Infinite Possibilities

User Manual

Indoor & Outdoor Access Points

INDOOR AND OUTDOOR ACCESS POINT USER MANUAL USING GUI

This document helps you to understand the product features, configuration, login and logout process of Thin and Thick Access Point. This manual guides you through the installation process and the entire software user set.

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About HFCL Limited

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 IO products and provides information to familiarize you with the product features. It also guides you through the installation process and the entire software user set.

1.2 Intended Audience

The intended audiences for this document are:

1. Network Administrators
2. System Administrators
3. Product managers
4. System Integration and Verification team at HFCL Ltd.

1.3 Document Conventions

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

Document Conventions

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.

1.4 Terms and Abbreviations

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

Terms and Abbreviations

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	Received
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 Access Point (AP). IO Access Points are oriented to next generation high-speed wireless access. The Access Point Configuration is controlled through GUI and WLC. BLE Support is also available for initial configuration for all the APs.

Following are the variants of IO product family:

1. Dual Band 4x4:4 Indoor Access Point (ion8i).
2. Dual Band 4x4:4 Outdoor Access Point (ion8/ion8e).

3 Federal Communication Commission Certified

These equipment 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.

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 Dual Band 4x4:4 Indoor Access Point

Technical specifications of this variant are given below:

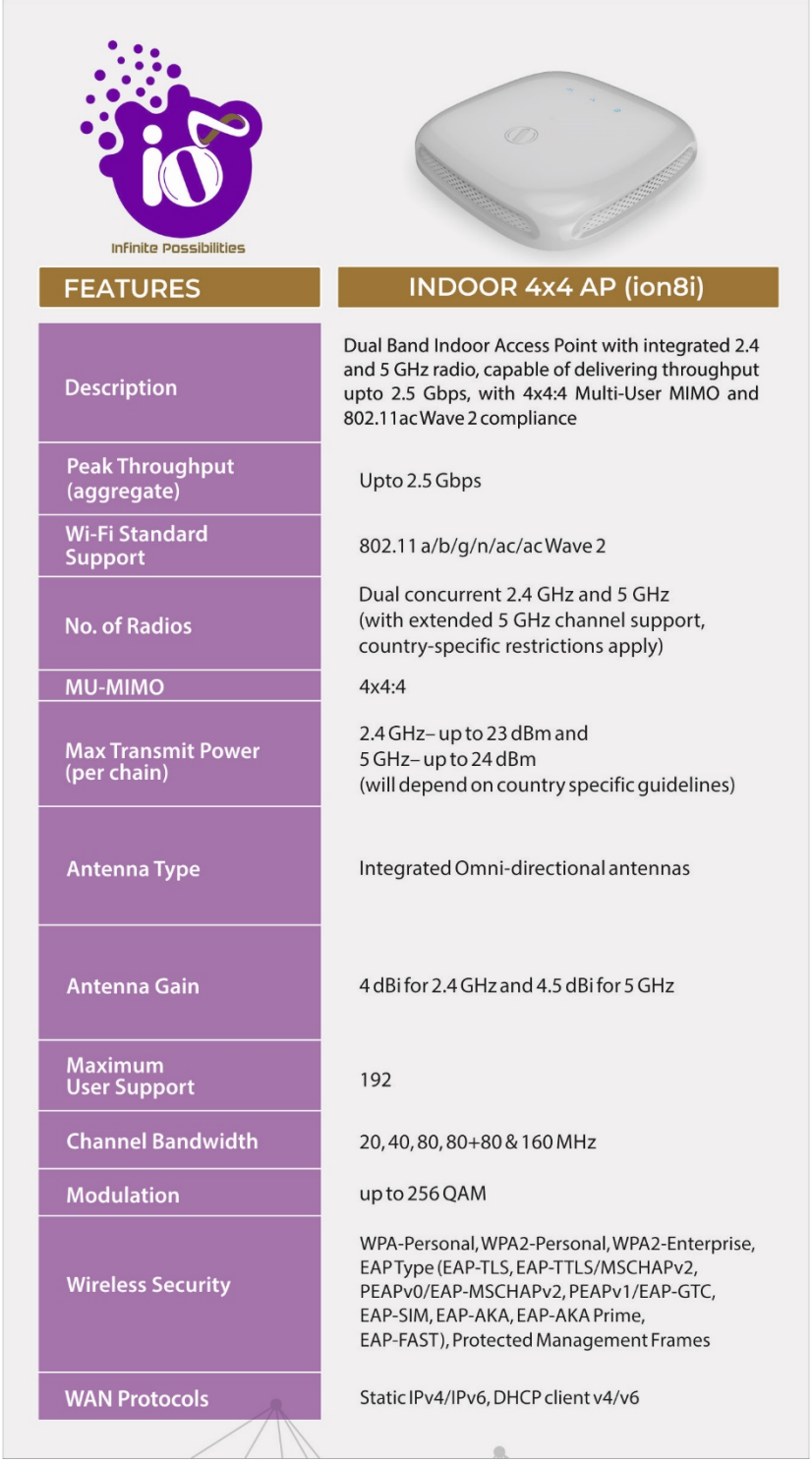
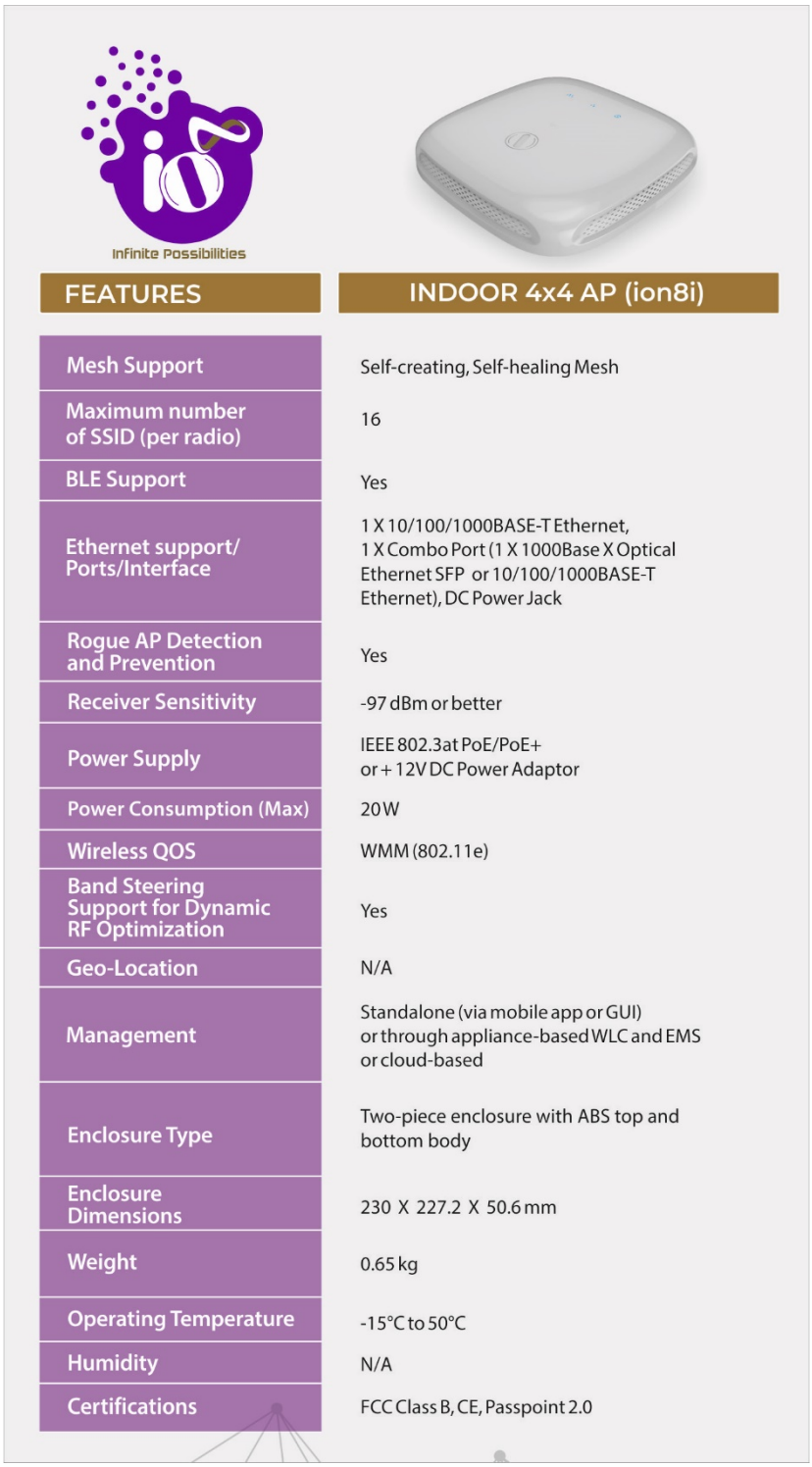


Figure 1: Dual Band 4x4:4 Indoor Access Point - Specifications & Highlights-1



FEATURES	INDOOR 4x4 AP (ion8i)
Mesh Support	Self-creating, Self-healing Mesh
Maximum number of SSID (per radio)	16
BLE Support	Yes
Ethernet support/ Ports/Interface	1 X 10/100/1000BASE-T Ethernet, 1 X Combo Port (1 X 1000Base X Optical Ethernet SFP or 10/100/1000BASE-T Ethernet), DC Power Jack
Rogue AP Detection and Prevention	Yes
Receiver Sensitivity	-97 dBm or better
Power Supply	IEEE 802.3at PoE/PoE+ or +12V DC Power Adaptor
Power Consumption (Max)	20W
Wireless QOS	WMM (802.11e)
Band Steering Support for Dynamic RF Optimization	Yes
Geo-Location	N/A
Management	Standalone (via mobile app or GUI) or through appliance-based WLC and EMS or cloud-based
Enclosure Type	Two-piece enclosure with ABS top and bottom body
Enclosure Dimensions	230 X 227.2 X 50.6 mm
Weight	0.65 kg
Operating Temperature	-15°C to 50°C
Humidity	N/A
Certifications	FCC Class B, CE, Passpoint 2.0

