

# **User Guide**

**Ion12xi\_h/h2  
Access Point**

**HFCL**

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# 1 Introduction

**ion12xi\_h** is uniquely designed to address ultra-high-density data demands and integrated 2.4 and 5 GHz 8x8:8 MU-MIMO radios. Easy Access Points configuration in the high-bandwidth environment as a 4x4 MU-MIMO in 160 MHz channel available in 5GHz band, or as an 8x8 MU-MIMO in the 80 MHz channel, without compromising peak data rates.

## 1.1 Variants

- **ion12xi\_h1**: IO Wi-Fi 6 Dual Band 8x8:8 Indoor Access Point with Integrated Antenna (6 dBi) [DC powering]
- **ion12xi\_h2**: IO Wi-Fi 6 Dual Band 8x8:8 Indoor Access Point with Integrated Antenna (6 dBi) [DC & PoE powering]

## 1.2 Federal Communication Commission Certified

The **APs** are 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 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:

- 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.
- FCC Class B, CE
- Wi-Fi Certified Passpoint 2.0
- Wi-Fi Certified 6
- Wi-Fi Certified EasyMesh
- Wi-Fi Certified WPA3

### 1.2.1 FCC Caution

To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could avoid the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

### 1.2.2 FCC Radiation Exposure Statement

- This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.
- This 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:
  - These devices may not cause harmful interference.
  - These devices must accept any interference received, including interference that may cause undesired operation.

## 1.3 Make in India

These devices complies with **Make in India** standards.

## 1.4 Safety

- Do not power the device during installation
- Keep away from high voltage cables
- Keep away from high temperature
- Disconnect the device from power source before cleaning
- Do not use damp cloth for wiping
- Do not power off the unit in the middle of an upgrade process
- The gland should be ground facing all the time
- Do not open the enclosure
- Fasten the device tightly
- Make sure the earthing wire is connected properly to the earthing points

## 2 ion12xi\_h (Dual Band 8x8:8 Wi-Fi 6 Indoor AP)

### 2.1.1 Front View

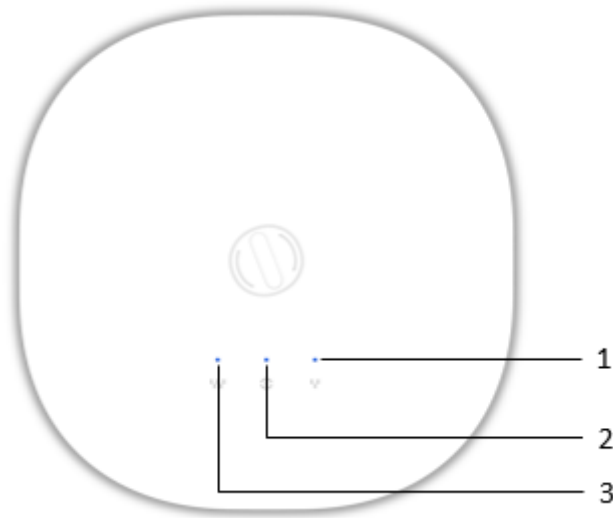


Figure 1: ion12xi\_h Front View

Call Out	Name	Description
1.	2.4 GHz LED	Blinks in blue color when 2.4 GHz wireless network interface comes up
2.	Power LED	Blinks in blue color to notify the user that the device is powered ON
3.	5 GHz LED	Blinks in blue color when 5 GHz wireless network interface comes up

Table 1: ion12xi\_h Front View Description



### 2.1.2 Connector View

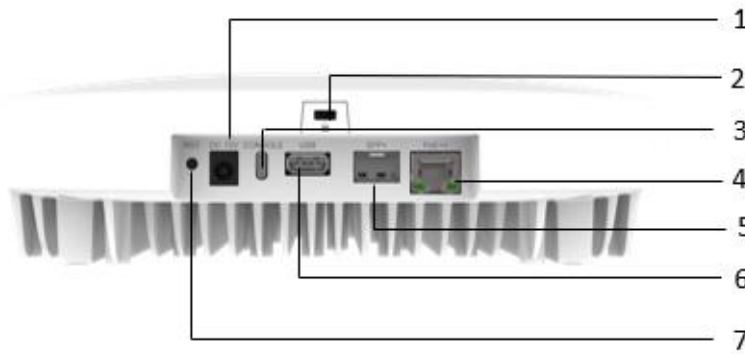


Figure 2: ion12xi\_h Connector View

Call Out	Name	Description
1.	DC Jack Port	Power up using 12V adaptor
2.	Kensington Lock	Provides extra physical security in device
3.	Console port with USB 2.0 Type C Connector	Helps to access the AP for administration logs and configuration
4.	LAN + PoE Port (without gland)	Power up the device by PoE adaptor and a regular Ethernet Port
5.	SFP+ Port	Connects fibre cable
6.	USB 3.0 port Type A Connector	Helps to transfer data faster to the storage devices
7.	Reset	To reset the device

Table 2: ion12xi\_h Connector View Description

### 2.1.3 Back View

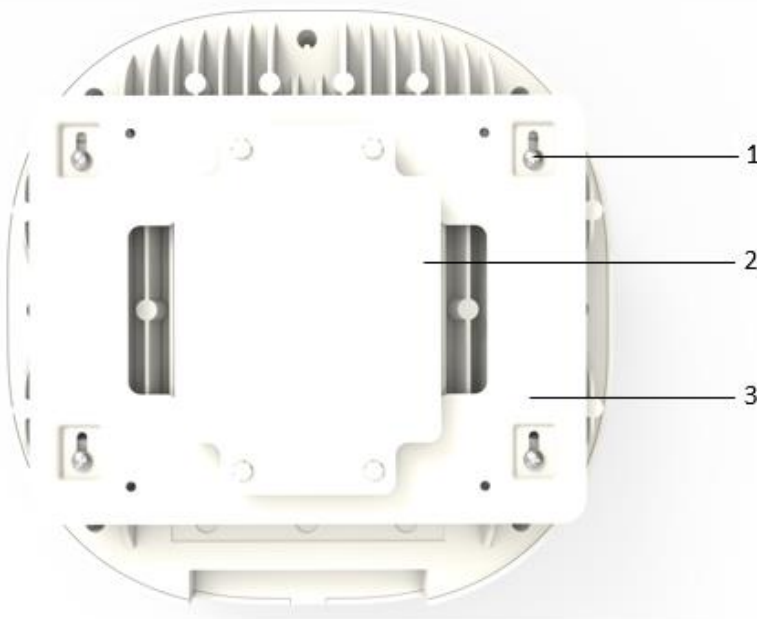


Figure 3: ion12xi\_h Back View

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Call Out	Name	Description
1.	Mounting screws	Helps in device mounting
2.	Ceiling Plate	Helps in mounting device to the ceiling
3.	Mounting Bracket	Helps in device mounting

Table 3: ion12xi\_h Back View Description

## 3 Connect to Thick Access Point and Log In

The user can connect to the access point's web management interface to view or change its LAN and wireless access settings. This section explains how to login through GUI for ion4x\_HMR as an example.

### 3.1 Login through GUI

This is the first screen of AP GUI. It provides access to the users with valid login credentials only. The login credentials will determine the access rights of the user.

### 3.2 Dashboard

On the successful device set up and login the user can view the Dashboard with the following options in the left pane

- Status
- System
- Network
- Wi-Fi Schedule
- Statistics
- Diagnostic
- Switch AP Mode
- Logout

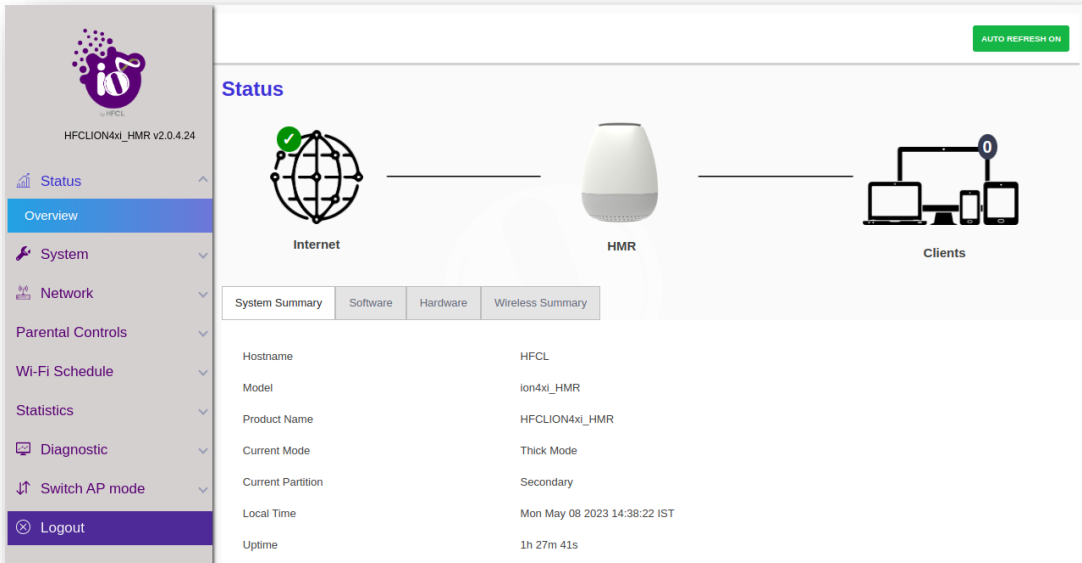


Figure 4: Device Dashboard

### 3.3 Status

The **Status** page provides a summary of the system, software, hardware, and wireless configurations under **Overview**.

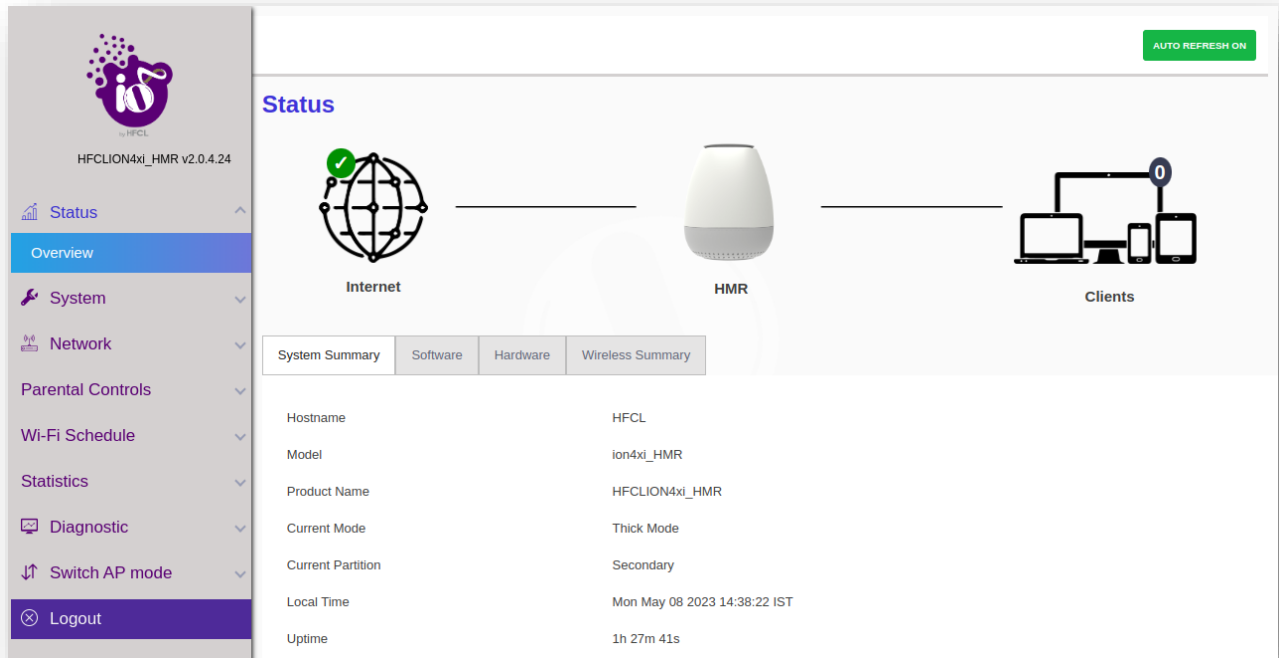


Figure 5: Status Screen

S.No.	Field	Description
1.	System Summary	Gives a brief overview of both the device and the software settings such as current mode from a bird's eye view.

