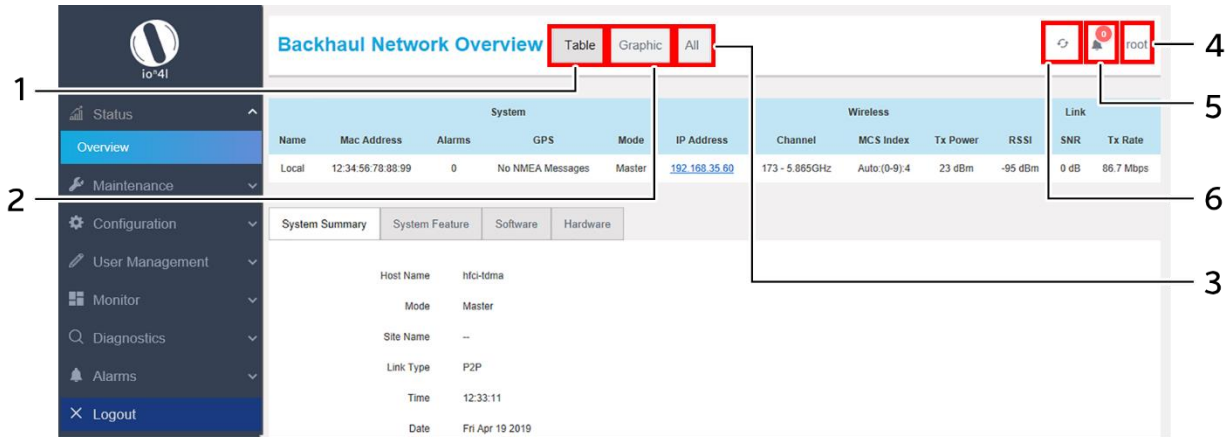

Figure 7: Basic overview of toolbar on top

CONFIDENTIAL

The list of actions available at overview toolbar on the top is as follows:

Table 4: List of actions at overview toolbar on the top

Callout	Name	Description
1.	Table	Click on the "Table" option to view the backhaul network overview in a tabular format. Click on the "Graphic" option to hide the table and view the graphical overview
2.	Graphic	Click on the "Graphic" option to view the backhaul network overview in a graphical format. Click on the "Table" option to hide the graphical overview and view the tabular overview
3.	All	Click on the "All" option to view the backhaul network overview in both tabular and graphical format.
4.	User	The name of the user is displayed
5.	Bell Icon	Click on the bell icon to view all alarms and notifications of respective UBR. The user will be directed to Alarm listing page once clicked.
6.	Refresh	Click on the icon and refresh the page

The user can click on "Table" option to view the backhaul network overview in tabular format. The tabular format of the backhaul network overview shows following details:

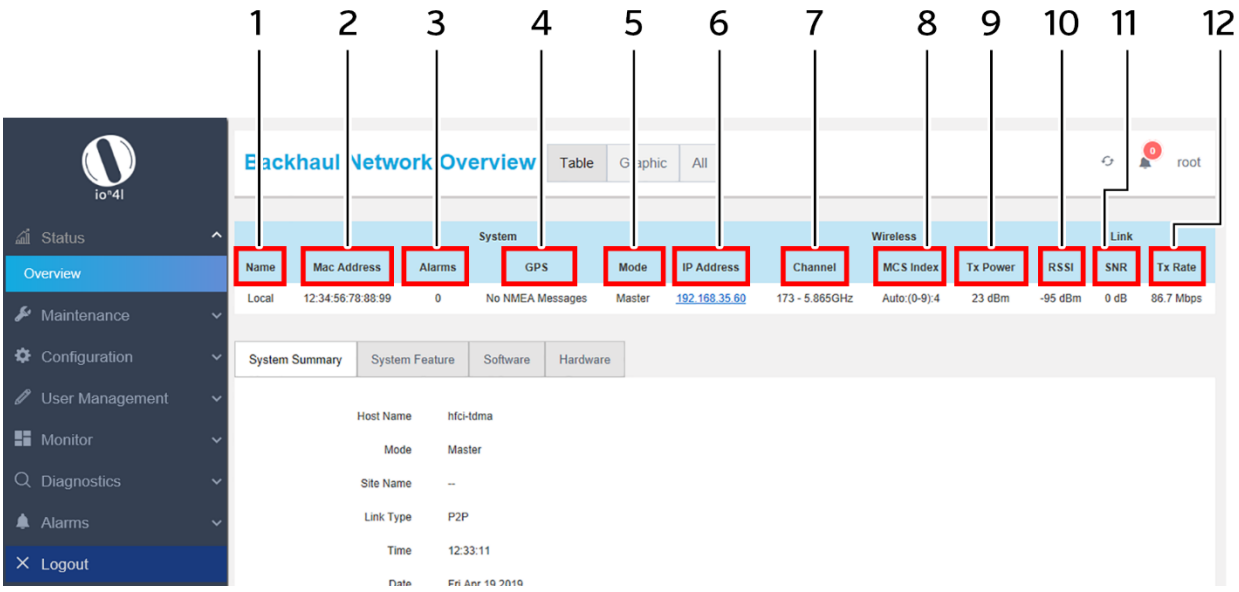

Figure 8: Tabular format of Backhaul Network Overview

Table 5: Details in tabular format of backhaul network overview

Callout	Name	Description
	System	
1.	Name	Displays the name of the site, either local or peer
2.	MAC Address	Displays the MAC address of the respective device
3.	Alarms	Displays the number of alarms raised in the system
4.	GPS	Displays the status of the GPS. Either locked or still searching
5.	Mode	Displays the acting mode (Master or Slave) of the respective UBR in the link (P2P or P2MP). The same is configured in the "Link settings" section
6.	IP Address	Displays the IP address of the respective UBR
	Wireless	
7.	Channel	Displays the current channel being used by the wireless port of the device
8.	MCS Index	Displays the MCS modulation index number. This is the unique reference given to the combination of "number of spatial streams + modulation type + coding rate"
9.	Tx Power	Displays the transmission power at which the wireless radio signal is being transmitted
	Link	
10.	RSSI	Displays the RSSI value. The value determines the power present in the received radio signal
11.	SNR	Signal-to-noise ratio (abbreviated SNR or S/N) is a measure that compares the level of a desired signal to the level of background noise. SNR is defined as the ratio of signal power to the noise power, often expressed in decibels. A ratio higher than 1:1 (greater than 0 dB) indicates more signal than noise.
12.	Tx Rate	Tx rate measures how much data is transmitted in a given amount of time. Tx rate is commonly measured in bits per second (bps), kilobits per second (Kbps), or megabits per second (Mbps).

The user can click on "Graphic" option to view the backhaul network overview in graphical format. The graphical format of the backhaul network overview shows following details:

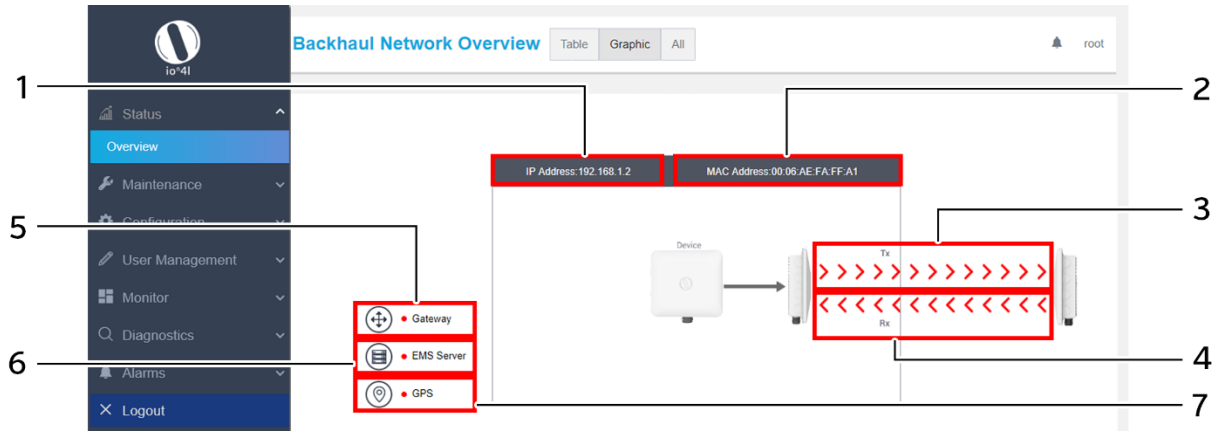

Figure 9: Graphical format of Backhaul Network Overview

Table 6: Details in graphical format of Backhaul Network Overview

Callout	Name	Description
1.	IP	Displays the IP address of the respective UBR
2.	Master MAC Address	Displays the MAC address of the master device in the link
3.	Tx Link	Displays the colour coded representation of the Tx link. The "Green" colour indicates good link and the "Red" colour indicates the broken link
4.	Rx Link	Displays the colour coded representation of the Rx link. The "Green" colour indicates good link and the "Red" colour indicates the broken link
5.	Gateway	Displays the colour coded representation of the gateway status. The "Green" colour indicates that the gateway is up and running and the "Red" colour indicates that the gateway is down
6.	EMS Server	Displays the colour coded representation of the EMS server status. The "Green" colour indicates that the EMS server is up and running and the "Red" colour indicates that the EMS server is down
7.	GPS status	Displays the colour coded representation of the GPS status. The "Green" colour indicates that the GPS is up and locked and the "Red" colour indicates that the GPS is still searching and is not locked yet

The user can click on “All” option to view the backhaul network overview in both tabular and graphical format as shown in the figure below.