Figure 2: Dual Band 4x4:4 Indoor Access Point - Specifications & Highlights-2

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3.2 Dual Band 4x4:4 Outdoor Access Point (ion8/ion8e)

The Dual Band 4x4:4 outdoor Access Point has two factory fitted variants: one with integrated antennas (ion4) and the other with connectors for external antennas (ion4e). Technical specifications are given below:

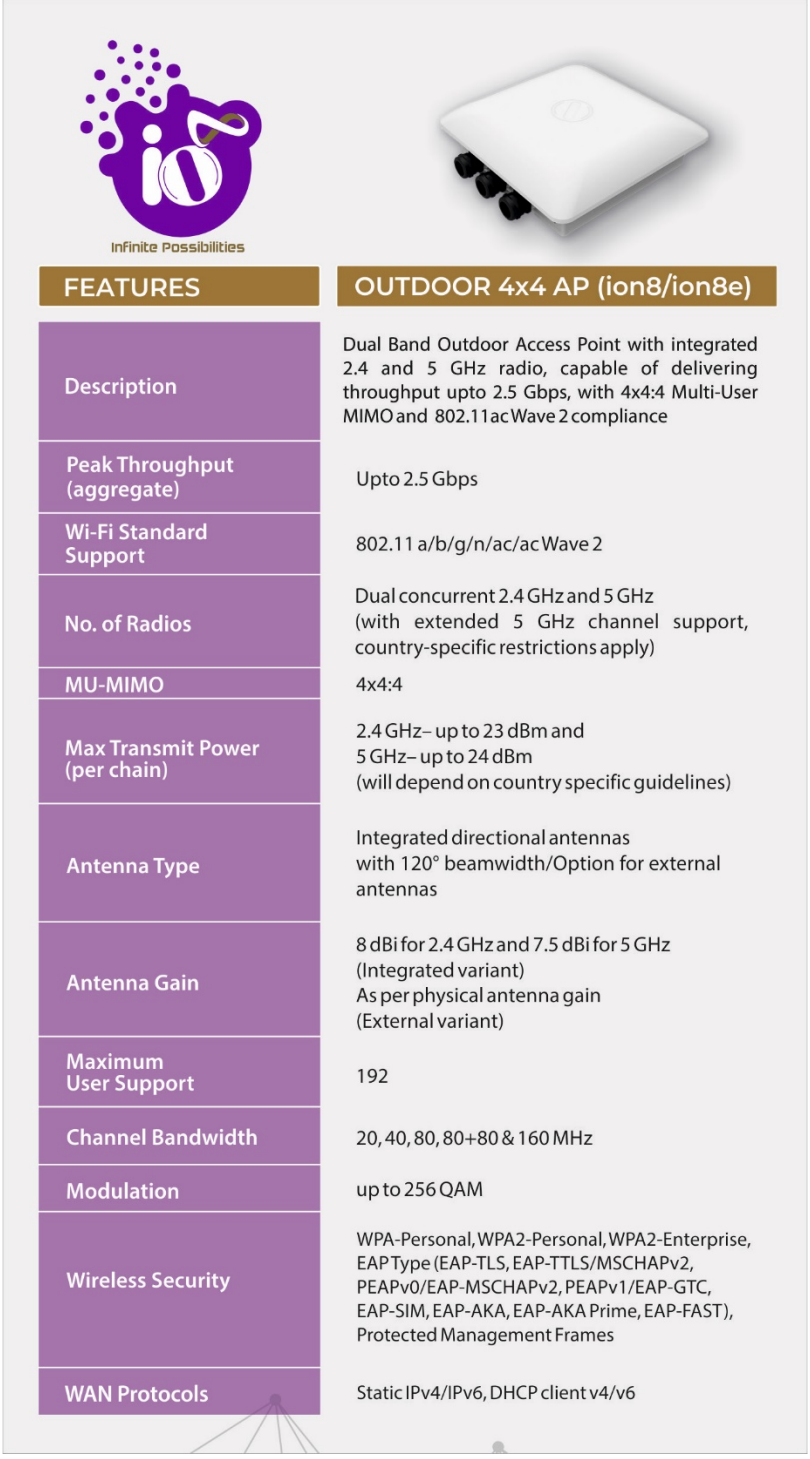

Figure 3: Dual Band 4x4:4 Outdoor Access Point - Specifications & Highlights-1

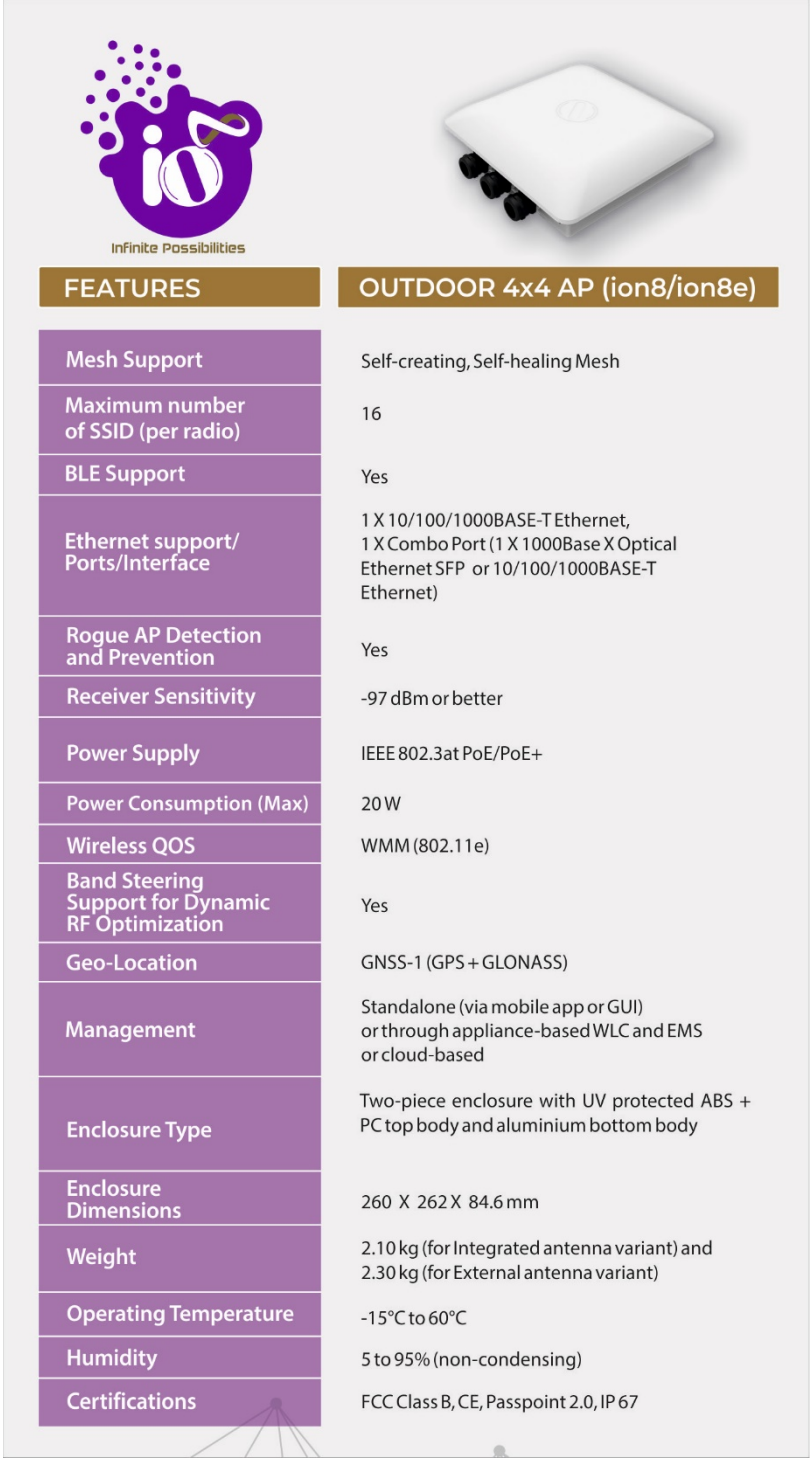

Figure 4: Dual Band 4x4:4 Outdoor Access Point - Specifications & Highlights-2

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4 Hardware Setup

4.1 System Requirements

Before installing the access point, 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 adaptor which should be 803at/af compliant. A 100–240 V, 50–60 Hz AC power source.
4. A web browser to configure the devices.
5. At least 802.11b/g-compliant devices.

4.2 Packaging Content – For ion8i/ion8/ion8e variants of this product

Your package contains the following items.

Figure 5: Packaging Content of ion8i/ion8/ion8e Variants

Your box contains the following items:

1. User can choose any of the Access Point model mentioned below:
    a. Dual Band 4x4:4 Indoor Access Point (ion8i).
    b. Dual Band 4x4:4 Outdoor Access Point (ion8/ion8e).
2. AC power adaptor (plug varies by region).
3. PoE Adaptor (only with Dual Band 4x4:4 Outdoor Access Point (ion8/ion8e)).
4. Mounting bracket kit.
5. User Manual.
6. Quick Start Guide with cabling and access point setup instructions. If any parts are incorrect, missing, or damaged, contact HFCL Ltd. customer care support.

5 Getting to Know the IO Access Point

5.1 Dual Band 4x4:4 Indoor Access Point

5.1.1 Front / Side View

A basic overview of the front/side view of the indoor AP is given below:

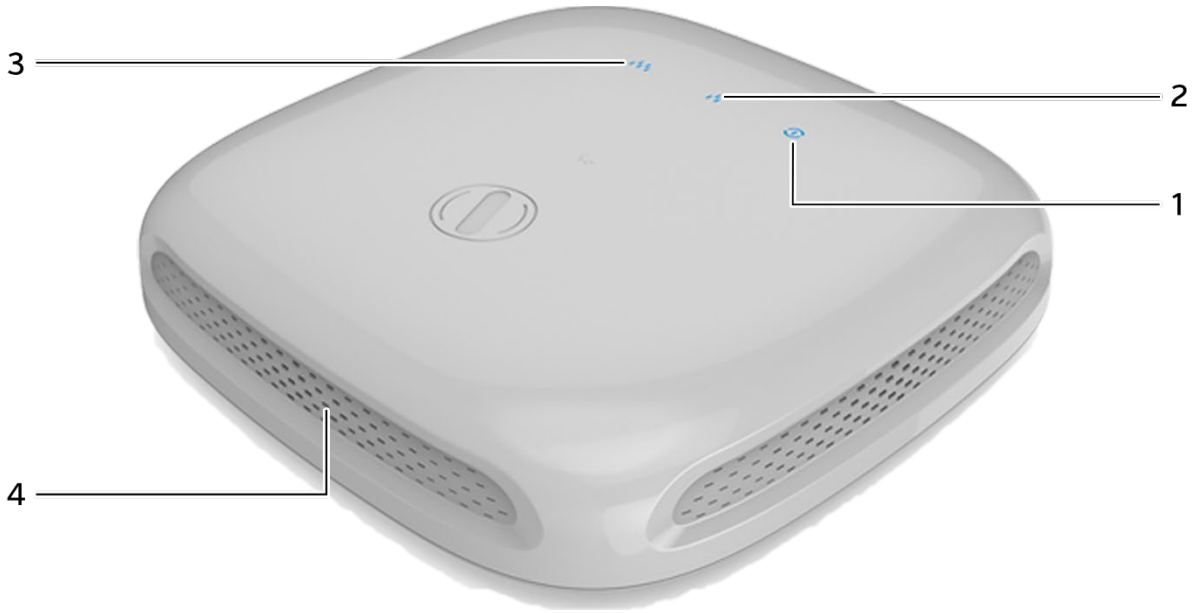

Figure 6: Front/side view of the indoor AP

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

Table 1: List of information displayed in front/side view of the indoor AP

Callout	Name	Description
1.	Power LED	This LED blinks in Blue color to notify the user that device is powered ON
2.	2.4GHz LED	This LED blinks in Blue color when 2.4GHz wireless network interface comes up
3.	5GHz LED	This LED blinks in Blue color when 5GHz wireless network interface comes up
4.	Vent	Transfers the heat in the ambient

5.2 Bottom View

Bottom side overview of the indoor AP is given below:

Figure 7: Bottom view of the indoor AP

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

Table 2: List of information displayed in bottom view of the indoor AP

Callout	Name	Description
1.	Cable Connection Area	The space is provided for power and other cables of AP as shown in the back view of the same
2.	Mounting Slot	This helps in the attachment of mounting bracket and indoor AP in case of wall and ceiling mounting

5.2.1 Back View

Back side overview of the indoor AP is given below:

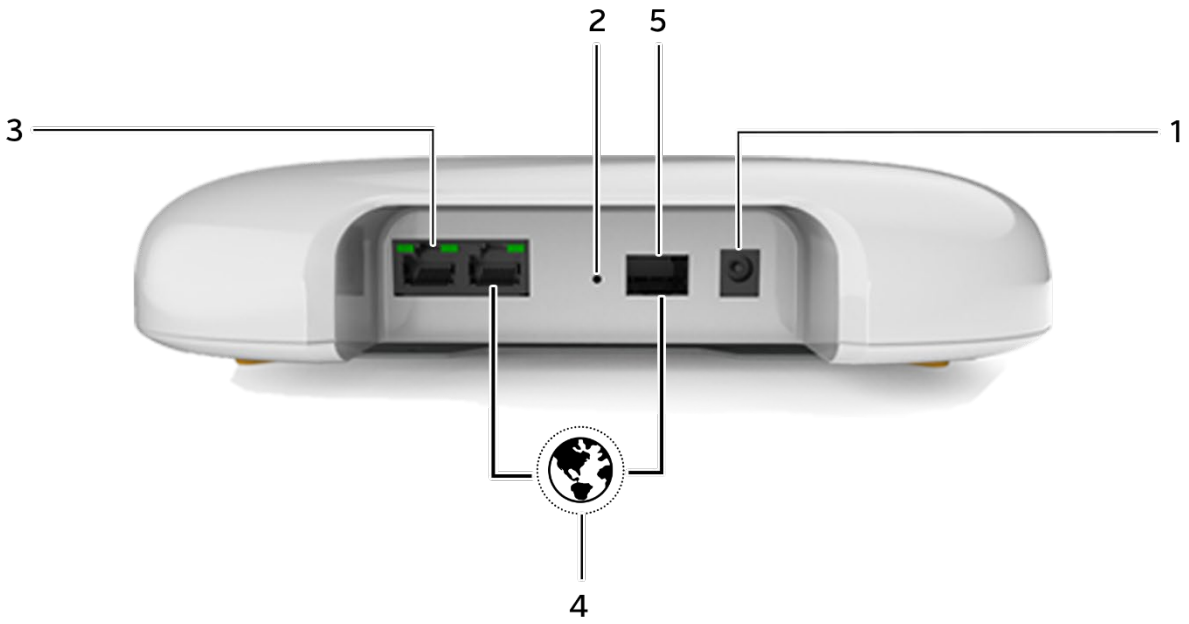

Figure 8: Back side view of the indoor AP

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

Table 3: List of information displayed in the back side view of the indoor AP

Callout	Name	Description
1.	DC Jack	The DC jack is provided to power up the AP with 12 V power adaptor
2.	Reset	Use an appropriate pointed pin and press the reset button to restore the AP with default factory settings
3.	LAN + PoE Port	Used for powering up the device via PoE adaptor. This port can be used to carry data as well (optional)
4.	WAN Combo Port	Used to connect the device with the backhaul network or to connect to a laptop through an Ethernet cable. One of Ethernet or SFP can be used at a time
5.	SFP	Connects fiber cable with the maximum data transfer rate capability of 1 Gbps.