2.	Software	Gives the details regarding the software.
3.	Hardware	Provides current hardware configuration details.
4.	Wireless Summary	Gives a succinct overview of the wireless specifications.

Table 4: Status

### 3.3.1 System Summary

**System Summary** provides a detailed overview of the system specifications including **Model Number, Product Name, Uptime** along with a basic insight to the **Memory Allocation** and **Network Specifications** (IPv4 and IPv6).

System Summary	Software	Hardware	Wireless Summary
Hostname	HFCL		
Model	ion4xi_HMR		
Product Name	HFCLION4xi_HMR		
Current Mode	Thick Mode		
Current Partition	Secondary		
Local Time	Mon May 08 2023 14:46:31 IST		
Uptime	1h 35m 51s		
CPU Load Average 5 min(%)	1.55		

Figure 6: System Summary

S.No.	Field	Description
1.	Hostname	Current hostname of the software as configured
2.	Model	Model of the Home mesh router (HMR) device
3.	Product Name	Product name of the model
4.	Current Mode	The current mode of the software (either Thick or Thin mode)
5.	Current Partition	Primary or Secondary
6.	Local Time	Current local time as per the software.
7.	Uptime	The time duration from the last downtime period
8.	CPU Load Average 5 min (%)	Gives the current CPU Load Average of the last 5 minutes

Table 5: System Summary



Figure 7: Memory & Network Allocations

S.No.	Field	Description
1.	Memory	Memory occupied shown in percentage.
2.	Network	Gives information on IPv4 address and IPv6 network specifications such as current interface, gateway, and IP address, etc.
3.	IPv4 Address	Displays the allocated IPv4 address
4.	IPv6 Address	Displays the allocated IPv6 address

Table 6: Memory & Network Specifications

### 3.3.2 System Software

The **Software** option provides the **Current Firmware Version** of the device and an **Alternate Firmware Version**.

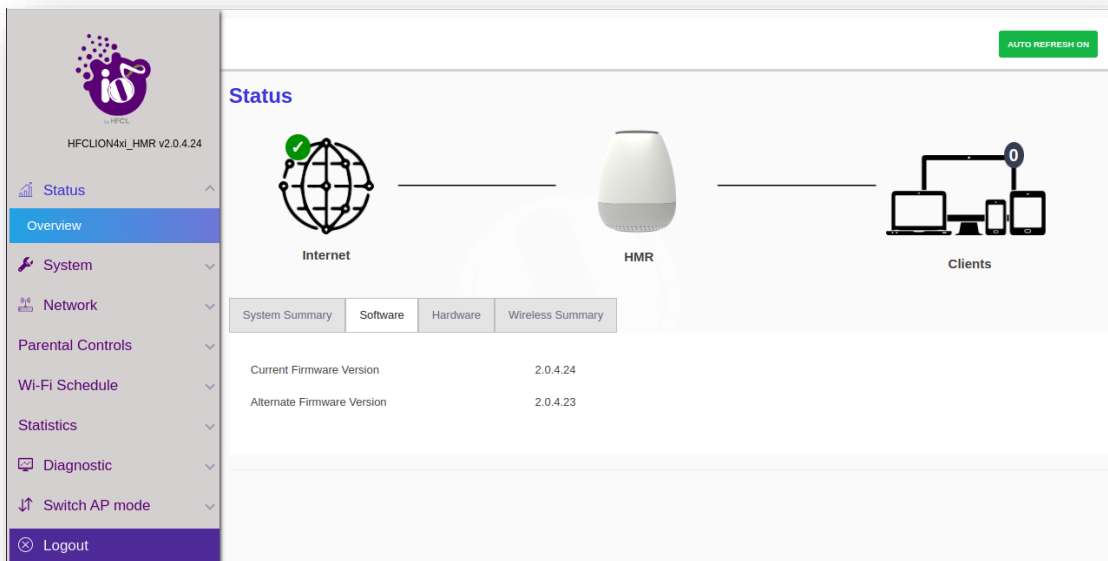


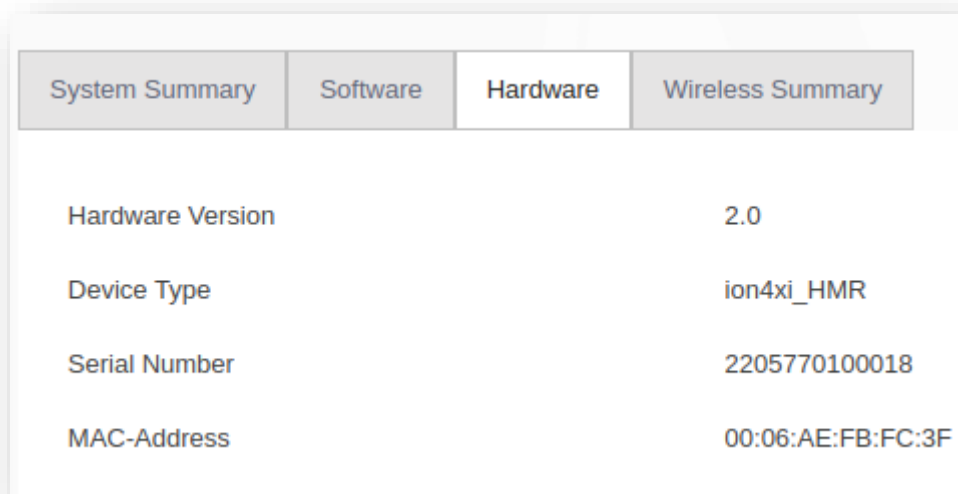
Figure 8: Software Specifications

S.No.	Field	Description
1.	Current Firmware Version	Current firmware version of the device.
2.	Alternate Firmware Version	Alternate firmware version that user can update to.

Table 7: Software Specifications

### 3.3.3 System Hardware

The **Hardware** option provides the specifications including the specific device deployed like **Hardware Version**, **Device Type**, **MAC Address** of the particular device and its **Serial Number**.



System Summary	Software	Hardware	Wireless Summary
Hardware Version		2.0	
Device Type		ion4xi_HMR	
Serial Number		2205770100018	
MAC-Address		00:06:AE:FB:FC:3F	

Figure 9: Hardware Specifications

S.No.	Field	Description
1.	Hardware Version	Hardware version of the device.
2.	Device Type	Family of device types that this device belongs to (different from Product Name).
3.	Serial Number	Serial number (device ID) of the device.
4.	MAC Address	MAC address of the device.

Table 8: Hardware Specifications

### 3.3.4 Wireless Summary

The **Wireless Summary** provides specification such as **SSID**, **Mode** (Master/Client), **Channel**, **BSSID**, **Bitrate** and **Encryption** enforced on the wireless frequency bands of both Radio 2.4 GHz 802.11b/g/n/ax (Wi-Fi0) and Radio 5 GHz 802.11a/n/ac/ax (Wi-Fi1) are depicted.

System Summary	Software	Hardware	Wireless Summary		
<b>Radio 2.4 GHz 802.11b/g/n/ax (Wi-Fi0)</b>					
SSID	Mode	Channel	Bitrate	BSSID	Encryption
HFCLION	Master	6 (2.437 GHz)	573 Mbit/s	00:06:AE:FB:FC:33	WPA PSK (CCMP)
EasyMesh11ax	Master	6 (2.437 GHz)	573 Mbit/s	00:06:AE:FB:FC:34	WPA2 PSK (CCMP)
EasyMesh	Master	6 (2.437 GHz)	573 Mbit/s	00:06:AE:FB:FC:35	WPA2 PSK (CCMP)
<b>Radio 5 GHz 802.11a/n/ac/ax (Wi-Fi1)</b>					
SSID	Mode	Channel	Bitrate	BSSID	Encryption
HFCLION	Master	149 (5.745 GHz)	1201 Mbit/s	00:06:AE:FB:FC:3C	WPA PSK (CCMP)
EasyMesh	Master	149 (5.745 GHz)	1201 Mbit/s	00:06:AE:FB:FC:3D	WPA2 PSK (CCMP)
EasyMesh11ax	Client	149 (5.745 GHz)	0 Mbit/s		

Figure 10: Wireless Summary

S.No.	Field	Description
1.	Radio 2.4 GHz (Wi-Fi0)	Depicts the current configuration of the Radio 2.4 GHz 802.11b/g/n/ax (Wi-Fi0) such as the SSIDs created of the devices, their respective modes (Client / Master) and the encryption enabled, respectively.
2.	Radio 5GHz (Wi-Fi1)	Depicts the current configuration of the Radio 5 GHz 802.11a/n/ac/ax (Wi-Fi1) such as the SSIDs created of the devices, their respective modes (Client / Master) and the encryption enabled, respectively.

Table 9: Wireless Summary

### 3.4 System

Allows the end users to configure the system settings for the device. The system has the following 6 tabs. Enables the users to configure the system settings like **Administrator Password**, **Factory Reset** and to apply updated firmware with backups.

- System Settings
- Set AP Password
- Backup/ Upgrade Firmware
- Reboot

- Factory Reset
- Syslog

### 3.4.1 System Settings

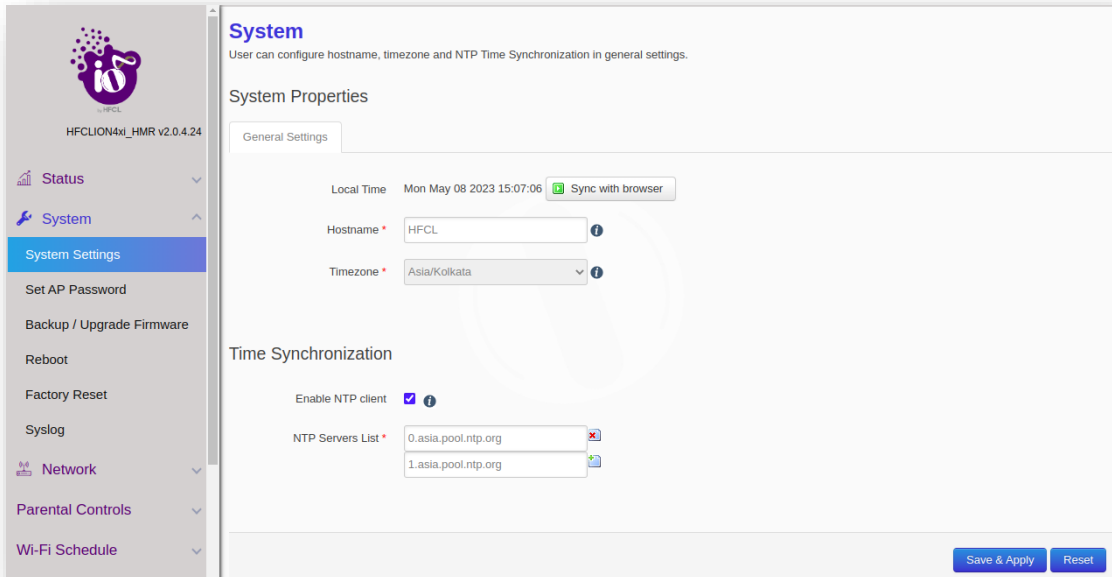


Figure 11: System Settings

Users can

- configure the **Hostnames**
- enable syncing local time with browser and **Time zones**
- enable **NTP Client** where a maximum of 5 NTP servers can be enabled
- populate **NTP servers List** can be populated according to the user specification

S.No.	Field	Description
1.	Local Time	The current local time according to the software is displayed (which can be synchronized with the local time of the browser if required).
2.	Hostname	The host name of the software can be configured.
3.	Time zone	Time Zone of the user can be configured here.
4.	Time synchronization	Allows user to synchronize computer clock time sources in the network.
5.	Enable NTP Client	Users can opt for time synchronization using this button.
6.	NTP Servers List	If time synchronization has been enabled, then users can choose and select from the NTP Servers List as per user's requirement.
7.	Save & Apply	All changes to the configuration will be saved here and then applied.
8.	Reset	Any configuration changes made but not saved and applied will be reset.