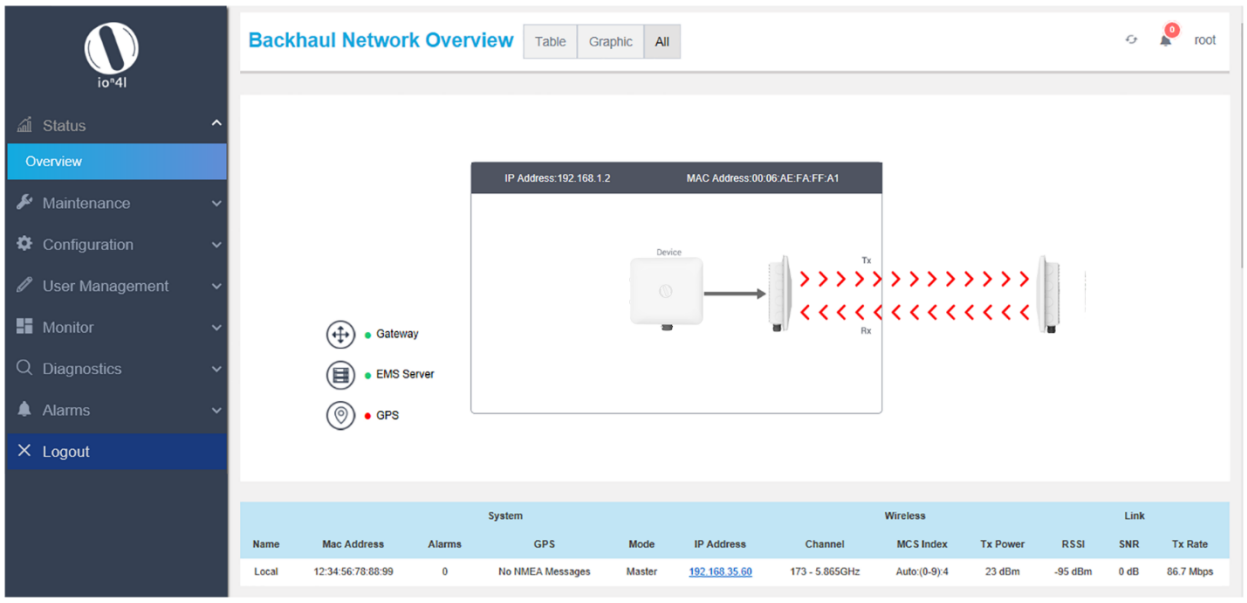

Figure 10: Graphical and tabular format of Backhaul Network Overview

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8.2 Navigation toolbar on the left

The navigation toolbar aid the user to move from one screen to other. It further provides various options to the user for:

1. UBR's System Status Overview
2. UBR's System Maintenance
3. UBR's System Configuration
4. UBR's User Management
5. UBR's Performance Monitoring
6. UBR's Diagnostics
7. UBR's Alarms
8. Logout

A basic overview of navigational toolbar options is shown below:

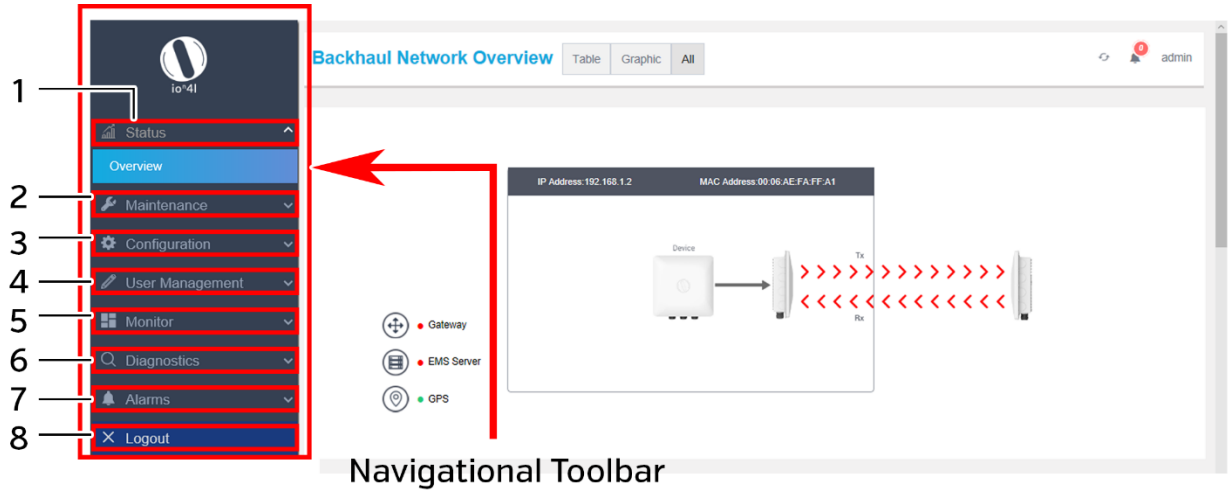

Figure 11: Basic overview of navigational toolbar

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9 Status overview screen

The screen provides the status overview of:

1. System summary
2. System feature
3. Software
4. Hardware

9.1 System summary

A basic layout of the system summary is given below:

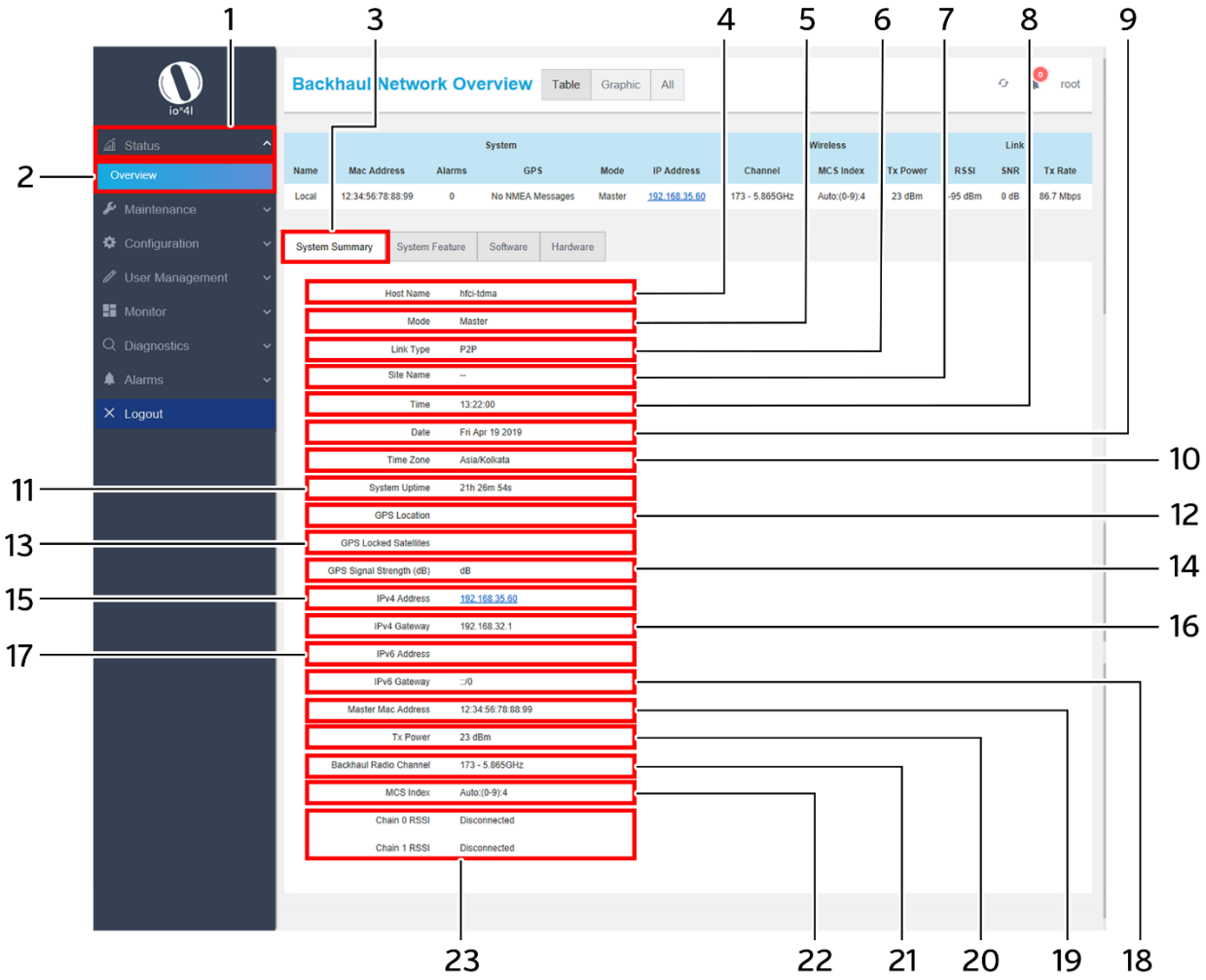

Figure 12: Basic layout of the system summary screen

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Follow the steps given below to view the system summary:

Table 7: List of information displayed in the system summary

Callout	Name	Description
1.	Status	Click on the "Status" dropdown in navigational toolbar
2.	Overview	Click on "Overview" option
3.	System summary	Click on "System summary" option
4.	Hostname	Displays the "Hostname" assigned to the respective UBR in the "System Configuration" screen
5.	Mode	Displays the acting mode (Master or Slave) of the respective UBR in the P2P or P2MP link. The same is configured for the UBR in the "Link settings" section
6.	Link Type	Displays the role of the respective UBR in the link. Either the device is participating in P2P link or P2MP link. The same is configured in the "Link settings" section
7.	Site Name	Displays the name of the site with which the respective UBR is associated to. The site name is given in the "System Configuration" screen
8.	Time	Displays the time details according to the time zone allocated in the "System Configuration" screen
9.	Date	Displays the date details according to the time zone allocated in the "System Configuration" screen
10.	Time Zone	Displays the selected time zone according to which the date and time calculations are done for the respective UBR. The same is configured in the "System Configuration" screen
11.	System uptime	Displays the time duration since the respective UBR board is up and successfully running without any shutdown
12.	GPS Location	Displays the locked position of the GPS in coordinate system. If the GPS status (13) is still in "searching" state, no coordinates will be displayed.
13.	GPS Locked Satellites	Displays the number of satellites contributing for the calculation of GPS location
14.	GPS Signal Strength	Displays the signal strength of GPS and is expressed in dB
15.	IPv4 Address	Displays the assigned IPv4 address of the UBR
16.	IPv4 Gateway	Displays the assigned IPv4 gateway address of the UBR
17.	IPv6 Address	Displays the IPv6 address, if assigned to the UBR or displays "Not connected" if no IPv6 address is assigned to the UBR
18.	IPv6 Default Gateway	Displays the IPv6 Default Gateway, if assigned to the UBR or displays "Not connected" if no IPv6 Default Gateway is assigned to the UBR
19.	Master MAC Address	Displays the MAC address of the master device
20.	Tx Power	Displays the power of wireless radio signal being transmitted over the link

Callout	Name	Description
21.	Backhaul Radio Channel	Displays the wireless radio channel being used for transmission
22.	MCS Index	Displays the MCS index
23.	RSSI per chain	Displays the RSSI value of connected chains or displays "Disconnected"

9.2 System feature

A basic layout of the system features is given below:

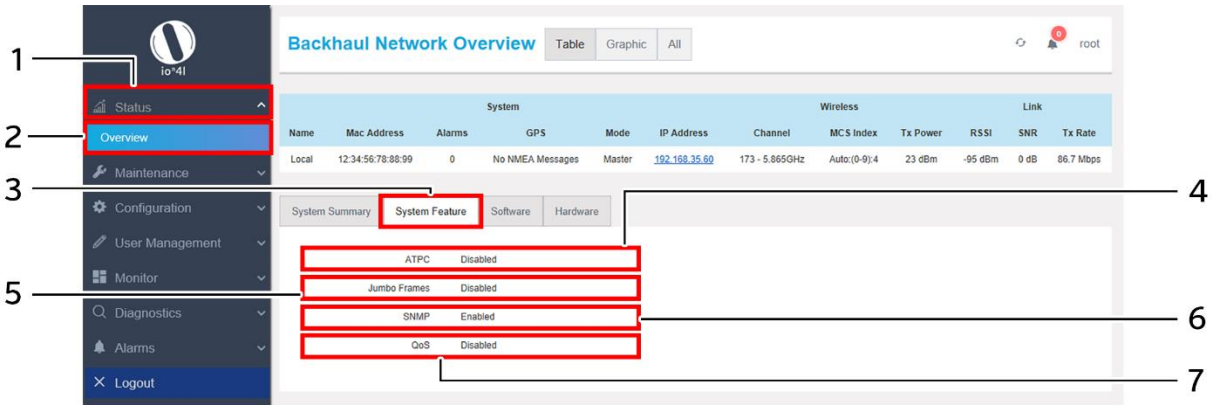

Figure 13: Basic layout of the system feature screen

Follow the steps given below to view the system feature:

Table 8: List of information displayed in the system feature

Callout	Name	Description
1.	Status	Click on the "Status" dropdown in navigational toolbar
2.	Overview	Click on "Overview" option
3.	System feature	Click on "System feature" option
4.	ATPC	Displays "Enabled", if the ATPC setting is configured in configuration/ATPC screen. Displays "Disabled if the same is not configured"
5.	Jumbo Frames	Displays "Enabled", if the Jumbo frames setting is configured in configuration/Jumbo frames screen. Displays "Disabled if the same is not configured"
6.	SNMP	Displays "Enabled", if the SNMP setting is configured in configuration/SNMP screen. Displays "Disabled if the same is not configured"
7.	QoS	Displays "Enabled", if the Quality of Service has been configured in Configuration of traffic management (Quality of Service) screen. QoS is an advanced feature that prioritizes the internet traffic based on the priority level in case of wireless congestion. Different type of traffic such as background, best effort, video, and voice can be configured with four different priority levels (low, medium, high, and highest) respectively

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9.3 System software

A basic layout of the system software is given below:

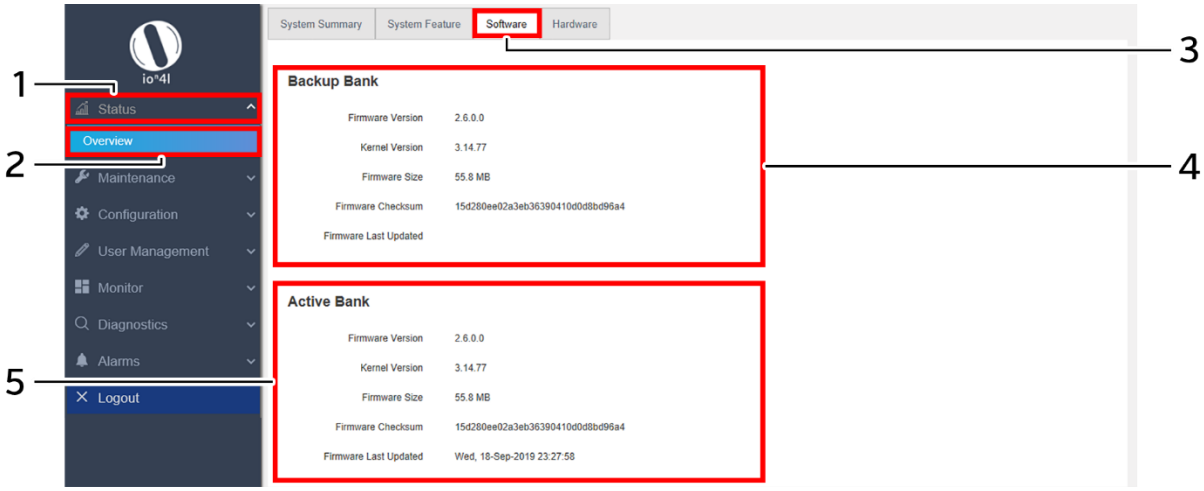


Figure 14: Basic layout of the system software screen

Follow the steps given below to view the system software information:

Table 9: List of information displayed in the system software screen

Callout	Name	Description
1.	Status	Click on the "Status" dropdown in navigational toolbar
2.	Overview	Click on "Overview" option
3.	Software	Click on "Software" option
4.	Backup Bank	Displays the firmware version available in the alternate drive of the respective UBR. The operating system is based on openwrt project model
5.	Active Bank	Displays the firmware version available in the current drive of the respective UBR

9.4 System hardware

A basic layout of the system hardware is given below:

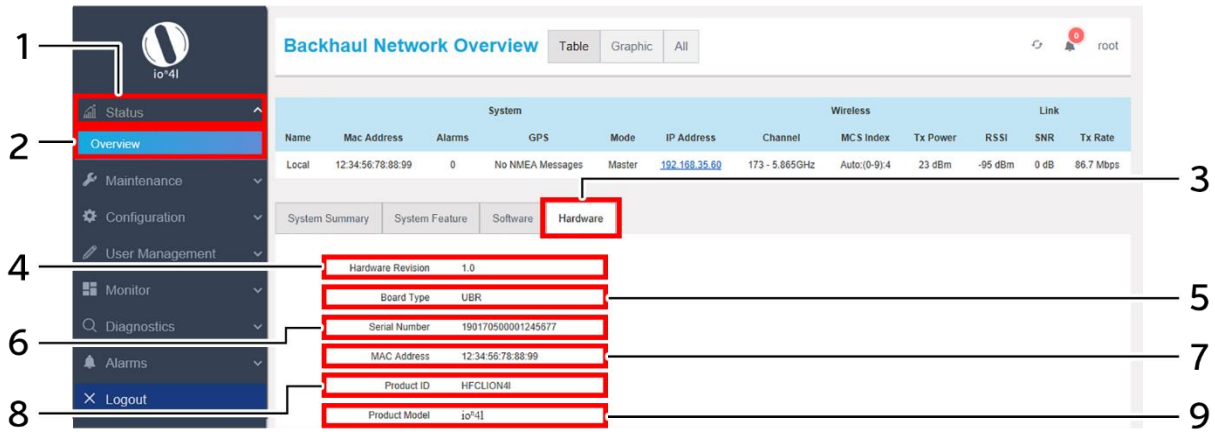


Figure 15: Basic layout of the system hardware screen

Follow the steps given below to view the system hardware information:

Table 10: List of information displayed in the system hardware screen

Callout	Name	Description
1.	Status	Click on the "Status" dropdown in navigational toolbar
2.	Overview	Click on "Overview" option
3.	Hardware	Click on "Hardware" option
4.	Hardware Revision	Displays the current hardware version of the respective UBR
5.	Board Type	Displays the board type of the respective device
6.	Serial Number	Displays the serial number of the respective UBR. The same is configured with the factory settings of the device and reflects in this section on system boot up
7.	MAC-Address	Displays the MAC address assigned to the product. The same is configured with the factory settings of the device and reflects in this section on system boot up
8.	Product ID	Displays the ID of the product. The same is configured with the factory settings of the device and reflects in this section on system boot up
9.	Product Model	Displays the model number of the product, ion4l/ion4le in case of 2x2 UBR. The same is configured with the factory settings of the device and reflects in this section on system boot up

10 Maintenance screen

The maintenance activities of the connected UBR are executed from this screen. The list of options available for the user is given below:

1. Backup/Flash Firmware
2. Reboot
3. Factory Reset

10.1 Backup/Flash Firmware

Downloading the configuration files at an external drive location and updating the configuration files from an external file is a common feature. It helps the user to keep a backup of different configuration files and even makes it easier to apply the same in multiple devices. The UBR device supports dual firmware.

10.1.1 Generate Backup

Download the existing configuration of the device in a file with this option. The user can use this backup file and apply the same configuration again from **Upload configuration or backup** screen. This avoids configuration of each and every parameter again and again, if a similar configuration is already available in the backup files.

A basic overview of the Backup/Flash Firmware screen to generate the backup is given below:

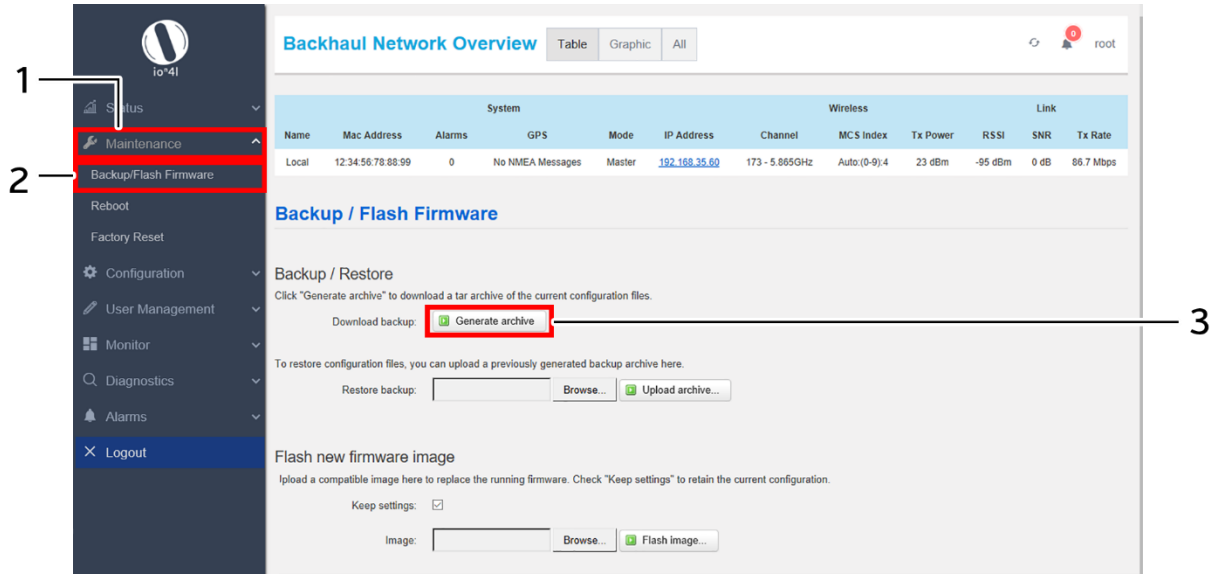


Figure 16: Basic overview of the backup/flash firmware screen to generate backup

Follow the steps given below to generate a backup of current device's configuration and files:

Table 11: List of actions to generate a backup of current device's configuration and files

Callout	Name	Description
1.	Maintenance	Click on "Maintenance" dropdown in navigation tollbar
2.	Backup/Flash Firmware	Click on "Backup/Flash Firmware" option

Callout	Name	Description
3.	Download backup	Click on "Generate archive" option to download the backup. The user can select the location in his computer to extract and save the configuration and system files.