5.3 Dual Band 4x4:4 Outdoor Access Point

5.3.1 Front / Side View

A basic overview of the front/side view of the outdoor AP is given below:

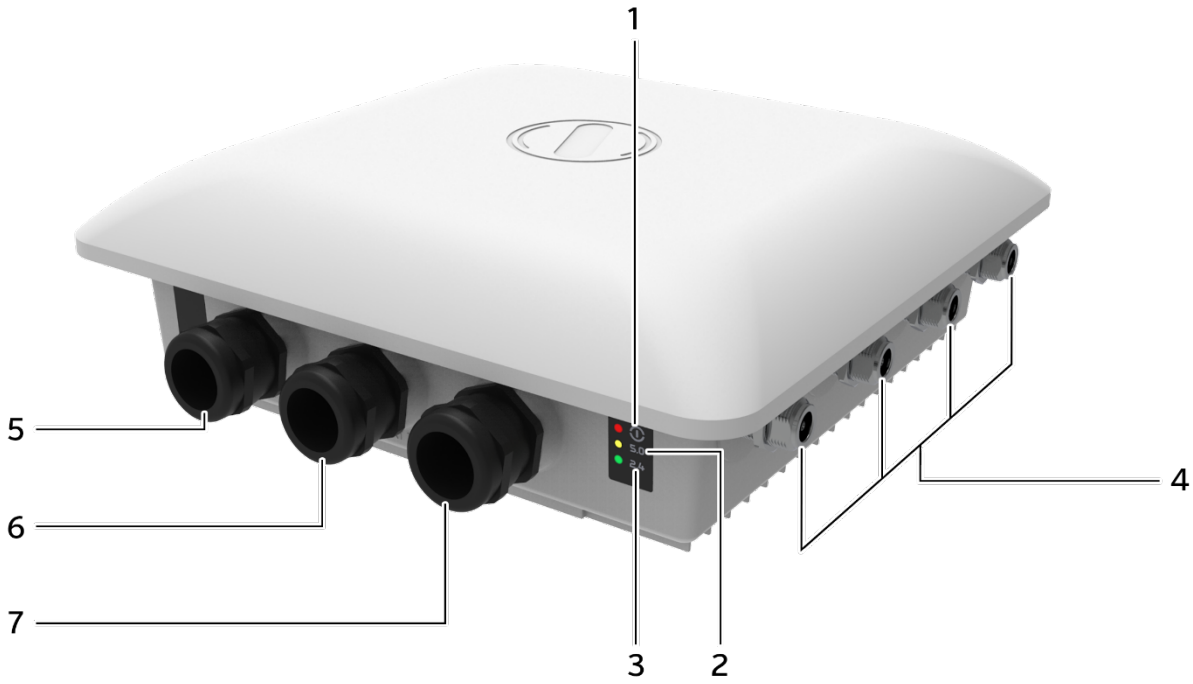

Figure 9: Front/side view of the outdoor AP

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

Table 4: List of information displayed in front/side view of the outdoor AP

Callout	Name	Description
1.	Power LED	This LED will blink in Red color to notify the user that device is powered ON
2.	5GHz LED	This LED will blink in Yellow color when 5GHz wireless network interface comes up
3.	2.4GHz LED	This LED will blink in Green color when 2.4GHz wireless network interface comes up
4.	External antenna connectors	Total 8 n-type antenna connectors are available for ion8e variant of 4x4:4 outdoor AP. Four on LHS and four on RHS.
5.	LAN + PoE Port	Used for powering up the device via PoE adaptor. This port can be used to carry data as well (optional)
6.	Combo Port	Used to connect the device with the backhaul network or to connect to a laptop through an Ethernet cable. One of Ethernet or SFP can be used at a t time
7.	SFP	Connects fiber cable with the maximum data transfer rate capability of 1 Gbps.