Table 10: System Settings



### 3.4.2 Set AP Password for thick AP

The user can configure the Administrator password to access the devices.

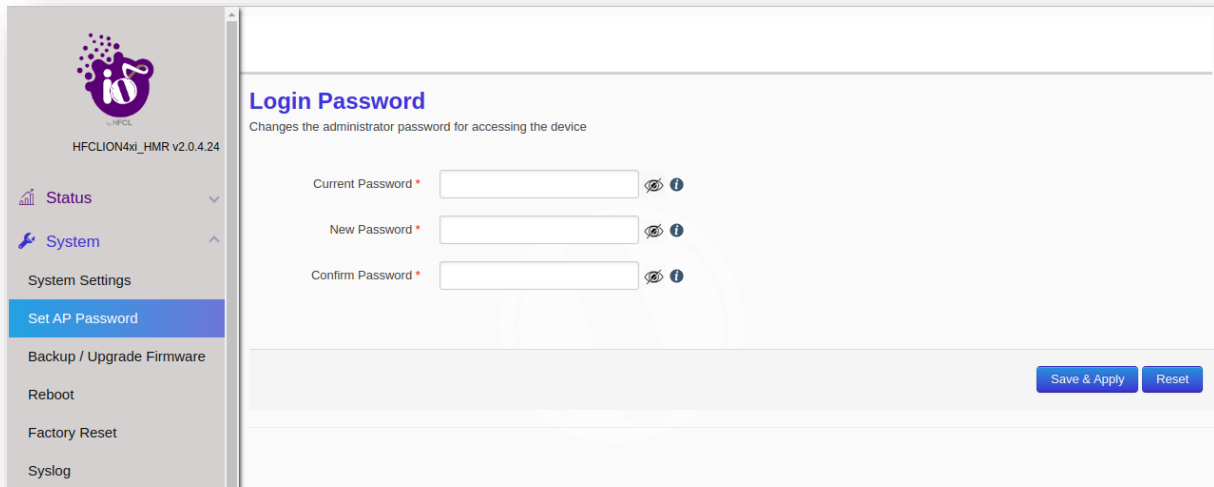


Figure 12: Set AP Password Screen

S.No.	Field	Description
1.	Set AP Password	Changes the administrator password for accessing the device.
2.	Login Password	Allows login configurations to be made and applied as per user's specifications.
3.	Current Password	Current password set to access the device.
4.	New Password	New password that the user wants to specify for the device access.
5.	Confirm Password	Password confirmation.
6.	Save & Apply	All changes to the configuration will be saved here and then applied.
7.	Reset	Any configuration changes made but not saved and applied will be reset.

Table 11: Set AP Password

### 3.4.3 Backup/ Upgrade Firmware

#### 3.4.3.1 Backup/ Restore

- Enables users to perform actions such as restoring configuration files by uploading previously generated backup archives.
- Users can also create an archive of the current configuration files which can be used to implement backups in case of failovers.

### 3.4.3.2 Firmware Upgrade

The firmware is stored in flash memory and can be updated with new versions to include new features or to modify the existing one. This AP has two partitions. The firmware version is always uploaded in the alternate partition to keep the current firmware image restored which is located in the current partition of access point. When we upgrade new firmware, the existing firmware will become backup firmware. If any issues are found in new firmware, the backup firmware will be booted.

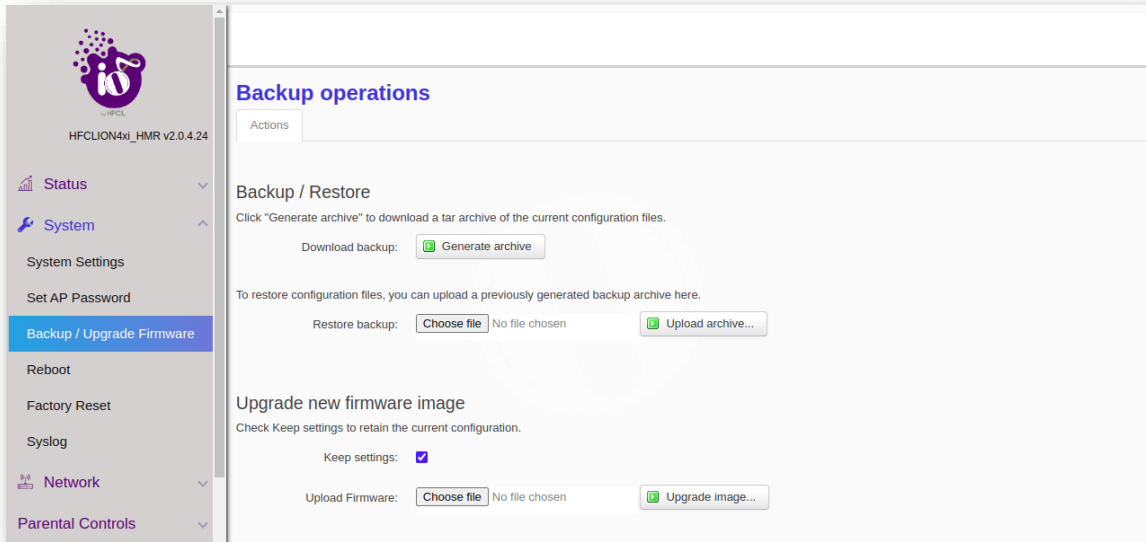


Figure 13: Backup/Upgrade Firmware

Save the software file in the system drive of your laptop or system. Refer the image below:

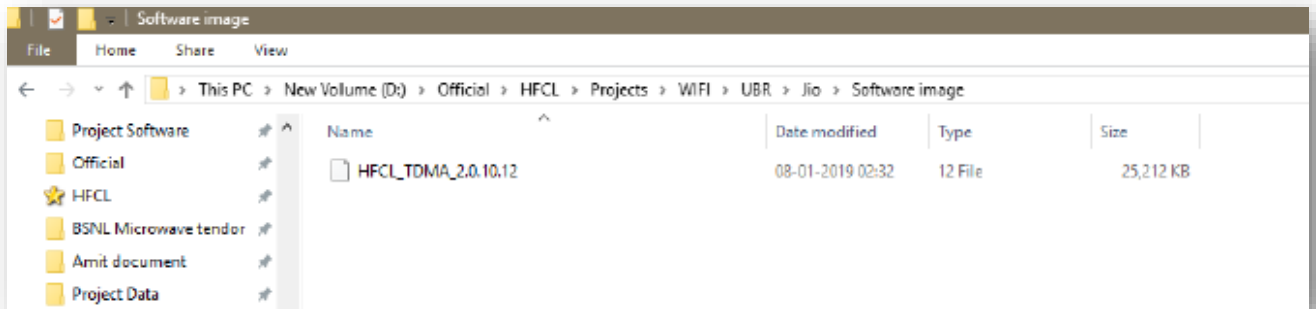


Figure 14: Upload Archive

S.No.	Field	Description
1.	Backup/Upgrade Firmware	Current firmware of the device can be upgraded and backups of the same can be created.
2.	Backup Operations	Enables users to perform backup operations.
3.	Backup/Restore	Allows user the feature of creating backups of current configuration files and restoring the same.

4.	Generate archive	Downloads a tar archive of the current configuration files if user wishes to create a backup.
5.	Restore backup-Choose File	Any previous backup can also be restored by uploading a previously generated backup archive.
6.	Upload archive	Users can upload the backup archive which needs to be restored.
7.	Upgrade new firmware image	Firmware image to be uploaded here for firmware upgrade.
8.	Keep Settings	Check this to retain the current configuration.
9.	Upload Firmware- Choose File	Upload the firmware image desired.
10.	Upgrade Image	Upgrade the current firmware image.

Table 12: Backup/Upgrade Firmware

### 3.4.4 Reboot

Reboot restarts the device with existing configuration. The user 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.

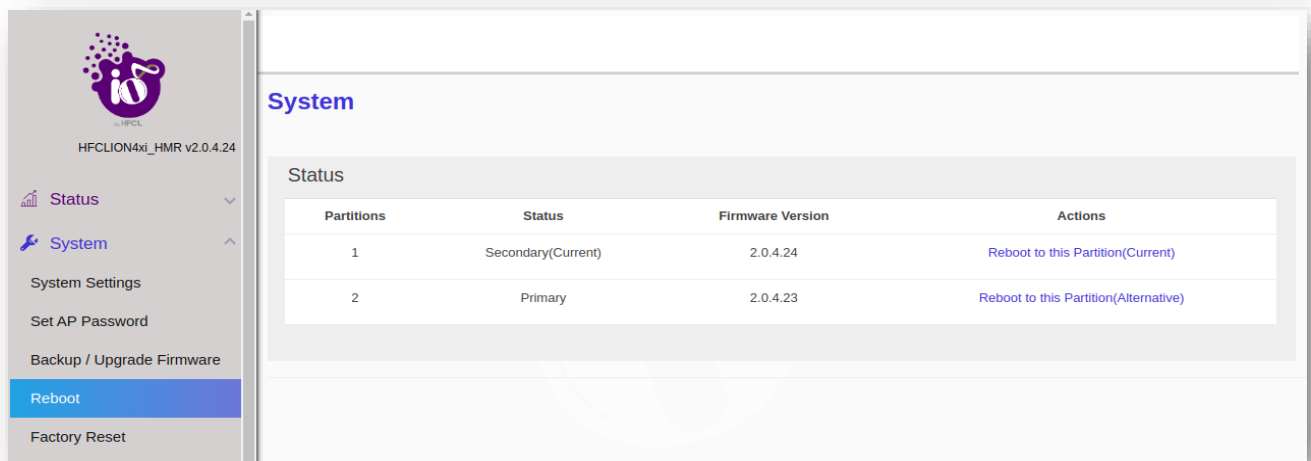


Figure 15: Reboot Screen

S.No.	Field	Description
1.	Reboot	Device can be rebooted if user desires.
2.	Partition	Displays the partition number.
3.	Status	Displays status of the device system such as Primary, Secondary.
4.	Firmware Version	Displays the current firmware version of the specific partition.
5.	Actions	Enables users to reboot to this specific partition.

Table 13: Reboot

### 3.4.5 Factory Reset

The 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.