10.1.2 Upload configuration or backup

Use an existing valid configuration file or device backup file and change the device parameters respectively from this screen. The user can apply similar configuration to multiple devices or can apply different type of configurations to various set of devices with minimal of the effort.

A basic overview of the Backup/Flash Firmware screen to upload data and configuration from an external file is given below:

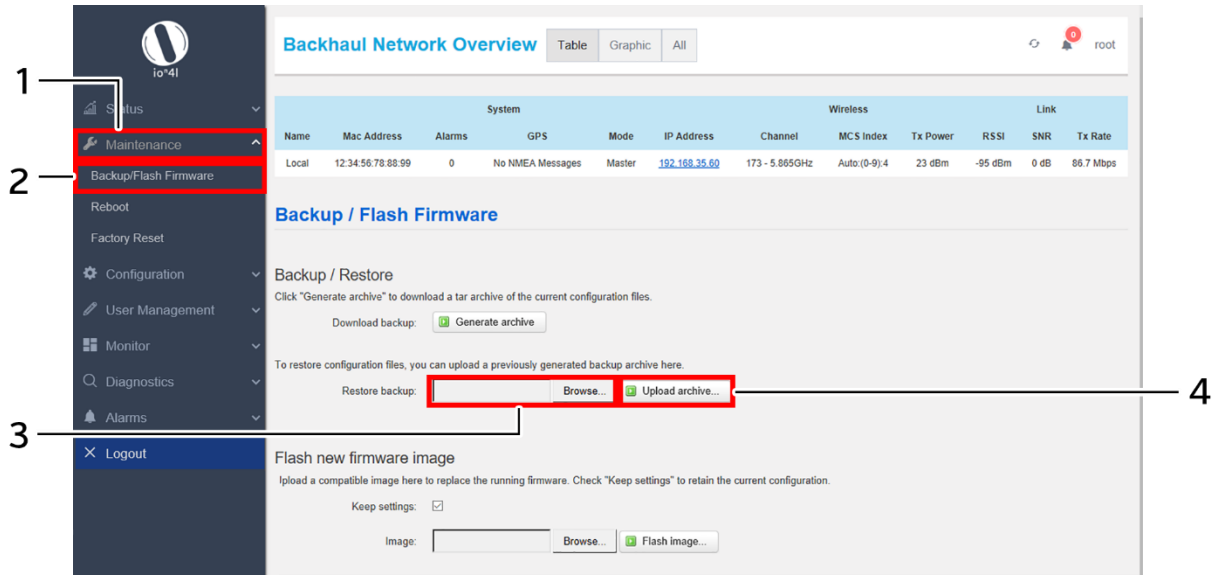


Figure 17: Basic overview of the backup/flash firmware screen to upload configuration

Follow the steps given below to upload data and configuration from an external file:

Table 12: List of actions to upload configuration from an external file

1.	Maintenance	Click on "Maintenance" dropdown in navigation tollbar
2.	Backup/Flash Firmware	Click on "Backup/Flash Firmware" option
3.	Browse/Restore backup	Click on "Browse" option and select the file in your computer to and restore the backup file or any other valid configuration file
4.	Restore backup	Click on "Upload archive" option to apply the configurations from selected file

10.1.3 Upgrade firmware

The firmware is stored in the flash memory and can be updated with new versions to include new features or to modify the existing one. This UBR has two partitions. The new firmware version is always uploaded in the alternate partition (Backup Bank) to keep the current firmware image restored which is located in the current partition (Active Bank) of UBR. When we upgrade the device with new firmware, the device reboots and the new firmware from the alternate drive becomes the active firmware in current partition (Active Bank) and the old firmware becomes the backup firmware in alternate drive (Backup Bank). If any issues found in new firmware, the backup firmware will be booted.

A basic overview of the Backup/Flash Firmware screen to upgrade the firmware from an external file is given below:

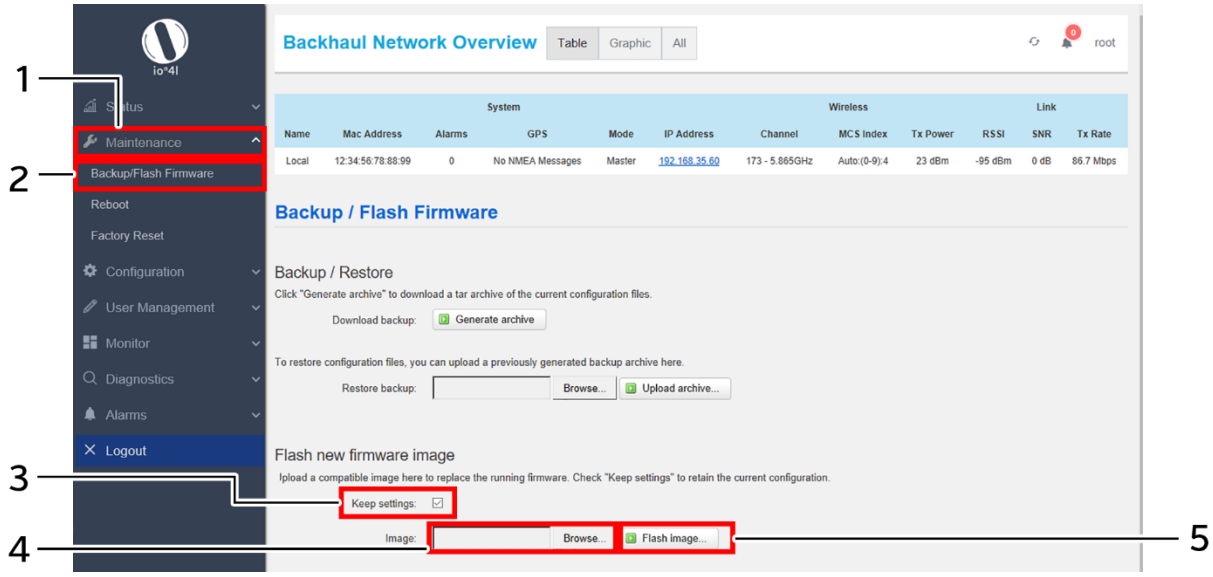
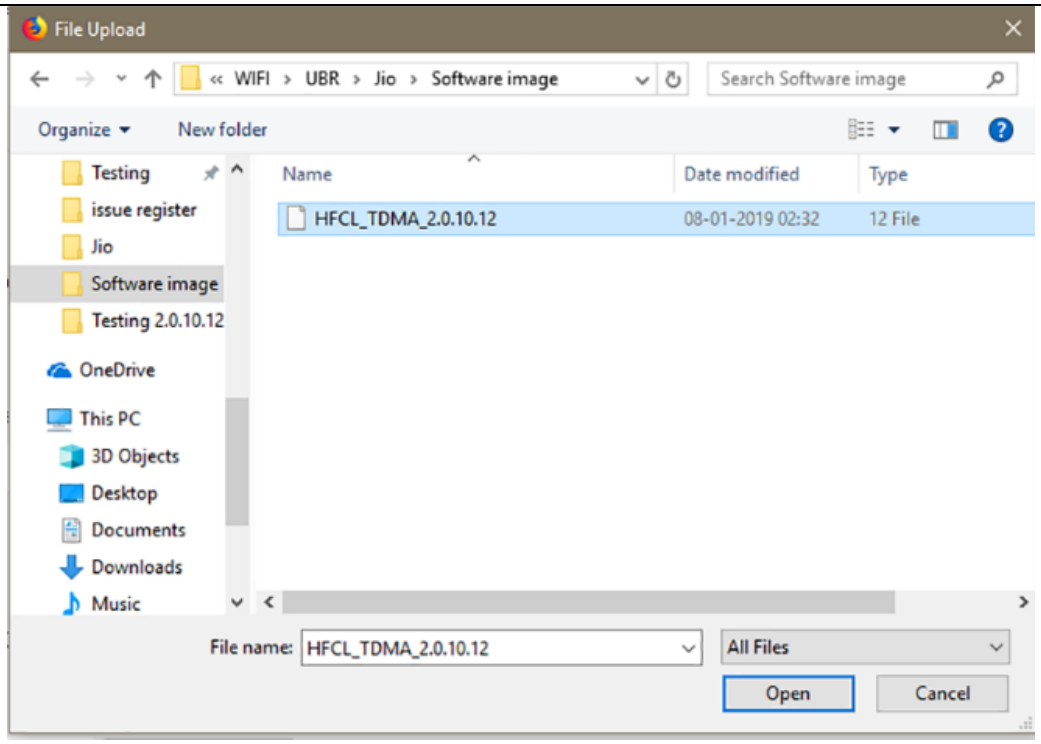


Figure 18: Basic overview of the backup/flash firmware screen to upgrade the firmware

Follow the steps given below to upgrade the firmware from an external file:

Table 13: List of actions to upgrade the firmware from an external file

1.	Maintenance	Click on "Maintenance" dropdown in navigation tollbar
2.	Backup/Flash Firmware	Click on "Backup/Flash Firmware" option
3.	Selection box/Keep settings	Click on "Selection box" to retain the existing device configuration (or) deselect the "Selection box" to discard the same while updating the firmware of the device with a new version.
4.	Browse/Image	Click on "Browse" option. A popup window will appear on the screen. Go to the respective folder of software file and select the sysupgrade-compatible image to replace the running firmware. Refer image below.



Click on open, once the compatible images is selected.