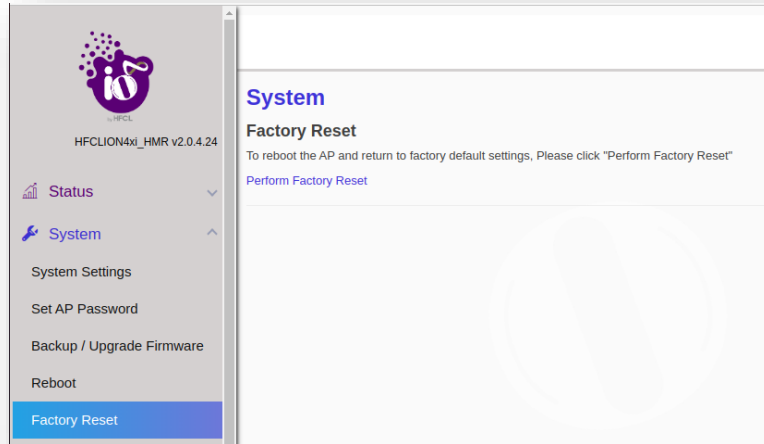


Figure 16: Factory Reset Screen

S.No.	Field	Description
1.	Factory Reset	Enables the users to make the device revert back to the factory settings (default settings).

Table 14: Factory Reset

### 3.4.6 Syslog

This page enables users to create their own syslog.

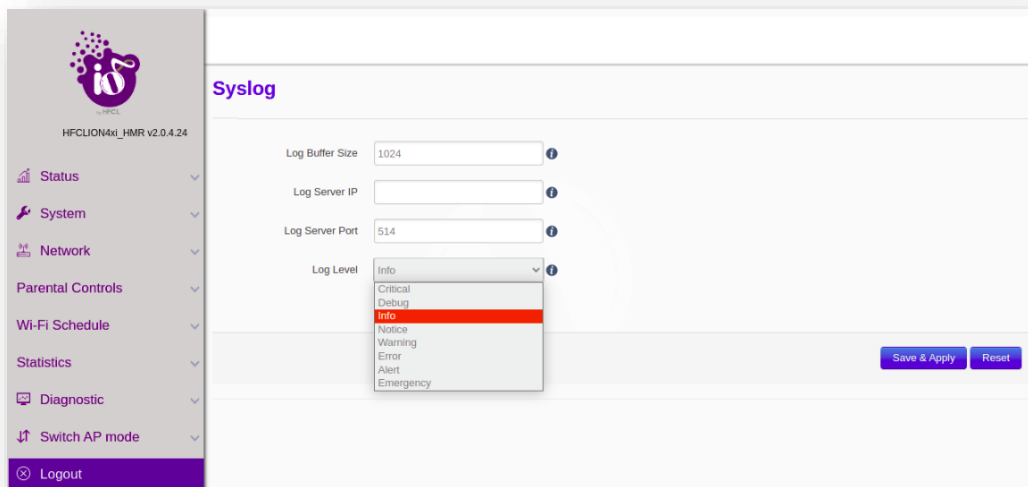


Figure 17: Syslog Screen

S.No.	Field	Description
1.	Logout	Users can log out of this application (GUI).
2.	Syslog	Provides the user with the system logs.
3.	Log Buffer Size	Create buffer size with range of 16 to 1024 kB, with a default value of 1024 kB.
4.	Log Server IP	Server IP where the syslog are to be rendered. Both IPv4 and IPv6 can be configured.
5.	Log Server Post	Users can specify the port within the range of 0 to 65353; default port as 514.
6.	Log Level	Logs all messages with a level greater than or equal to the selected one. For example, setting the priority threshold to DEBUG (lowest priority) causes all messages to be logged.

Table 15: Syslog

Enables users to create their own syslog according to the user specified parameters, such as

- Log Buffer Size
- Log Server IP
- Log Server Port
- Log Level
  - Critical
  - Debug
  - Info
  - Notice
  - Warning
  - Error
  - Alert
  - Emergency

S.No.	Field	Description
1.	Alert	Logs which need the users to be informed about something or alerted.
2.	Info	Logs pertaining to information.
3.	Critical	For critical logs of high priority.
4.	Debug	Logs related to debugging.
5.	Notice	Notification related logs.
6.	Warning	For logs which are warning related.
7.	Error	For error related logs.
8.	Emergency	For highest level priority concerns.

Table 16: Log Level

Logs all messages with a level greater than or equal to the selected one. For example, setting the priority threshold to DEBUG (lowest priority) causes all messages to be logged.

### 3.5 Network

The Network tab, has been further segregated into 5 divisions:

- Wireless
- Interfaces
- Easy Mesh Configuration
- DHCP Server configuration
- Static Routes

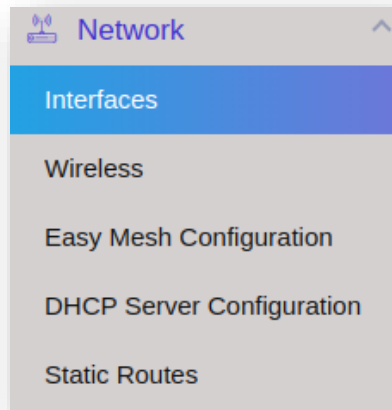


Figure 18: Network Screen

#### 3.5.1 Interfaces

The Interface tab depicts the Interface overview and the Ethernet Port status.

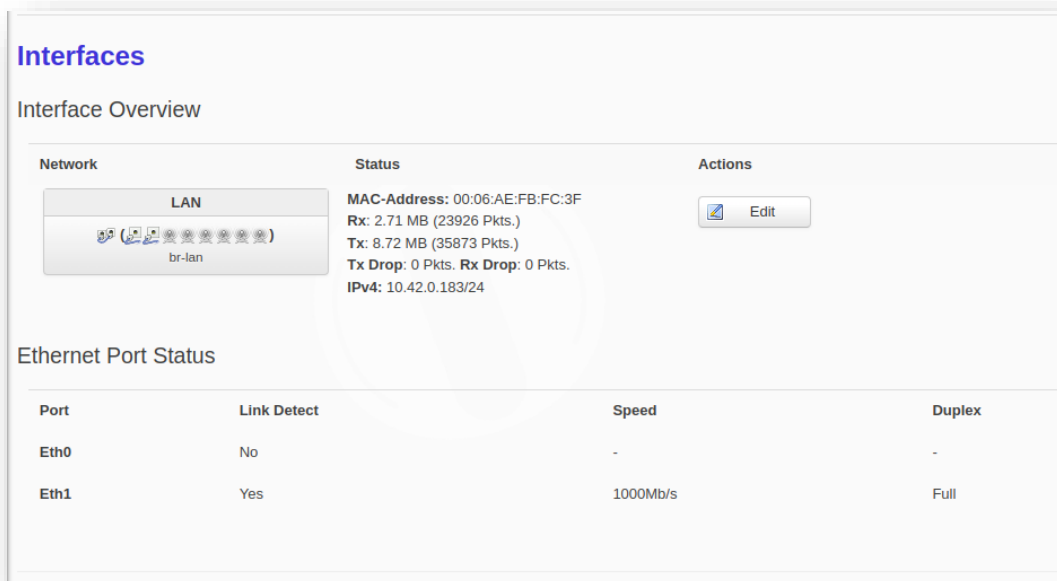


Figure 19: Interface Screen

S.No.	Field	Description
1.	Interface Overview	Gives information of the interfaces of the device.
2.	Network	Gives the interface name.
3.	Status	Displays the interface specific information.
4.	Actions	Allows users to make configuration changes pertaining to the interface.
5.	Ethernet Port Status	Displays the current ports of the device.
6.	Port	Gives the port name.
7.	Link Detect Speed	Informs if Link Detect has been enabled or not and its respective speeds.

Table 17: Interface

Information regarding the network connected, its status (MAC address, Transaction information and IPv4) is displayed. Users can also edit the interface and can configure the same according to their requirements.

### 3.5.1.1 Network Interfaces – LAN

In this Interface page of setting, user can configure the network interfaces. It has two subdivisions:

- General Setup
- Management VLAN Settings

#### 3.5.1.1.1 Network Interface: General Setup

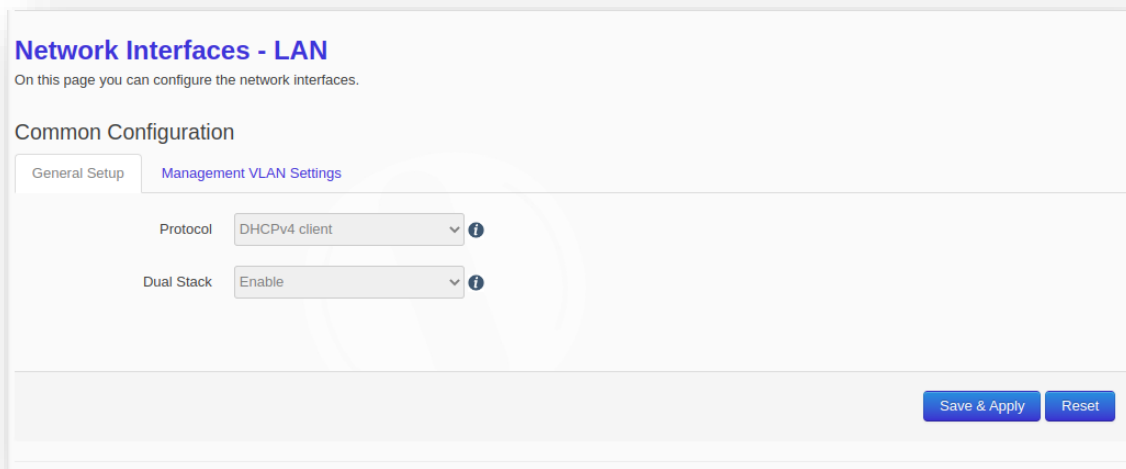


Figure 20: General Setup Setting

S.No.	Field	Description
1.	Network Interface	Enables the users to configure network interfaces.
2.	Common Configuration	Gives the current configuration and enables users to re-configure them.
3.	General Setup	General configurations.
4.	Protocol	Protocol of the interface.
5.	Dual Stack	Enable/Disable dual stack of the interface.

Table 18: General Setup

### 3.5.1.1.2 Network Interface: Management VLAN Settings

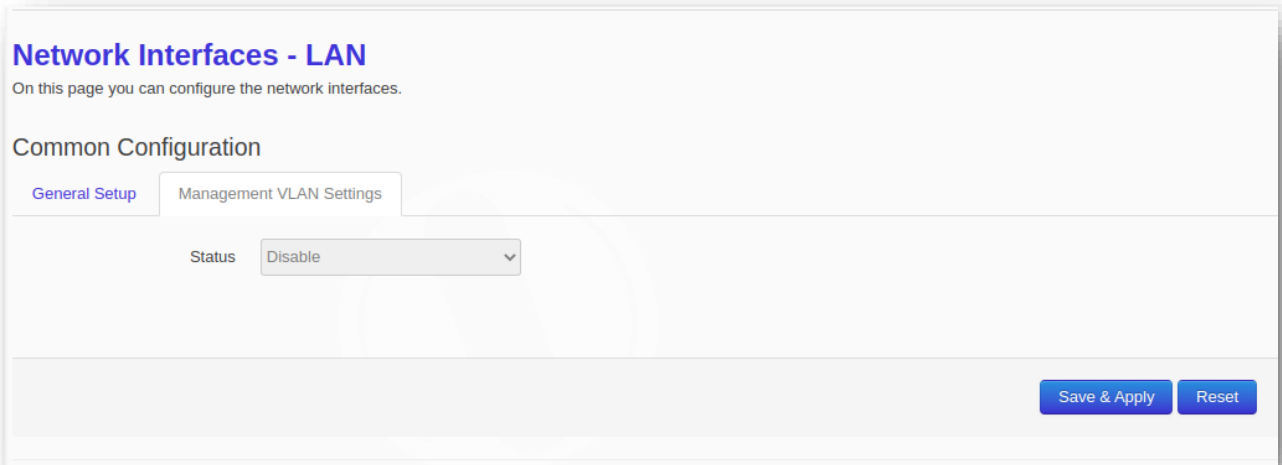


Figure 21: Management VLAN Setting

S.No.	Field	Description
1.	Network Interface	Enables the users to configure network interfaces.
2.	Common Configuration	Gives the current configuration and enables users to re-configure them.
3.	Management VLAN Settings	Configuration pertaining to Management VLAN settings.
4.	Status	Enable/Disable management VLAN.
5.	Save & Apply	All configuration changes made will be saved and applied.
6.	Reset	All configuration changes made but not saved will be discarded.

Table 19: Management VLAN Setting

### 3.5.1.1.3 Ethernet Port Status

Ethernet Port Status tab displays the Link detection & the Port Status (Speed and Duplex valve).

The screenshot shows the 'Ethernet Port Status' table with the following data:

Port	Link Detect	Speed	Duplex
Eth0	No	-	-
Eth1	Yes	1000Mb/s	Full

Figure 22: Ethernet Port Status

S.No.	Field	Description
1.	Ethernet Port Status	Displays the status of ethernet ports and their current configurations.



2.	Port	Name of the ethernet ports.
3.	Link Detect	Displays if link detect has been enabled or not.
4.	Speed	Displays the speed of the port.
5.	Duplex	Shows duplex of the port (Half or Full).

Table 20: Ethernet Port

### 3.5.2 Wireless

In this page, User can make changes in the existing configuration and can make new SSIDs of devices under the Radio bands.

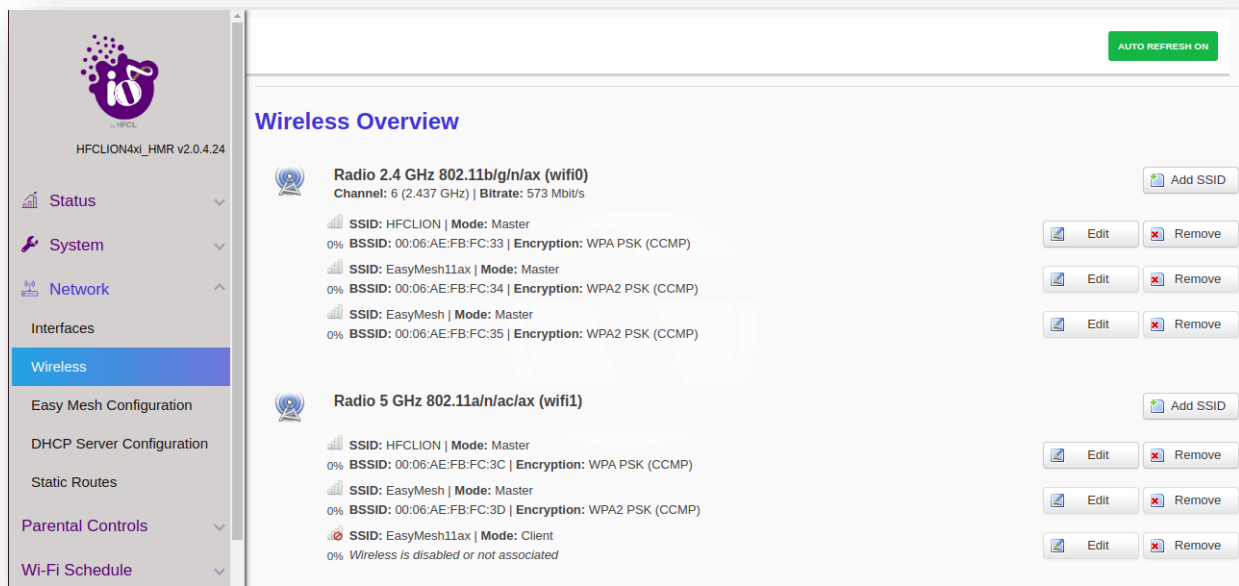


Figure 23: Wireless Overview Screen

S.No.	Field	Description
1.	Wireless Overview	Allows the wireless settings to be configured as per user's requirement.
2.	Radio 2.4 GHz	Shows the SSIDs of Radio 2.4 GHz
3.	Radio 5GHz	Shows the SSIDs of Radio 5 GHz
4.	Add SSID	A new SSID can be added to the HMR device.
5.	Edit	Current configuration can be edited here.
6.	Remove	The specific SSID can be removed here.

Table 21: Wireless

- Detailed overview of wireless configurations are displayed for both Radio 2.4 GHz 802.11b/g/n/ax (wifi0) and Radio 5 GHz 802.11a/n/ac/ax (wifi1).
- Users can also make changes in the existing configuration and can also add new SSID of devices under the two radio bands: unlike the brief display of configuration under the System Tab of Dashboard. (Refer to Figure: 7 Wireless Summary Screen)
- On clicking **“Add SSID,”** user gets two sets of setting configuration

- Radio Configuration
- SSID Configuration

### 3.5.2.1 Radio Configurations

In Radio Configurations settings, there are two sub-categories: General Settings & Advanced Settings

### 3.5.2.2 Radio Configuration: General Settings

- Radio Status
- Transmit power
- Mode
- Channel width
- Channel

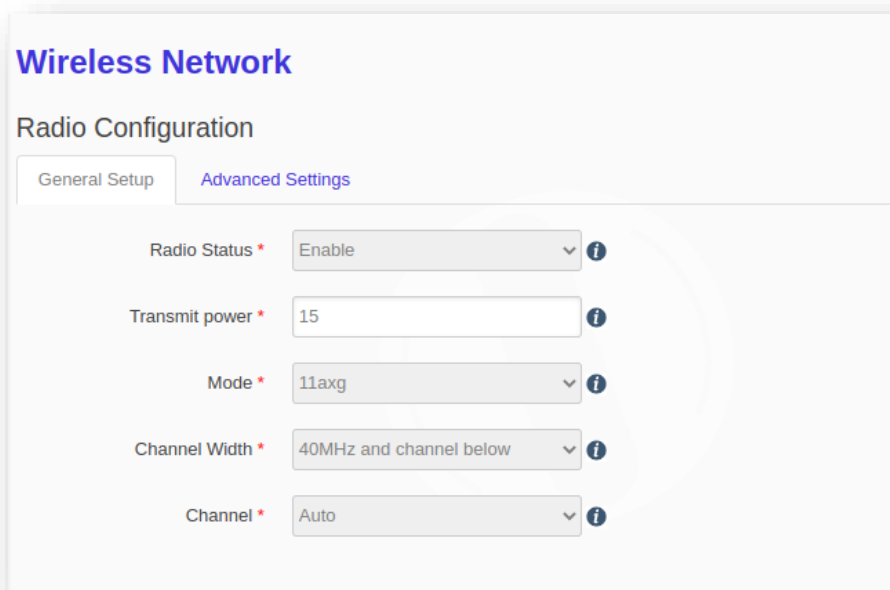


Figure 24: Radio Configuration General Settings

S.No.	Field	Description
1.	Wireless Network	Allows the wireless settings to be configured as per user's requirement.
2.	Radio Configuration	General Settings
3.	Radio Status	Enable the radio status to make SSID visible to allow users to connect.
4.	Transmit Power	Supported range from 6dBm to 23dBm.
5.	Mode	Wireless standard to be selected which is compatible with the device.
6.	Channel Width	Channel bandwidth in which radio needs to operate
7.	Channel	Selecting 'Auto' will automatically select one of the available channels.

Table 22: Radio Configuration General Settings

### 3.5.2.3 Radio Configuration: Advanced Settings

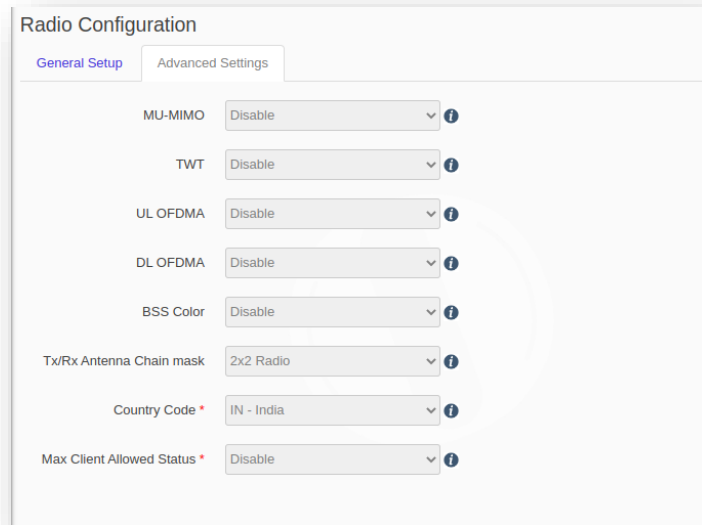


Figure 25: Radio Configuration Advanced Settings

S.No.	Field	Description
1.	Wireless Network	Allows the wireless settings to be configured as per user's requirement.
2.	Radio Configuration	Advanced Settings
3.	MU-MIMO	By enabling MU-MIMO, multiple clients connected to the access point will be able to send acknowledgement responses (ack) simultaneously, thus saving airtime. This ultimately improves network throughput and efficiency.
4.	TWT	It allows devices to negotiate when and how often they will wake up to send or receive data. TWT increases device sleep time and, in turn, substantially improves battery life.
5.	UL OFDMA	The total bandwidth is divided into several bundles of sub-carriers (denoted by resource units (RUs)) and each station transmits its UL frames through the allocated RU.
6.	DL OFDMA	The total bandwidth is divided into several bundles of sub-carriers (denoted by resource units (RUs)) and AP transmits its DL frames through the allocated RU.
7.	BSS Color	This helps mitigate overlapping Basic Service Sets (OBSS). In turn, this enables a network to more effectively – and concurrently – transmit data to multiple devices in congested areas.
8.	Tx/Rx Antenna Chain Mask	Users can select Tx/Rx Antenna Chain Mask 1x1 or 2x2.
9.	Country Code	Standard Country code.
10.	Max Client Allowed status	Enable Max Client Allowed to use Max Client Allowed

Table 23: Radio Configuration Advanced Settings

### 3.5.2.4 SSID Configurations

In SSID Configuration page, user gets four further types of settings to configure SSIDs.

- General Setup
- Advanced Settings
- Wireless Security
- MAC Filter

#### 3.5.2.4.1 SSID Configuration: General Settings

Figure 26: SSID Configuration General Settings

S.No.	Field	Description
1.	SSID Configuration	General Setup
2.	VAP Status	Select enable/disable to change the VAP status.
3.	SSID	Users can give the SSID of the device.
4.	Mode	In Access Point mode, Device can be connected to a wired network and transform the wired access into wireless that multiple devices can share together, especially for a home, office, or hotel where only wired network is available.
5.	Network	If DHCP Server is enabled, then the network will be NAT if DHCP Server is disabled then the network will be LAN.
6.	Hide SSID	Users can select enable/disable to change the Hide SSID status.

Table 24: SSID Configuration General Settings

### 3.5.2.4.2 SSID Configuration: Wireless Security

Users can choose the type of network authentication (data encryption) that is required to connect to the SSID.