5.	Image	Click on “Flash image” to upload a sysupgrade-compatible imagec a`1

It will show a new page, which will have checksum, file size and other information. Refer image below:

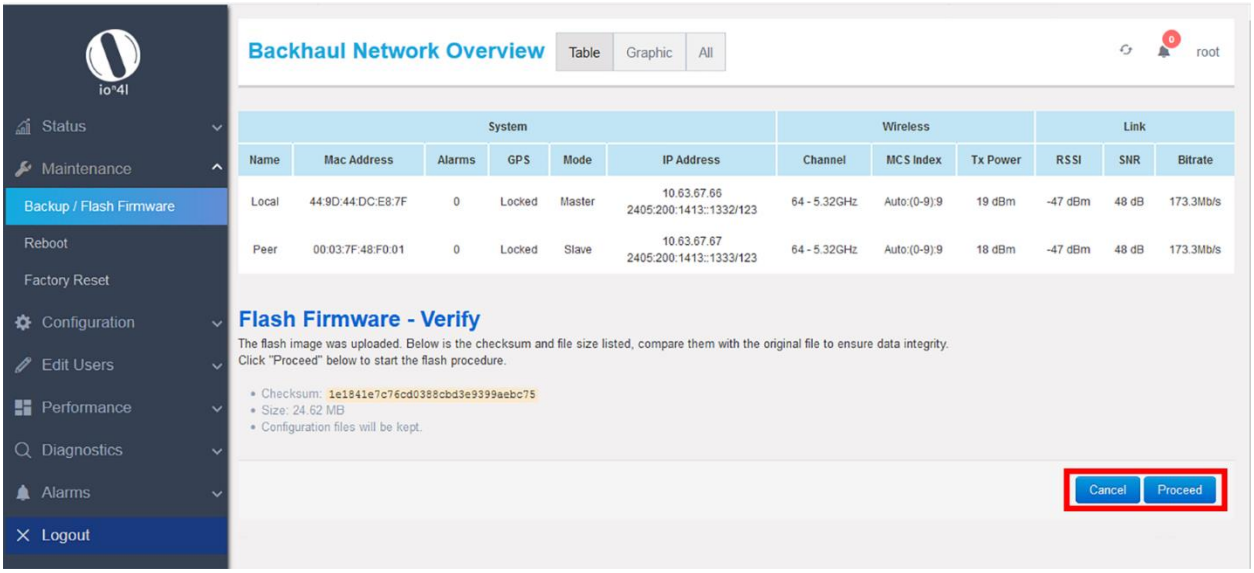


Figure 19: Verify software upgrade

Click on Proceed after checking software version.

10.2 Reboot

Reboot restarts the device with existing configuration. We can change the firmware when the device is rebooted with different partitions. Based on the selected partition, the corresponding firmware will be loaded into the device as working firmware

A basic overview of the Reboot screen is given below:

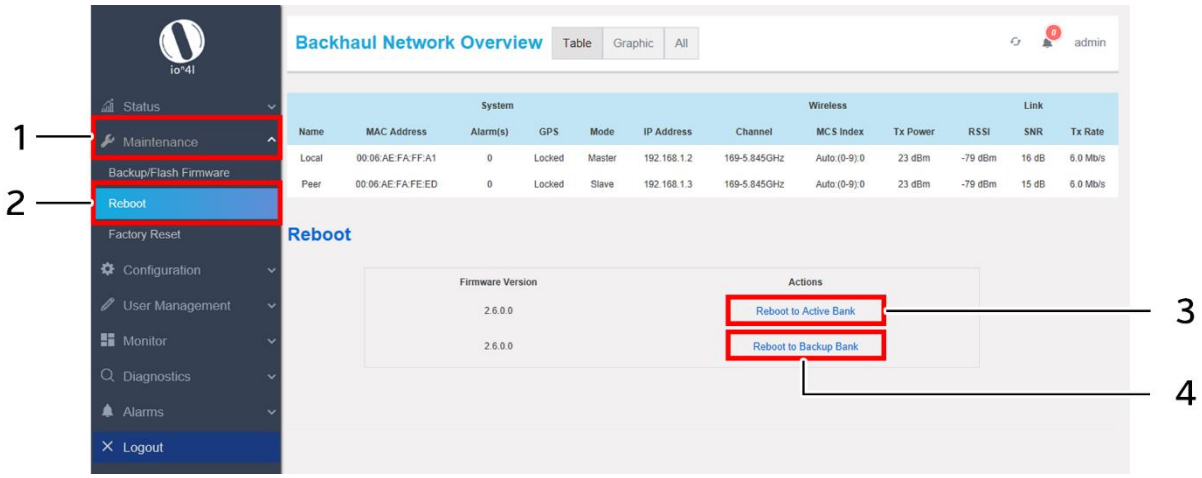


Figure 20: Basic overview of the reboot screen

Follow the steps given below and reboot the UBR:

Table 14: List of actions to reboot the UBR

Callout	Name	Description
1.	Maintenance	Click on "Maintenance" dropdown
2.	Reboot	Click on "Reboot" option
3.	Reboot to Current partition	Click on "Reboot to Active Bank" option. Device will boot from current partition, and the firmware version present in the current partition will be in use
Or		
4.	Reboot to Alternate partition	Click on "Backup Bank" option. Device will boot from alternate partition, and the firmware version present in the alternate partition will be in use. The firmware upgrade always happen on alternate partition. Use this option and reboot to the latest uploaded firmware version.

10.3 Factory Reset

The UBR device has factory assigned settings and configurations on deployment. The user can set the device to the same from this screen. The device will be configured back to factory settings and the existing settings and configurations will be discarded. It is recommended to take backup before setting the device to factory reset.

A basic overview of the Factory Reset screen is given below:

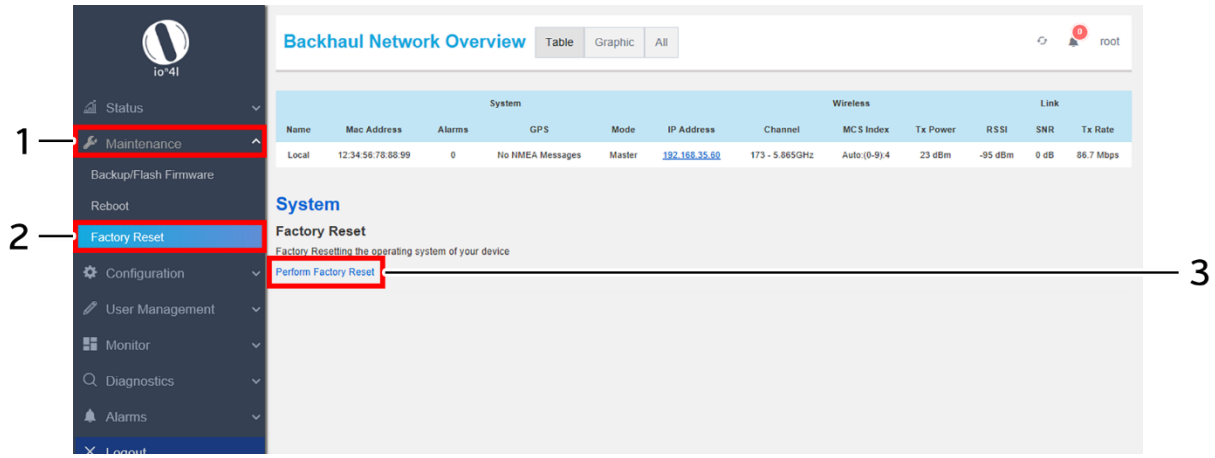


Figure 21: Basic overview of the factory reset screen

Follow the steps given below and factory reset the UBR:

Table 15: List of actions to factory reset the UBR

Callout	Name	Description
1.	Maintenance	Click on "Maintenance" dropdown
2.	Factory Reset	Click on "Factory Reset" option
3.	Perform Factory Reset	Click on "Perform Factory Reset" option to factory reset the respective UBR

11 Configuration screen

Activities with respect to the configuration of connected UBR are executed from this screen. The list of options available for the user is given below:

1. System Configuration
2. Admin Password
3. Network Configuration
4. Jumbo Frames Configuration
5. TDMA Configuration
6. Backhaul Radio Configuration
7. ATPC Configuration
8. SNMP Configuration
9. Alarm Configuration
10. Syslog Configuration
11. QoS Configuration

11.1 System Configuration

The user can configure the basic aspects of the UBR, like its hostname, site name or the timezone. A basic overview of the System Configuration screen is given below:

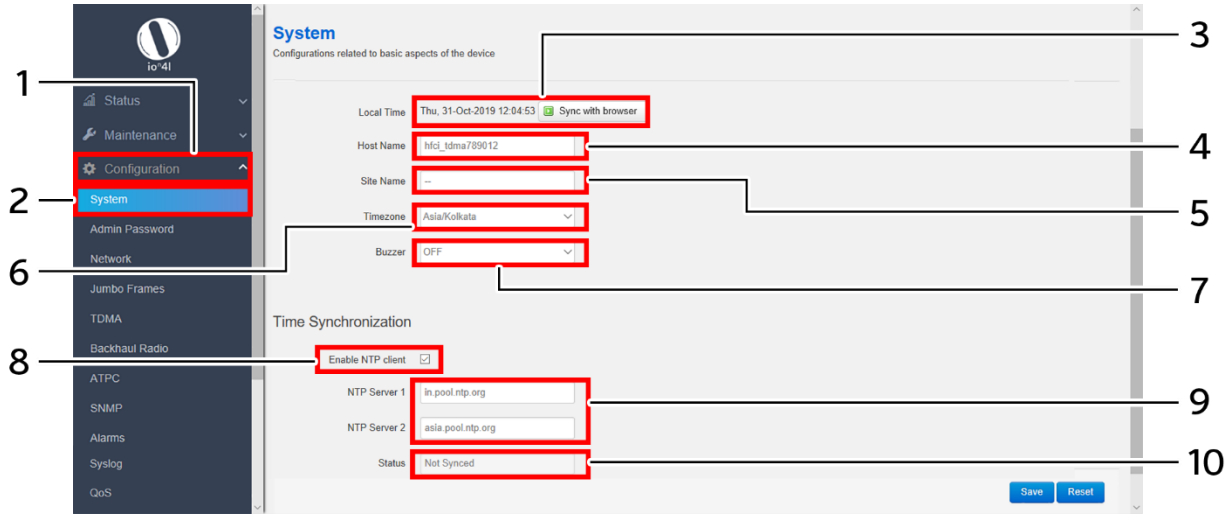


Figure 22: Basic overview of the system configuration screen

Follow the steps given below and configure the system settings for the UBR:

Table 16: List of actions to configure the system settings

Callout	Name	Description
1.	Configuration	Click on "Configuration" dropdown
2.	System Configuration	Click on "System Configuration" option
3.	Local Time	Displays the local date time of the device as per the selected "Time Zone". In case the user is not sure of the time zone, the user can click on the "Sync with browser" option and synchronize the date time with the browser
4.	Hostname	Enter the "Hostname". The same will be reflected in the system summary of status overview screen
5.	Site Name	Enter the "Site name". The same will be reflected in the system summary of status overview screen
6.	Timezone	Select the respective "Timezone" from the dropdown list. The date and time of the respective timezone will be reflected in the system summary of status overview screen
7.	Buzzer	Switch the "Buzzer" ON/OFF with this option. Buzzer is used at the time of link alignment. Rapid buzzer indicates correct alignment of UBR device in a link and slow buzzer indicates the misalignment of UBR device in a link
Note: Make sure to check the RSL in device GUI for final link alignment. The RSL is based on the link budget.		
8.	NTP Client	Click on the check box to enable the NTP client

Callout	Name	Description
9.	NTP Server	Enter the IP address of NTP server 1 and NTP server 2
10.	Status	Displays the status as synced or not synced

Click “Save” to save the system configuration or click “Reset” to configure the same again.