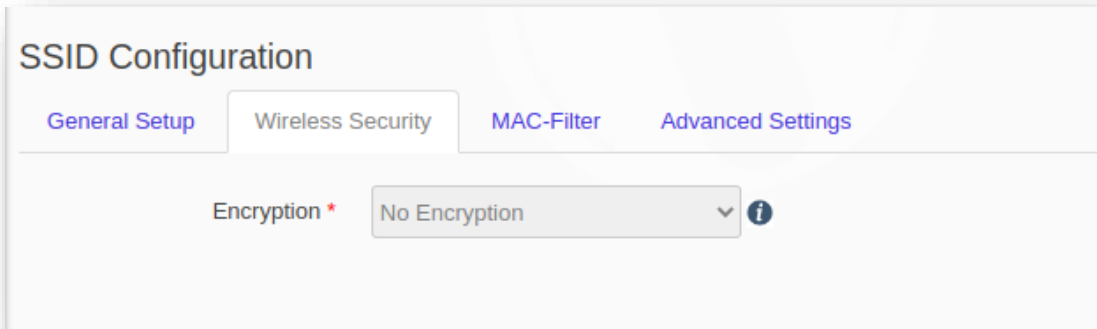


Figure 27: SSID Configuration Wireless Security

S.No.	Field	Description
1.	SSID Configuration	Wireless Security
2.	Encryption	Enables users to specify the encryption type to be set.

Table 25: SSID Configuration Wireless Security

### 3.5.2.4.3 SSID Configuration: MAC Filter

Users can select disable/Allow all listed/Allow all except listed.

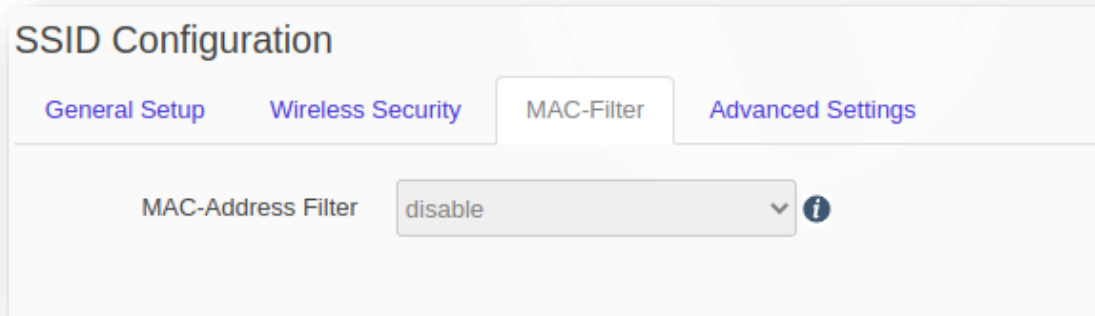


Figure 28: SSID Configuration MAC Filter

S.No.	Field	Description
1.	SSID Configuration	Mac Filter
2.	MAC-Address Filter	Can be enabled or disabled as per user requirements.

Table 26: SSID Configuration MAC Filter

### 3.5.2.4.4 SSID Configuration: Advanced Settings

#### SSID Configuration

General Setup
Wireless Security
MAC-Filter
Advanced Settings

Client Isolation  ⓘ

RTS Status Disable ⓘ

DTIM Interval \* 1 ⓘ

Beacon Interval \* 100 ⓘ

Wi-Fi Multimedia Enable ⓘ

Max Client Limit 128 ⓘ

Wi-Fi Multimedia Power Save Enable ⓘ

VLAN Status Disable ⓘ

Option 82 Disable ⓘ

Option 18 Disable ⓘ

Rate Limit Disable ⓘ

ATF Enable Disable ⓘ

TX STBC Disable ⓘ

RX STBC Disable ⓘ

Number of Spatial Streams 2 ⓘ

Figure 29: SSID Configuration Advanced Setting

S.No.	Field	Description
1.	SSID Configuration	Advanced Settings
2.	Client Isolation	Prevents client-to-client communication
3.	RTS Status	Users can enable RTS Status to configure RTS.
4.	DTIM Interval	Specify the period of time to wake up clients from sleep mode to receive traffic at the right time. Allowed range is from 1ms to 255ms.
5.	Beacon Interval	Specify the time interval in which beacon packets have to be transmitted. Allowed range is from 100ms to 300ms.
6.	Wi-Fi Multimedia	Enabling the WMM will control the upstream traffic flow from Wi-Fi device to AP and downstream traffic flow from AP to Wi-Fi device.
7.	Max Client Limit	Supported range from 1-128.
8.	Wi-Fi multimedia Power Save	WMM-Power Save increases the efficiency and flexibility of data transmission. Specifically, the client device can doze between packets to save power, while the access point buffers downlink

		frames. The application chooses the time to wake up and receive data packets to maximize power conservation without sacrificing Quality of Service.
9.	VLAN Status	VLAN status enable/disable, if VLAN will be enabled then VLAN value 1 will be set by default.
10.	Option 82	This will add client VLAN ID in Option82 field (IPv4).
11.	Option 18	This will add client VLAN ID in Option18 field (IPv6).
12.	Rate Limit	Enable Rate Limit per VAP or Rate Limit per Client to select Upload Limit and Download Limit.
13.	ATF Enable	Enable ATF to use ATF feature.
14.	TX STBC	Space time block coding (STBC) transmits multiple copies of one data flow in wireless communication. STBC uses many antennas to produce multiple receive versions of data, improving data transmission reliability.
15.	Number of spatial streams	Spatial Streams 1-2 is supported.

Table 27: Radio Configuration Advanced Settings

### 3.5.3 Easy Mesh Configuration

A wireless mesh network serves as a network of radio nodes organized in a mesh topology. All APs participating in mesh topology does not need to have a wired connection for backhaul connectivity and only one root AP serves that purpose.

Mesh configurations require access points to operate in two operating modes as follows:

- Controller AP: Controller AP have wired connections, for example, Ethernet backhaul to a wired network and to cNMS.
- Agent AP: Repeats wireless signals to extend range without being connected with cable to Access Point, or with clients.

Mesh configuration allows access points to connect with each other in mesh topology. An access point (Controller AP) is connected to the wired network with the use of wireless connections over the 802.11 radio backhaul and other agent access points act as repeaters in mesh topology. In case of a mesh node failure, the surrounding nodes automatically re-connect and resume service without downtime. Nodes identify the best next hop and connect with it automatically.

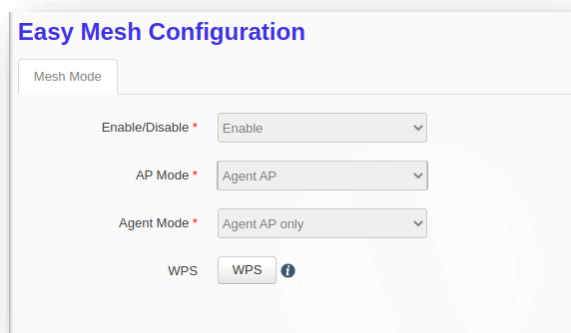


Figure 30: Easy Mesh Configuration

S.No.	Field	Description
1.	Easy Mesh Configuration	Users can configure easy mesh configuration.
2.	Enable/Disable	Mesh mode can be enabled/disabled.
3.	AP Mode	AP Mode to be selected
4.	Agent Mode	Agent Mode to be configured.
5.	WPS	Enable wifi-protected setup by choosing either soft or hard WPS (software or hardware respectively).

Table 28: Easy Mesh Configuration

### 3.5.4 DHCP Server Configuration

The AP itself can act as a DHCP service provider for the connected clients and configuration for the same is executed from this screen. A basic overview of the screen to enable thick AP as DHCP server (IPv4) is given below:



Figure 31: DHCP Configuration

S.No.	Field	Description
1.	DHCP Configuration	DHCP protocol settings can be configured as per user requirements.
2.	Server Settings	DHCP server settings can be configured.
3.	DHCP Server	Can be enabled/disabled.

Table 29: DHCP Configuration



### 3.5.5 Static Routes

Users can specify the interface and gateway through which a certain host or network can be reached in the Route Configuration tab. Both static IPv4 and static IPv6 routes can be configured by the user. Before clicking the **Add** Button, the page looks like:

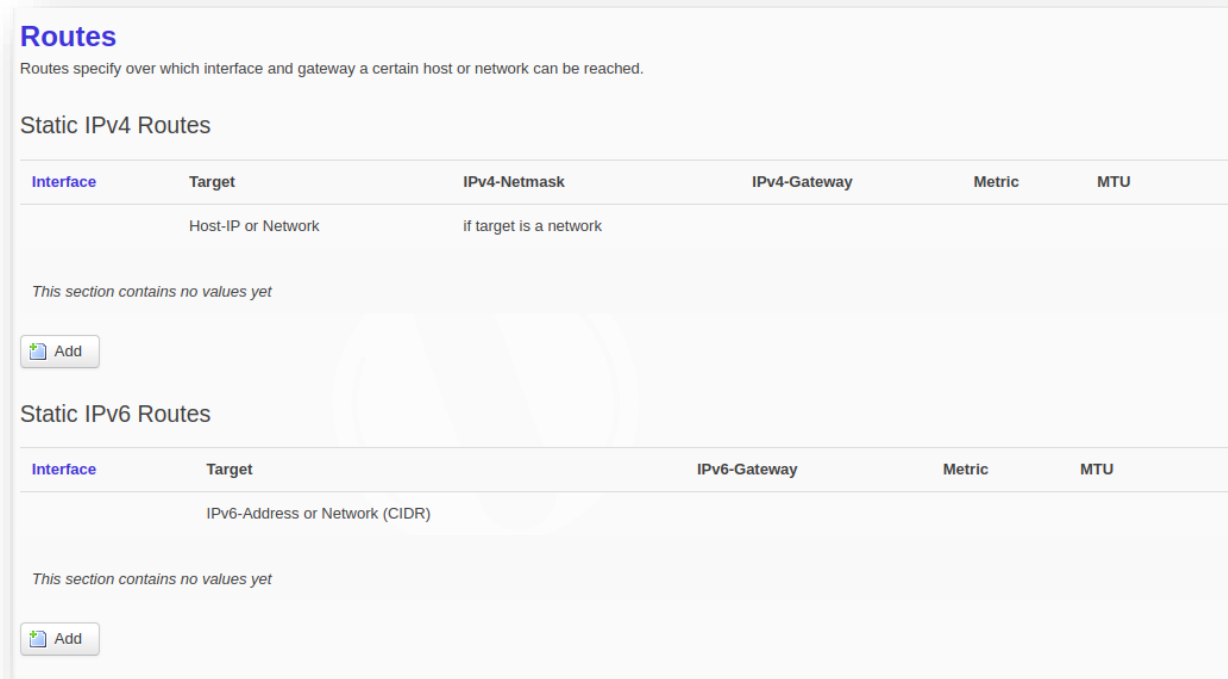


Figure 32: Static Routes (1)

S.No.	Field	Description
1.	Routes	Specifies over which interface and gateway a certain host or network can be reached.
2.	Static IPv4 Routes	All static IPv4 routes are displayed
3.	Add	New static IPv4 routes can be added by the end-user.
4.	Static IPv6 Routes	All static IPv6 routes are displayed.
5.	Add	New static IPv6 routes can be added by the end-user.

Table 30: Static Routes\_1

After clicking **Add** Button, the page looks like:

Figure 33: Static Routes\_2

S.No.	Field	Description
1.	Routes	Specifies over which interface and gateway a certain host or network can be reached.
2.	Static IPv4 Routes	New static IPv4 routes are added.
3.	Interface	Interface, along with the Host-IP, IPv4 target, gateway and MTU can be configured by the end-user.
4.	Static IPv6 Routes	New static IPv6 routes are added.
5.	Interface	Interface, along with the Host-IP, IPv6 target, gateway and MTU can be configured by the end-user.
6.	Add	More routes can be added as required.
7.	Save & Apply	All new configuration changes will be applied after being saved.
8.	Reset	All configuration changes which have not been saved and applied will be discarded.

Table 31: Static Routes\_2

### 3.6 Wi-Fi Schedule

Wi-Fi schedules can be created and viewed by the user as per their own configurations. It has two categories: **Create Schedule & View Schedule**

#### 3.6.1 Create Schedule

The current status of the Wi-Fi on the AP is displayed. The user can enter the Wi-Fi Schedule profile name. This profile name should not be the same as an existing profile name. This is not case sensitive.

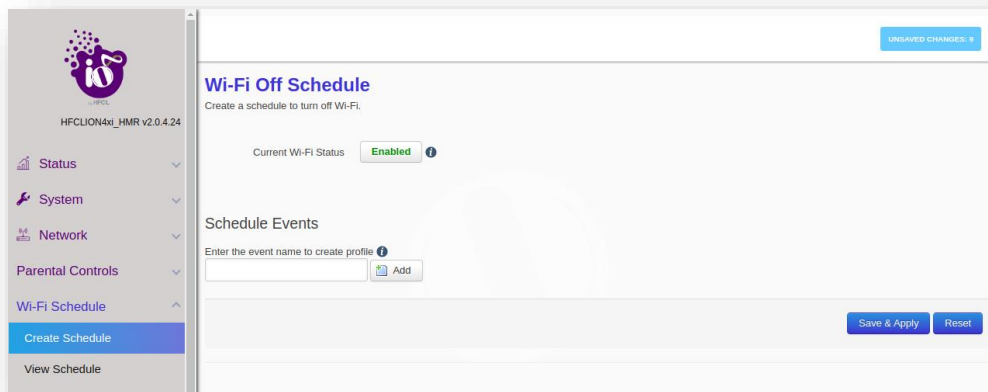


Figure 34: Create Wi-Fi Schedule

S.No.	Field	Description
1.	Wi-Fi Schedule	Wi-fi schedule can be configured by the end-users.
2.	Current Wi-fi Status	Can configure the current wi-fi status (enables/ disabled)
3.	Schedule Events	Event name to create profile.
4.	Add	To add a schedule event.
5.	Save and Apply	Changes will be applied after saving.
6.	Reset	All changes not saved and applied will be discarded.
7.	Unsaved Changes	All changes unsaved for configuration.

Table 32: Wi-Fi Schedule

#### 3.6.2 View Schedule

Any schedule created will be populated on the screen under the 'View Schedule' Tab.

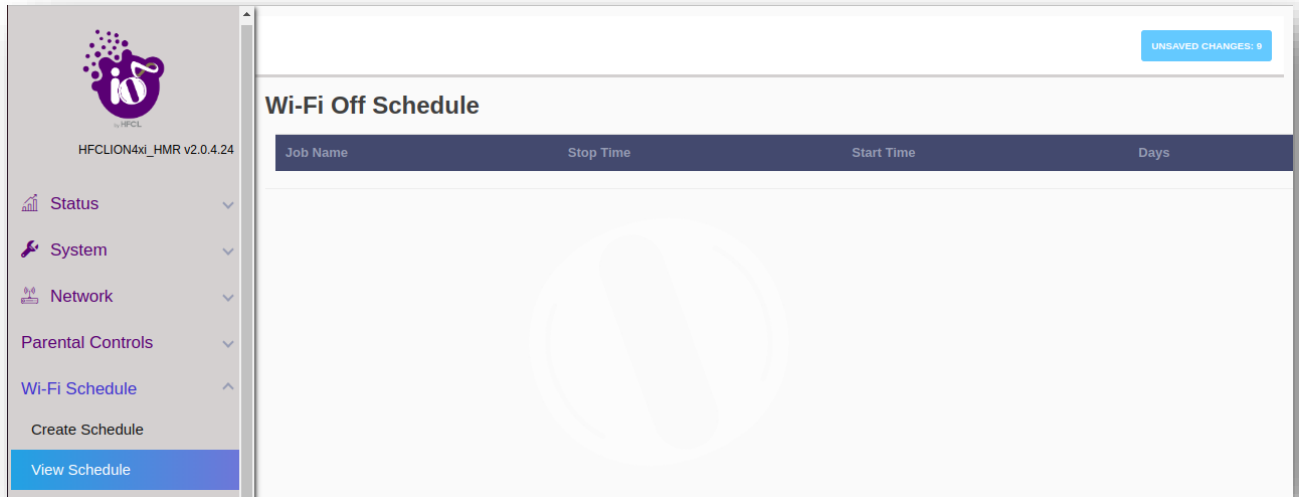


Figure 35: View Wi-Fi Schedule

S.No.	Field	Description
1.	View Schedule	Any schedule created will be displayed.
2.	Job Name	The name of job schedule.
3.	Stop Time	Time at which the schedule will stop.
4.	Start Time	Time at which the schedule will start.
5.	Days	Days the job schedule will be run.
6.	Unsaved Changes	Any changes unsaved.

Table 33: View Wi-Fi Schedule

### 3.7 Statistics

All statistical information such as reports, and statistical graphs will be rendered to the user. It includes Realtime Graphs & Reports.

#### 3.7.1 Realtime Graphs

The real time load graph shows the CPU load of last 3 min and the graph is refreshed at every 3 sec intervals. In addition to the displayed graph the user can find the average and the peak CPU load values of the respective AP. A basic overview of the Real-time load graphs screen is given below:

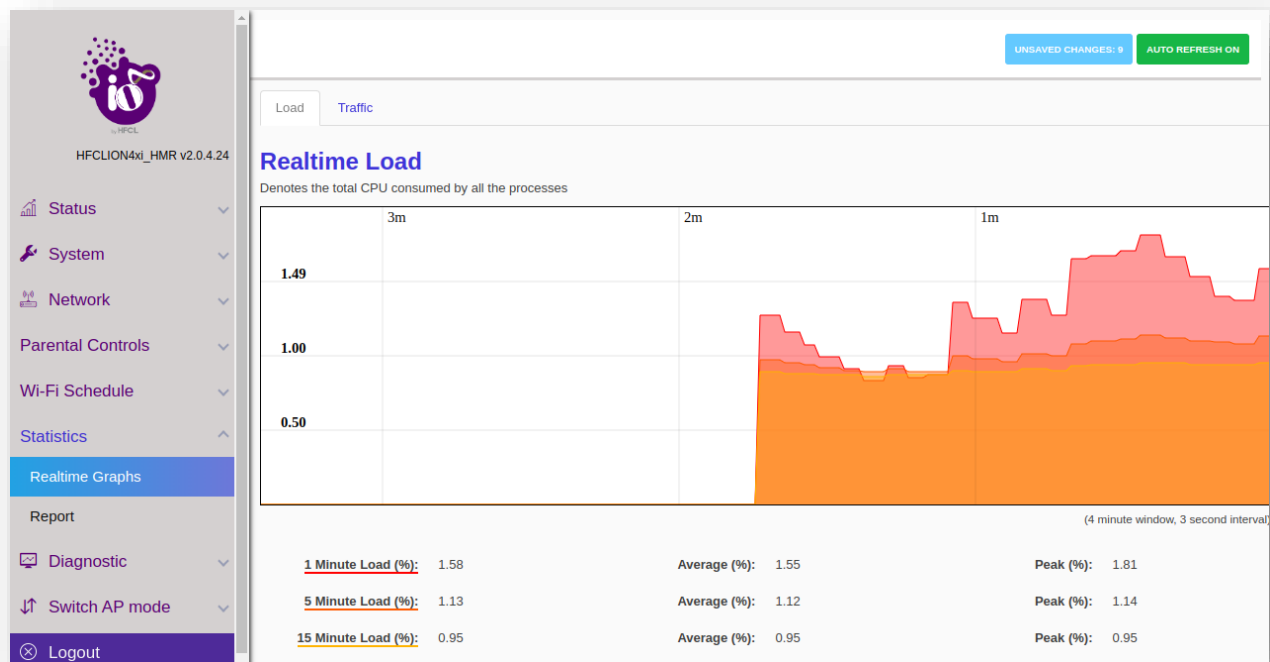


Figure 36: Real Time Load

S.No.	Field	Description
1.	Statistics	Statistical information is rendered on this page.
2.	Realtime Traffic	Real time traffic is rendered to end-users in the form of graphs.
3.	Realtime Load	Real time load is depicted by the total CPU consumed by all the processes.

Table 34: Realtime Load

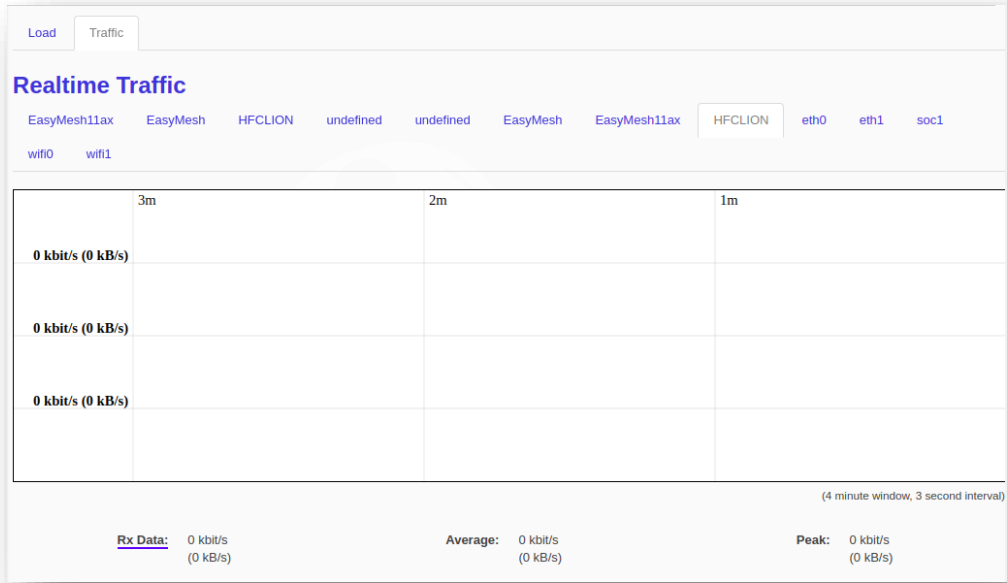


Figure 37: Real Time Traffic

S.No.	Field	Description
1.	Statistics	Statistical information is rendered on this page.
2.	Realtime Graphs	All real time graphs pertaining to different fields are rendered.
3.	Realtime Traffic	All real time traffic pertaining to different fields are rendered.

Table 35: Realtime Traffic

### 3.8 Reports

All the reports generated by the user can be downloaded for their perusal.

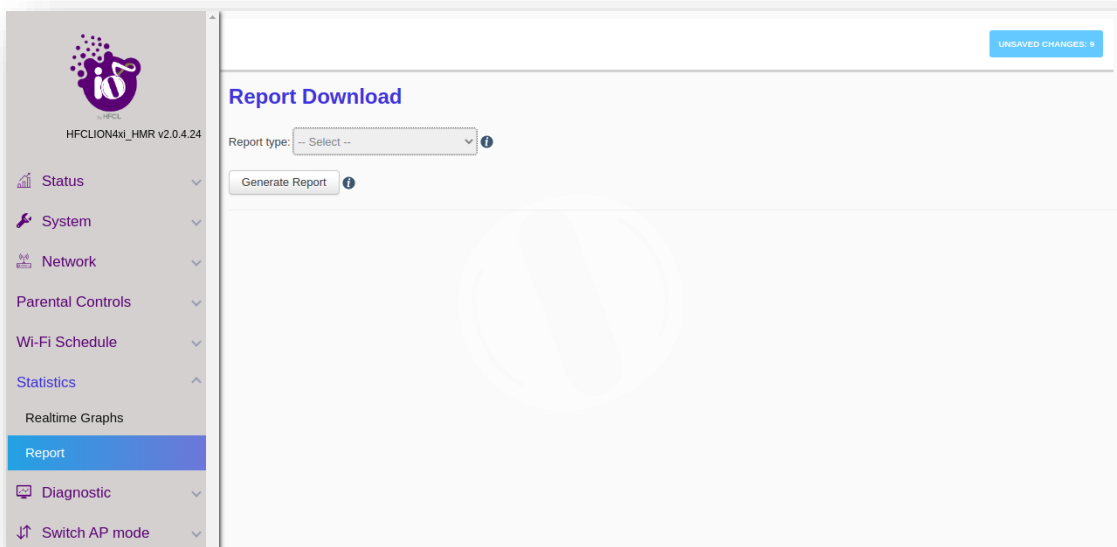


Figure 38: Report

S.No.	Field	Description
1.	Report Download	Reports can be downloaded by end-users in tar format for their perusal.
2.	Report Type	Report type can be selected as required.
3.	Generate Report	Reports are generated and automatically downloaded.