11.2 Configuration of Admin Password

This screen provides the default admin user with options to change the default password. The default username is "root" and the default admin password is "hfcl1". This screen is visible for default admin user only, no other user can view this screen.

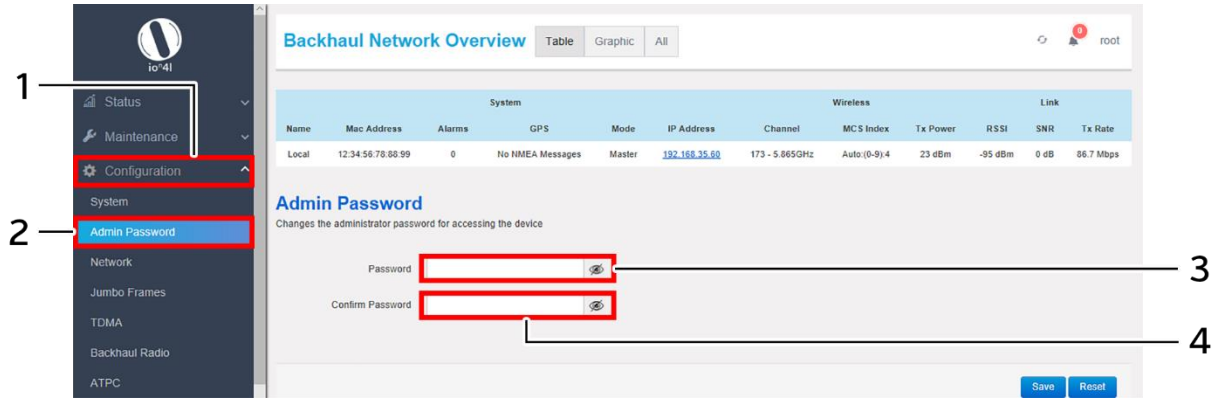


Figure 23: Basic overview of the system admin password configuration screen

Follow the steps given below and configure the system admin password for the UBR:

Table 17: List of actions to configure the system settings

Callout	Name	Description
1.	Configuration	Click on "Configuration" dropdown
2.	Admin Password	Click on "Admin Password" option
3.	Password	Enter the new "Password"
4.	Confirm Password	Enter the password again and confirm the password"

Click "Save" to save the system admin password configuration or click "Reset" to configure the same again.

11.3 Network configuration

A basic overview of the Network screen is given below:

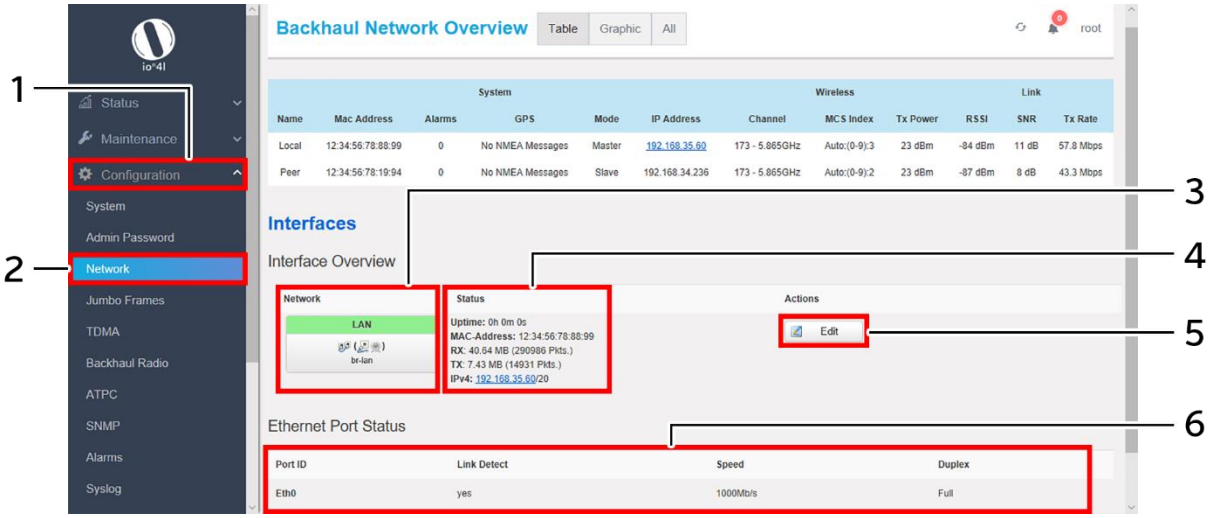


Figure 24: Basic overview of the network configuration screen

Follow the steps given below to view/edit the network configuration:

Table 18: List of actions to view/edit the network configuration

Callout	Name	Description
1.	Configuration	Click on "Configuration" dropdown
2.	Network	Click on "Network" option
3.	Network/Interface overview	Displays the type of network interface. The above figure shows the LAN interface overview
4.	Status	Displays the status of the LAN interface with the respect to the parameters shown in above figure
5.	Edit	Click on "Edit" option to configure the LAN-interface settings
6.	Ethernet Port Status	Displays the status of Ethernet port with respect to link status, speed, and the duplex mode

The user can click on "edit" option to further modify the following configurations:

1. General setup
2. Management VLAN settings
3. Advanced settings

11.3.1 General network setup configuration

Click on the "Edit" option in network screen as shown in "Figure 24: Basic overview of the network configuration screen". DHCP client (DHCPv4 client or DHCPv6 client) option is to get the dynamic IP address from reachable DHCP server in the network. Once the protocol is set to DHCPv4 client or DHCPv6 client, the device will automatically get the IP address (IPv4 or IPv6) from the DHCP server.

A basic overview of the general network setup configuration screen to switch from DHCP client to static address is given below:

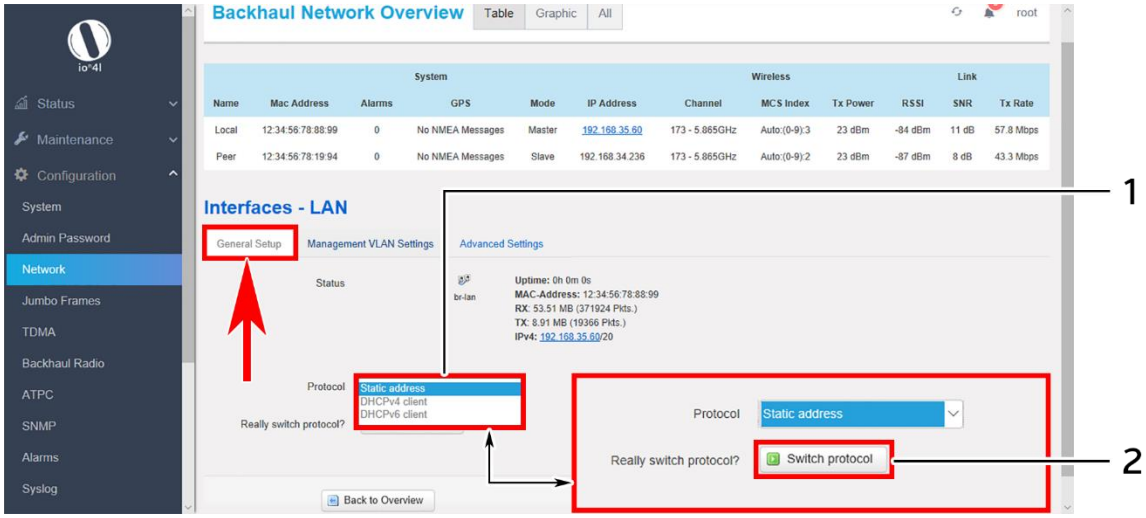


Figure 25: Basic overview of general setup switch protocol from DHCP client to Static address

Follow the steps given below to switch from DHCP client protocol to static address and change the general network setup configuration manually:

Table 19: List of actions to switch protocol from DHCP client to Static address

Callout	Name	Description
1.	Protocol	Select the protocol to "Static address" from the dropdown list (Static address/DHCPv4 client/DHCPv6 client)
2.	Really switch protocol	Click on "Switch protocol" to confirm the protocol switch from DHCP client to static address

11.3.1.1 Static address configuration

Refer the figure below to provide the static address parameters:

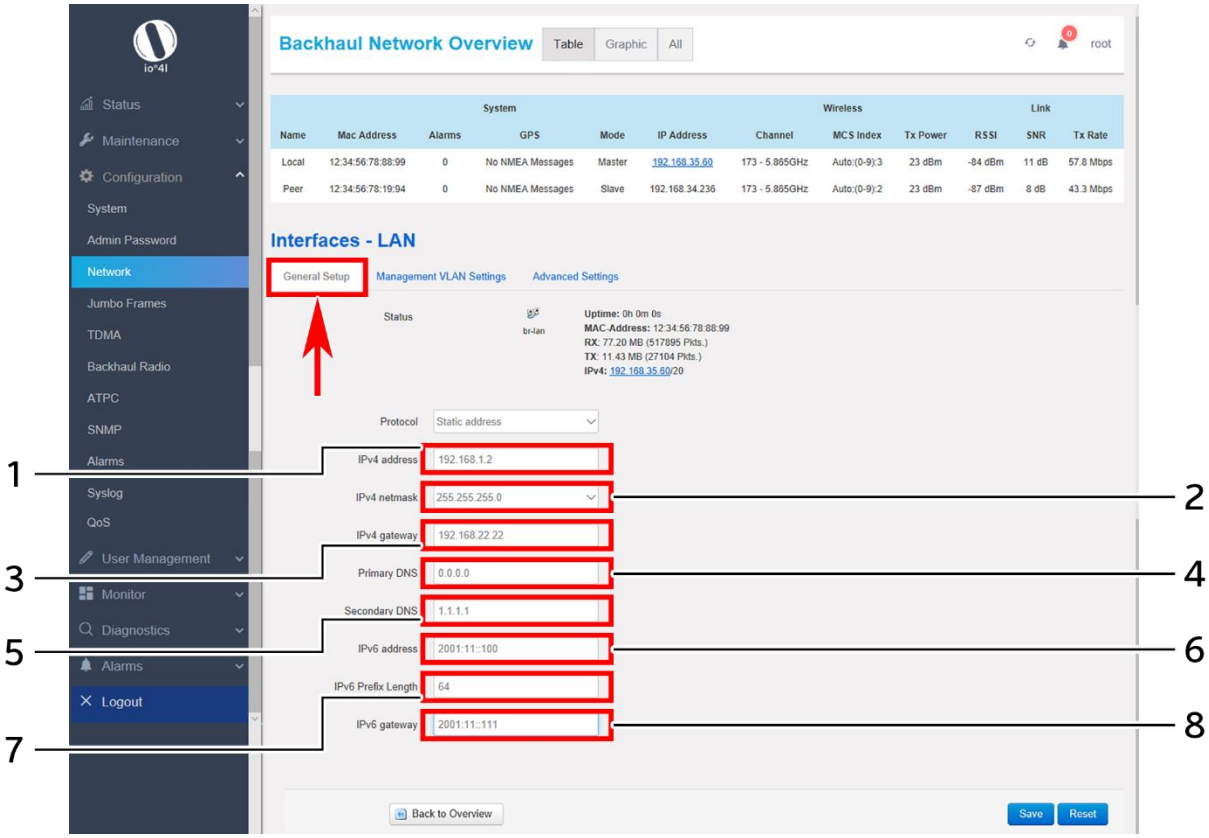


Figure 26: Basic overview of static address parameters for general network setup

Follow the steps given below to provide static address parameters:

Table 20: List of actions to provide static address parameters

Callout	Name	Description
1.	IPv4 address	Enter the "IPv4 address". This is a unique address of the Host/Device eg.192.168.100.10
2.	IPv4 netmask	Enter the "IPv4 netmask". This specifies the number of bits for network part and host part e.g.255.255.255.0
3.	IPv4 gateway	Enter the "IPv4 gateway". Gateway address is given to reach other network device e.g.192.168.100.254
4.	Primary DNS	Enter the IP address of "Primary DNS server". DNS server is to resolve the transition of domain name to IP and IP to domain name
5.	Secondary DNS	Enter the IP address of "Secondary DNS server". DNS server is to resolve the transition of domain name to IP and IP to domain name
6.	IPv6 address	Enter the "IPv6 address". Unique address of the Host/Device e.g.2001:11::100

Callout	Name	Description
7.	IPv6 prefix length	Specify the prefix length for IPv6 address. Specifies the number of bits that belong to network part. The prefix-length specifies a range of devices e.g. IPv6 prefix length = 64 means range of IP addresses between 2001:0DB8:ABCD:0012:0000:0000:0000:0000 and 2001:0DB8:ABCD:0012:FFFF:FFFF:FFFF:FFFF
8.	IPv6 gateway	Enter the "IPv6 gateway". Gateway address is given to reach other network device e.g.2001:11::1

Click "Save" to save the general network setup configuration or click "Reset" to configure the same again.

11.3.2 Management VLAN settings

The primary benefit of using a management VLAN is improved network security. When all management traffic is on a separate VLAN ID, it is much harder for unauthorized users to make changes to your network or monitor network traffic.

A basic overview of the management VLAN settings screen is given below:

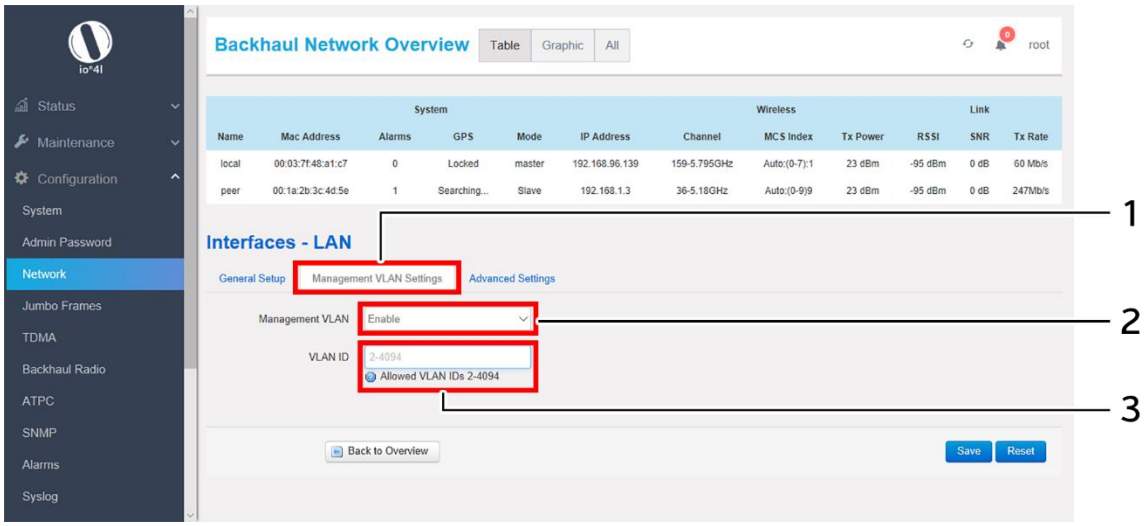


Figure 27: Basic overview of management VLAN settings screen

Click on the "Edit" option in network screen as shown in "Figure 24: Basic overview of the network configuration screen". Follow the steps given below to configure management VLAN settings:

Table 21: List of actions to configure management VLAN settings

Callout	Name	Description
1.	Management VLAN Settings	Click on "Management VLAN Settings" option
2.	Management VLAN	Select "Enable/Disable" option from the dropdown list
3.	VLAN ID	Enter the "VLAN ID", if Management VLAN is enabled. The allowed range for the VLAN ID is between 2 to 4094

Click "Save" to save the management VLAN settings or click "Reset" to configure the same again.

11.3.3 Advanced network settings

A basic overview of the network advanced settings screen is given below:

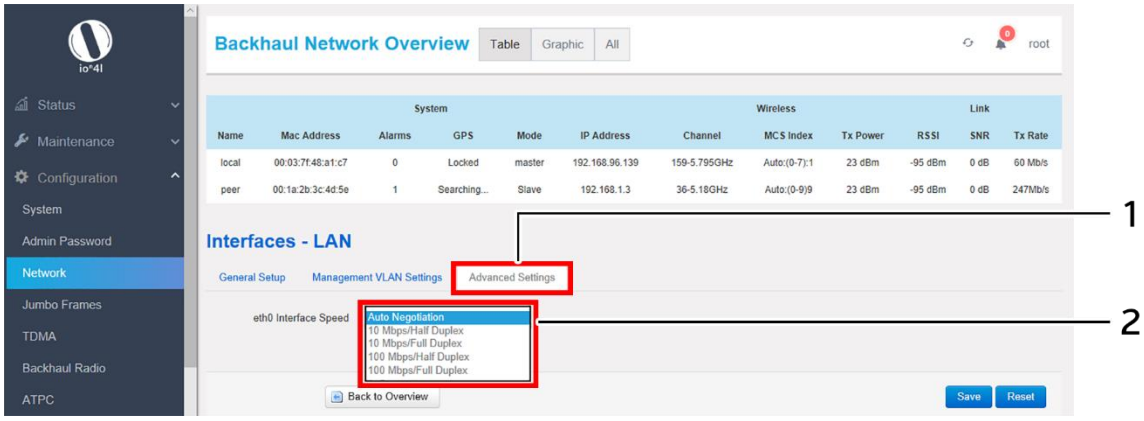


Figure 28: Basic overview of network advanced settings

Click on the "Edit" option in network screen as shown in "Figure 24: Basic overview of the network configuration screen". Follow the steps given below to configure network advanced settings:

Table 22: List of actions to configure network advanced settings

Callout	Name	Description
1.	Advanced Settings	Click on "Advanced Settings" option
2.	Ethernet Interface Speed	Select the interface speed from the dropdown list (10 Mbps-Half Duplex/ 10 Mbps-Full Duplex/ 100 Mbps-Half Duplex/ 100 Mbps-Full Duplex) or select "Auto Negotiation". The user can restrict the respective UBR to the selected ethernet interface speed

Click "Save" to save the network advanced settings or click "Reset" to configure the same again.

11.4 Jumbo Frames Settings

A basic overview of the screen to configure jumbo frames is given below:

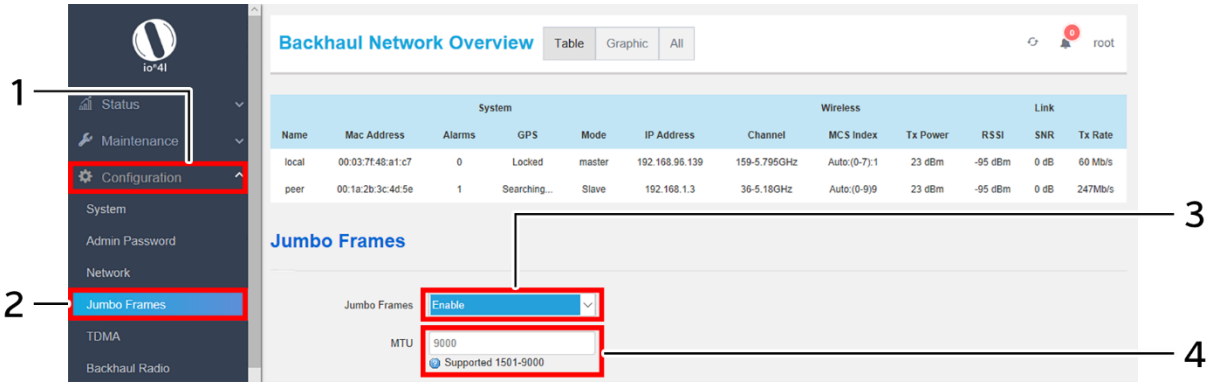


Figure 29: Basic overview of the screen to configure jumbo frames

Follow the steps given below to configure jumbo frame settings:

Table 23: List of actions to configure jumbo frames

Callout	Name	Description
1.	Configuration	Click on "Configuration" dropdown
2.	Jumbo Frames	Click on "Jumbo Frames" option
3.	Enable/Disable Jumbo Frames	Enable or Disable the jumbo frames. Enter the MTU value in the below parameter, if enabled.
4.	MTU	Enter the "MTU" value within the range of 1501 to 9000

Click "Save" to save the jumbo frame settings or click "Reset" to configure the same again.

11.5 TDMA Configuration

Time-division multiple access (TDMA) is a channel access method for shared-medium networks. It allows several users to share the same frequency channel by dividing the signal into different time slots. The users transmit in rapid succession, one after the other, each using its own time slot. This allows multiple stations to share the same transmission medium (e.g. radio frequency channel) while using only a part of its channel capacity.

Slot width is a feature in TDMA communication to provide equal opportunity of communication for devices in TDMA. Each TDMA slot width consists of data transfer time and guard time. During the data transfer time, data will be exchanged between the master and slave. Guard time is to ensure that data is received by the receiver.

The master device allocates the slot width for the slave devices. This slot width information broadcasted to all the slaves by beacons. After receiving beacons, the scheduler in the slave devices schedules TX and RX times in the slot for the slave device. The slot width is configured to 8ms.

The TDMA configuration screen has following options:

1. Link Settings
2. Link Security Settings
3. Advanced Settings
4. Redundant Link Switching

11.5.1 Link Settings

The UBR radio supports 2x2 MIMO (Multiple-Input and Multiple-Output) and TDMA up to 256QAM. MIMO refers to a practical technique for sending and receiving more than one data signal simultaneously over the same radio channel by exploiting multipath propagation.

The UBR can be configured for P2P and P2MP communication links. The term point-to-point communications (P2P) means a wireless data link between two fixed points. Point-to-multipoint communication (P2MP) is accomplished via a distinct type of one-to-many connection, providing multiple paths from a single location to multiple locations.

Link established between participating devices depends on the selected link type (P2P or P2MP) and mode type (master or slave). The link configuration for the master can be configured from the GUI and the slave device receives the link configuration from the respective master device. The various scenarios are discussed separately in below sections.

11.5.1.1 *Link settings of Master device in a P2P link*

A basic overview of the TDMA Configuration/Link settings screen of Master device in a P2P link is given below:

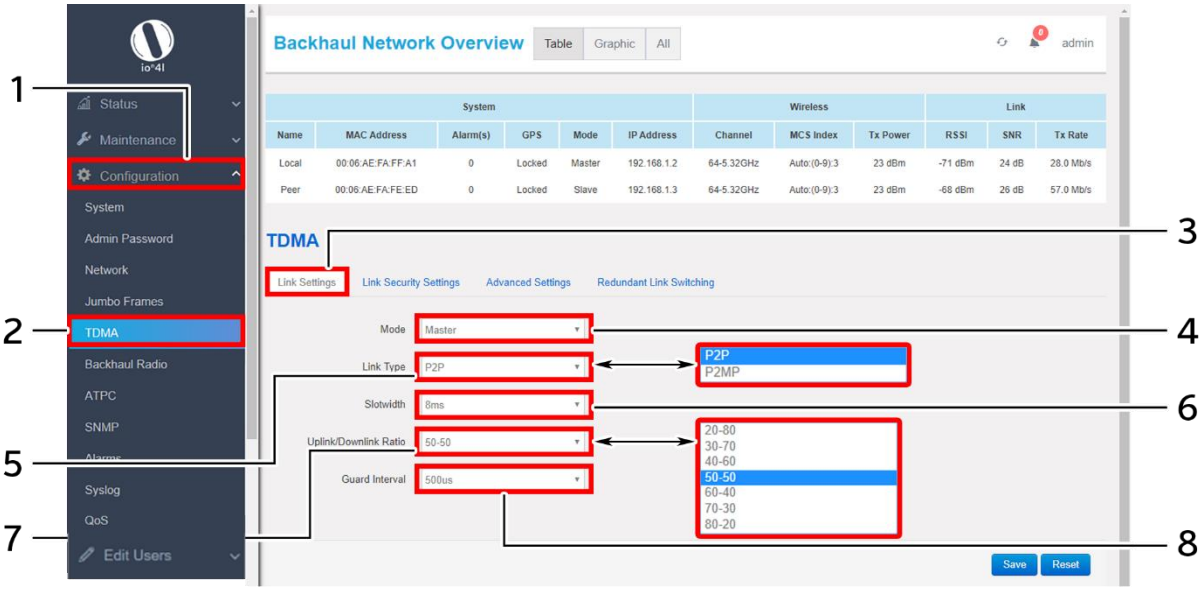


Figure 30: Link settings screen of Master device in a P2P link

Follow the steps given below and configure the link settings of Master device in a P2P link for the UBR:

Table 24: List of actions to configure the link settings of Master device in a P2P link

Callout	Name	Description
1.	Configuration	Click on "Configuration" dropdown
2.	TDMA	Click on "TDMA" option
3.	Link Settings	Click on "Link Settings" option
4.	Mode	Select the "Mode" to Master from the dropdown list (Master/Slave)
5.	Link Type	Select the "Link Type" to P2P from the dropdown list (P2P/P2MP)
6.	Slot width	Set the "Slot width" to 125Hz-8ms
7.	Downlink/ Uplink Ratio	Select the "Downlink/ Uplink Ratio" from the dropdown list (20-80/30-70/40-60/50-50/60-40/70-30/80-20). This ratio controls the bandwidth to be used for downlink and uplink from the device. E.g.: 20-80 means- Downlink = 20% of the total available bandwidth is used in downlink Uplink = 80% of the total available bandwidth is used in uplink
8.	Guard Interval	Enter the "Guard Interval" in the multiples of 10 within the range of 0 to 500ms. The Guard Interval (GI) is effectively a very short pause between packet transmissions to allow for any false information to be

Callout	Name	Description
		ignored. Longer guard intervals make for more reliable wireless.

Click "Save" to save the Link settings or click "Reset" to configure the same again.

11.5.1.2 Link settings of Master device in a P2MP link

A basic overview of the TDMA Configuration/Link settings screen of Master device in a P2MP link is given below:

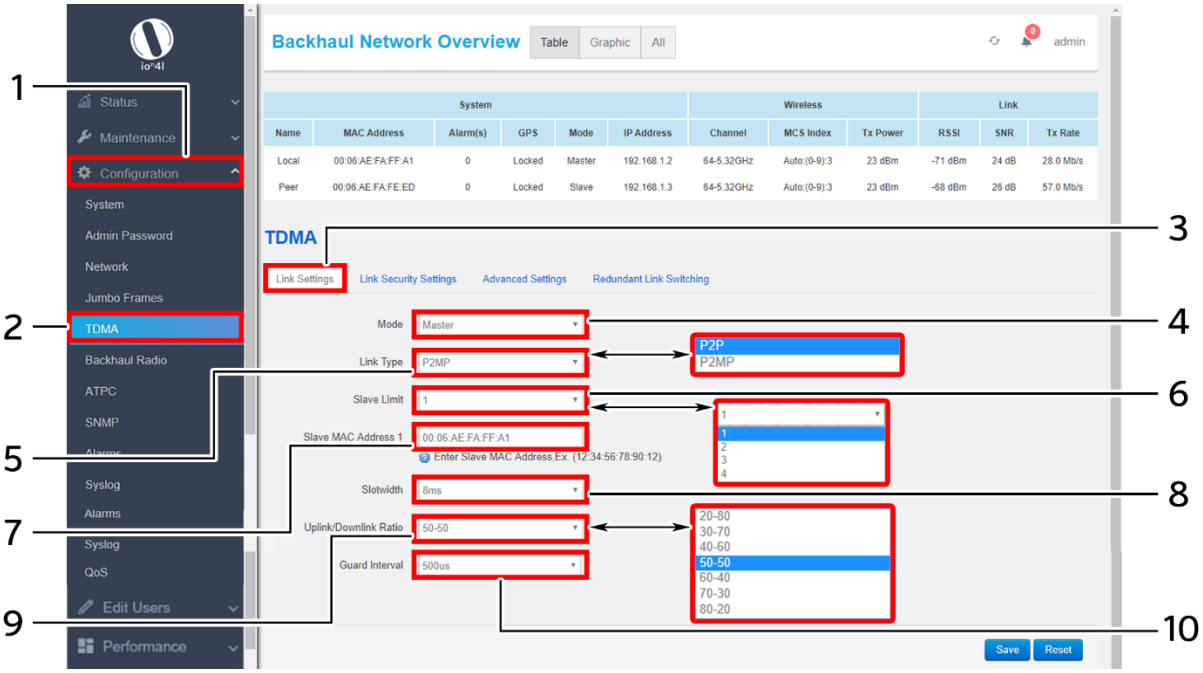


Figure 31: Link settings screen of Master device in a P2MP link

Follow the steps given below and configure the link settings of Master device in a P2MP link for the UBR:

Table 25: List of actions to configure the link settings of Master device in a P2MP link

Callout	Name	Description
1.	Configuration	Click on "Configuration" dropdown
2.	TDMA	Click on "TDMA" option
3.	Link Settings	Click on "Link Settings" option
4.	Mode	Select the "Mode" to Master from the dropdown list (Master/Slave)
5.	Link Type	Select the "Link Type" to P2MP from the dropdown list
6.	Limit Slave	Select the number of slaves from the "Limit Slave" dropdown list (1/2/3/4)
7.	Slave UID	Enter the "Slave UID". Slave UID is needed in the master to allow the association of slaves which has

Callout	Name	Description
		their MAC address configured. Slave UID is the MAC address of the slave
8.	Slot width	Set the "Slot width" to 125Hz-8ms
9.	Downlink/ Uplink Ratio	Select the "Downlink/ Uplink Ratio" from the dropdown list (20-80/30-70/40-60/50-50/60-40/70-30/80-20). This ratio controls the bandwidth to be used for downlink and uplink from the device. E.g.: 20-80 means- Downlink = 20% of the total available bandwidth is used in downlink Uplink = 80% of the total available bandwidth is used in uplink
10.	Guard Interval	Enter the "Guard Interval" in the multiples of 10 within the range of 0 to 500ms. The Guard Interval (GI) is effectively a very short pause between packet transmissions to allow for any false information to be ignored. Longer guard intervals make for more reliable wireless.

Click "Save" to save the Link settings or click "Reset" to configure the same again.