Table 36: Reports

### 3.9 Diagnostics

All the diagnostics services will be rendered to the user:

- Routes
- System Log
- Kernel Log
- Tools
- Associated stations

#### 3.9.1 Routes

The screenshot displays the 'Routes' configuration page. At the top, it states 'The following rules are currently active on this system.' Below this, there are three main sections:

- ARP:** A table with columns for IPv4-Address, MAC-Address, and Interface. One entry is shown: IPv4-Address: 10.42.0.1, MAC-Address: c8:4b:d6:51:32:e5, Interface: br-lan.
- Active IPv4-Routes:** A table with columns for Network, Target, IPv4-Gateway, Metric, and Table. Three entries are shown:
 

Network	Target	IPv4-Gateway	Metric	Table
lan	0.0.0.0/0	10.42.0.1	0	main
lan	10.42.0.0/24		0	main
lan	10.42.0.1		0	main
- Active IPv6-Routes:** A table with columns for Network, Target, Source, Metric, and Table. Multiple entries are shown, all with Target: ff00::/8 and Metric: 256.
 

Network	Target	Source	Metric	Table
lan	ff00::/8		256	local
(RRE)	ff00::/8		256	local
lan	ff00::/8		256	local
lan	ff00::/8		256	local
(adh113)	ff00::/8		256	local
lan	ff00::/8		256	local
lan	ff00::/8		256	local
lan	ff00::/8		256	local

Figure 39: Routes Tab

S.No.	Field	Description
1.	Routes	Routing routes are rendered for end-users.
2.	ARP	Address Resolution Protocol are displayed.
3.	Active IPv4 Routes	Current configured active IPv4 routes are displayed.
4.	Active IPv6 Routes	Current configured active IPv6 routes are displayed.

Table 37: Routes

### 3.9.2 System Log

This screen is provided to view the AP logs if the user faces any issue or wants to view the back-end logs. Only new logs are shown in this screen. However, old logs are stored in the database but will not be shown in this screen.

A basic overview of the System Log screen is given below:

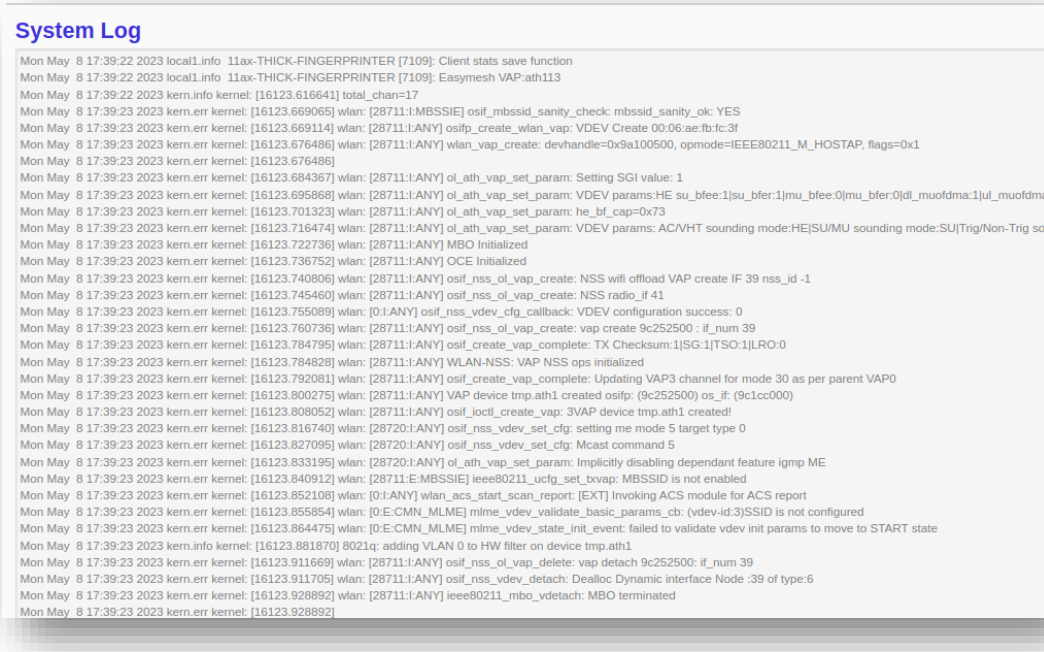


Figure 40: System Log Tab

S.No.	Field	Description
1.	System Log	System specific logs are rendered to the end-users.

Table 38: System Log



### 3.9.3 Kernel Log

```

Kernel Log
[16029.528407] wlan: [26623:1:ANY] osif_nss_of_vap_create: NSS radio_if_40
[16029.538384] wlan: [0:1:ANY] osif_nss_vdev_cfg_callback: VDEV configuration success: 0
[16029.544044] wlan: [26623:1:ANY] osif_nss_of_vap_create: vap create 9c257500: if_num 38
[16029.575949] wlan: [26623:1:ANY] osif_create_vap_complete: TX Checksum:1[SG-1][TSO:1][LRO:0
[16029.575993] wlan: [26623:1:ANY] WLAN:NSS: VAP NSS ops initialized
[16029.583206] wlan: [26623:1:ANY] osif_create_vap_complete: Updating VAP3 channel for mode 27 as per parent VAP0
[16029.593170] wlan: [26623:1:ANY] VAP device tmp.ath015 created osifp: (9c257500) os_if: (996d0000)
[16029.599670] wlan: [26623:1:ANY] osif_ioctl_create_vap: 3VAP device tmp.ath015 created!
[16029.608781] wlan: [26623:E:MBSSIE] ieee80211_ucfg_set_bvmap: MBSSID is not enabled
[16029.616182] wlan: [0:1:ANY] wlan_acs_start_scan_report: [EXT] Invoking ACS module for ACS report
[16029.623624] wlan: [0:E:CMN_MLME] mime_vdev_validate_basic_params_cb: (vdev-id:3)SSID is not configured
[16029.632491] wlan: [0:E:CMN_MLME] mime_vdev_state_init_event: failed to validate vdev init params to move to START state
[16029.644103] 8021q: adding VLAN 0 to HW filter on device tmp.ath015
[16029.680628] wlan: [26623:1:ANY] osif_nss_of_vap_delete: vap detach 9c257500: if_num 38
[16029.680663] wlan: [26623:1:ANY] osif_nss_vdev_detach: Dealloc Dynamic interface Node :38 of type:6
[16029.693390] wlan: [26623:1:ANY] ieee80211_mbo_vdetach: MBO terminated
[16029.693390]
[16029.693575] wlan: [0:E:ANY] ol_peer_delete_response_event_handler: peer_del_resp: mac: 00:06:ae:fb:fc:36 vdevid: 3 Unable to find vdev
[16029.693934] wlan: [0:1:ANY] osif_nss_wifili_vdev_get_mpsta_vdevid: Get MPSTA: vdev is NULL
[16029.716743] wlan: [26623:1:ANY] ieee80211_oce_vdetach: OCE terminated
[16029.716743]
[16054.126703] wlan: [26913:1:ANY] osif_nss_vdev_set_cfg: setting me mode 5 target type 0
[16054.126736] wlan: [26913:1:ANY] osif_nss_vdev_set_cfg: Mcast command 5
[16054.133727] wlan: [26913:1:ANY] ol_ath_vap_set_param: Implicitly disabling dependant feature igmp ME
[16054.198413] wlan: [26916:1:ANY] osif_nss_vdev_set_cfg: setting me mode 5 target type 0
[16054.198443] wlan: [26916:1:ANY] osif_nss_vdev_set_cfg: Mcast command 5
[16054.205417] wlan: [26916:1:ANY] ol_ath_vap_set_param: Implicitly disabling dependant feature igmp ME
[16054.276155] wlan: [26919:1:ANY] osif_nss_vdev_set_cfg: setting me mode 5 target type 0
[16054.276187] wlan: [26919:1:ANY] osif_nss_vdev_set_cfg: Mcast command 5
[16054.283075] wlan: [26919:1:ANY] ol_ath_vap_set_param: Implicitly disabling dependant feature igmp ME
[16054.357594] wlan: [26922:1:ANY] osif_nss_vdev_set_cfg: setting me mode 5 target type 0
[16054.357625] wlan: [26922:1:ANY] osif_nss_vdev_set_cfg: Mcast command 5
[16054.364597] wlan: [26922:1:ANY] ol_ath_vap_set_param: Implicitly disabling dependant feature igmp ME
[16054.431879] wlan: [26925:1:ANY] osif_nss_vdev_set_cfg: setting me mode 5 target type 0

```

Figure 41: Kernel Log Tab

S.No.	Field	Description
1.	Kernel Logs	Kernel Logs are displayed to the end-users.

Table 39: Kernel Log

### 3.9.4 Tools

S.No.	Field	Description
1.	Tools	Enables end users to debug and troubleshoot as per arising needs.

Table 40: Tools

### 3.9.5 Associated Stations

The list of connected clients along with the relevant information in respective information columns is populated in this screen. A basic overview of the screen to show connected clients is given below:

S.No.	Field	Description
1.	Associated Stations	Through this, end users can see the listings of the Client device details which are connected to the network.

Table 41: Associated Stations

### 3.10 Logout

S.No.	Field	Description
1.	Logout	Users can log out of the GUI after editing configuration according to their specific requirements.

*Table 42: Logout*

---

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## About HFCL Limited

HFCL is a leading technology company specializing in creating digital networks for telcos, enterprises, and governments. Over the years, HFCL has emerged as a trusted partner offering sustainable high-tech solutions with a commitment to provide the latest technology products to its customers. Our strong R&D expertise coupled with our global system integration services and decades of experience in fibre optics enable us to deliver innovative digital network solutions required for the most advanced networks.

The Company's in-house R&D Centers located at Gurgaon & Bengaluru along with invested R&D Houses and other R&D collaborators at different locations in India and abroad, innovate a futuristic range of technology products and solutions. HFCL has developed capabilities to provide premium quality Optical Fiber and Optical Fiber Cables, state-of-the-art telecom products including 5G Radio Access Network (RAN) products, 5G Transport Products, WiFi Systems (WiFi 6, WiFi 7), Unlicensed Band Radios, Switches, Routers and Software Defined Radios.

The Company has state-of-the-art Optical Fiber and Optical Fiber Cable manufacturing plants at Hyderabad, Optical Fiber Cable manufacturing plant in Goa and in its subsidiary HTL Limited at Chennai.

We are a partner of choice for our customers across India, Europe, Asia Pacific, Middle East, Africa, and USA. Our commitment to quality and environmental sustainability inspires us to innovate solutions for the ever-evolving customer needs.

## Correspondence

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## Revision History

Date	Rev No.	Description	Owner
28/02/2023	A0-00	Initial Draft Release	HFCL
12/05/2023	A0-01	Revised Draft	HFCL
30/5/2023	A0-02	Updated Draft	HFCL