5.4 Back View

Back side overview of the outdoor AP is given below:

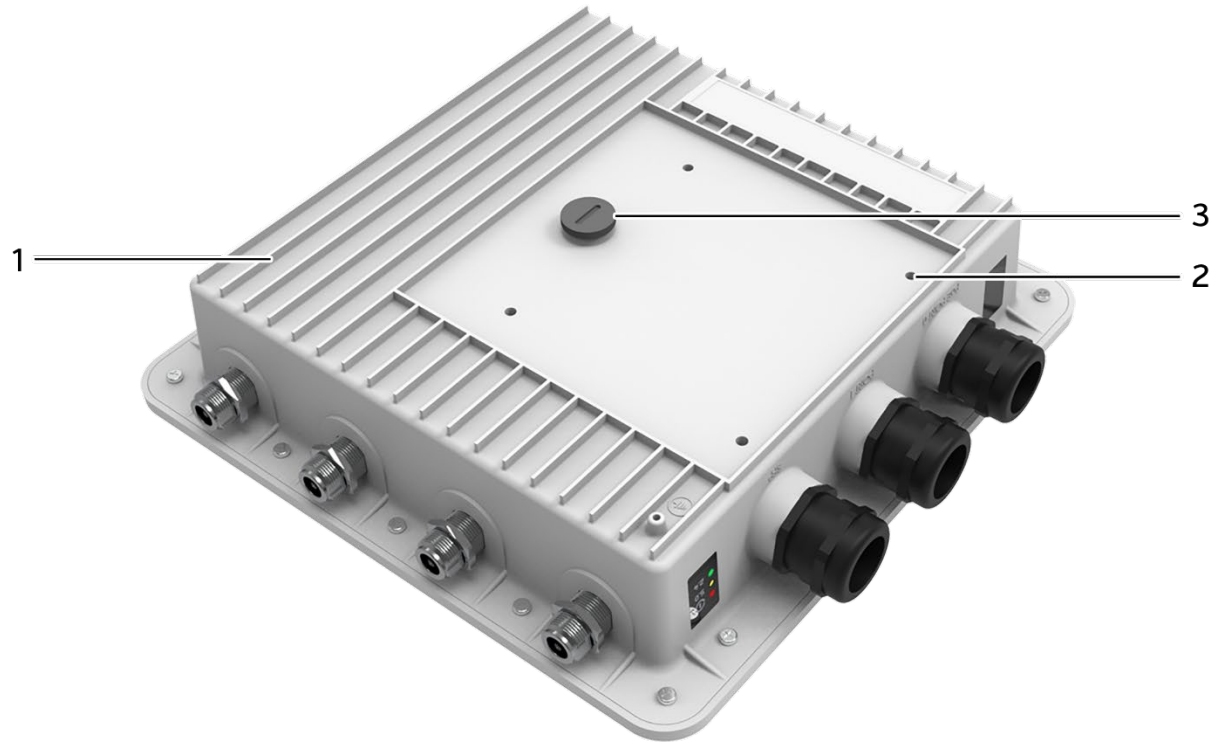

Figure 10: Back view of the outdoor AP

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

Table 5: List of information displayed in back view of the outdoor AP

Callout	Name	Description
1.	Thermal Plate (Heat Transfer)	It helps in heat transfer from the board environment to Ambient.
2.	Screws for Mounting bracket	This helps in the attachment of mounting bracket and outdoor AP in case of pole and wall mounting
3.	Humidity controller cap	Cap to control the humidity

Note: The Reset button of outdoor AP is located below the humidity controller cap. Turn the humidity controller cap in counter clock wise direction and remove it from the access point. Use an appropriate pointed object to press the button. 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 access point:

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 AP is working.
8. Fasten the device tightly.

6.1 Dual Band 4x4:4 Indoor Access Point

Power up the device using PoE Adaptor or AC Adaptor (12V) as shown below:

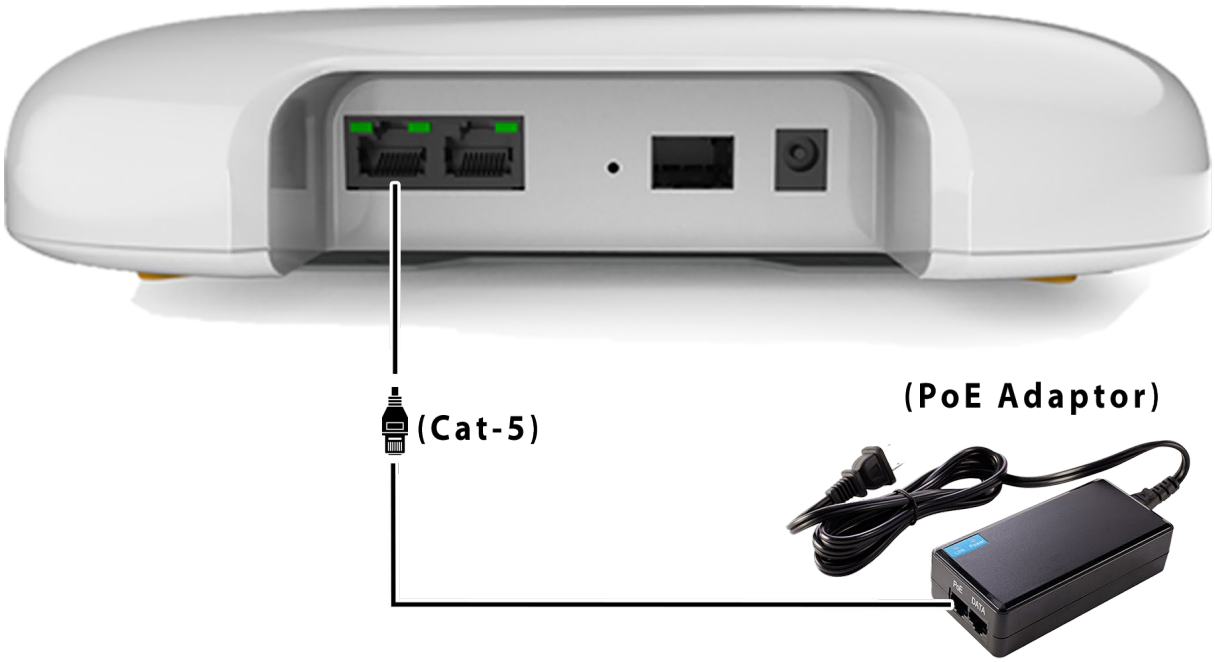

Figure 11: Power up the device using PoE adaptor

(OR)

Figure 12: Power up the device using AC Adaptor (12V)

6.1.1 Connect to the Indoor Access Point

Follow the steps mentioned below and connect to the indoor AP through GUI:

1. Configure a computer with a 1-domain static IP address e.g. 192.168.1.1 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 adaptor or combo port of the access point.
    a. Connect the other end of the Ethernet cable to the combo port. Use the unused port of PoE adaptor and connect to the backhaul network

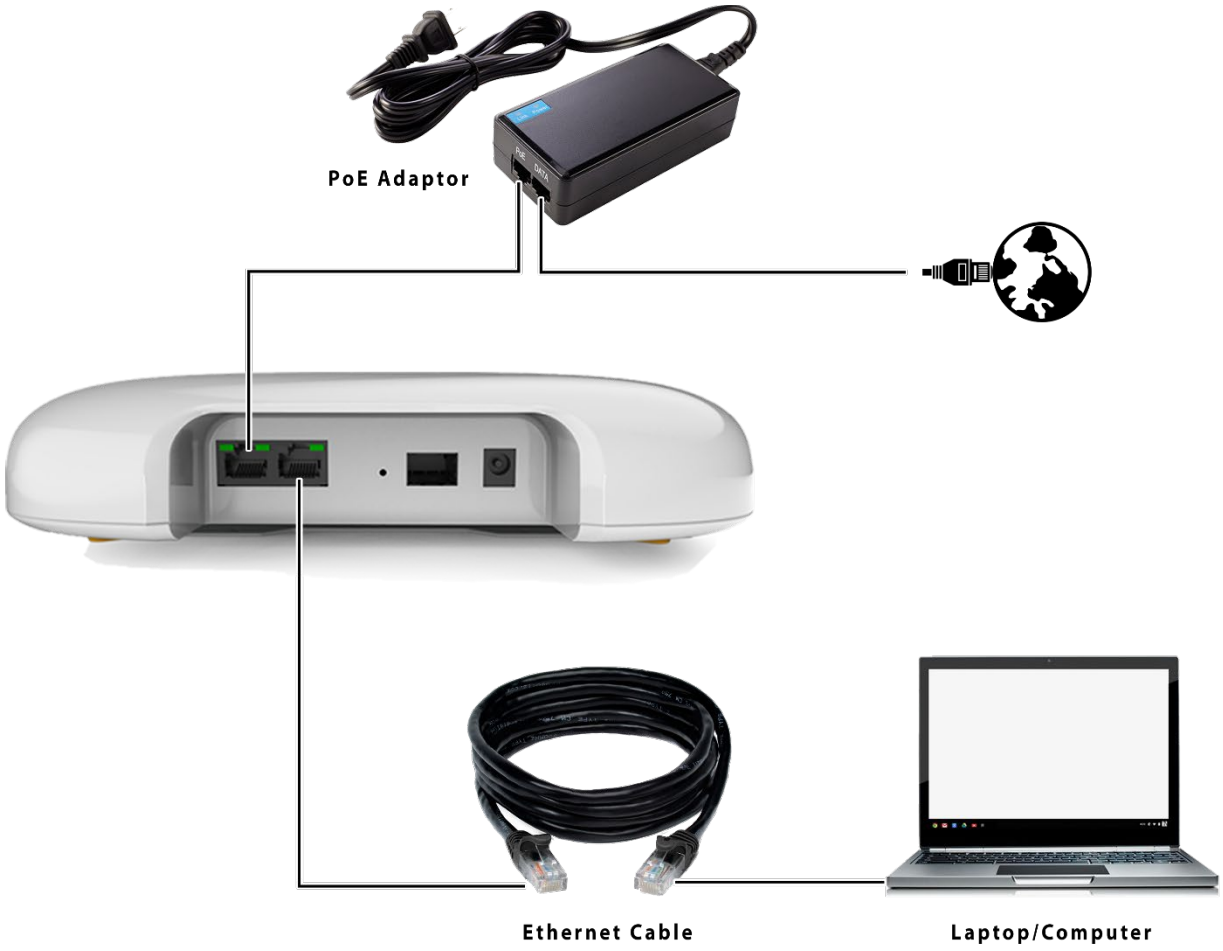

Figure 13: Connect to the network-1

(OR)

b. Connect the other end of the Ethernet cable to the PoE adaptor. Use the combo port and connect to the backhaul network.

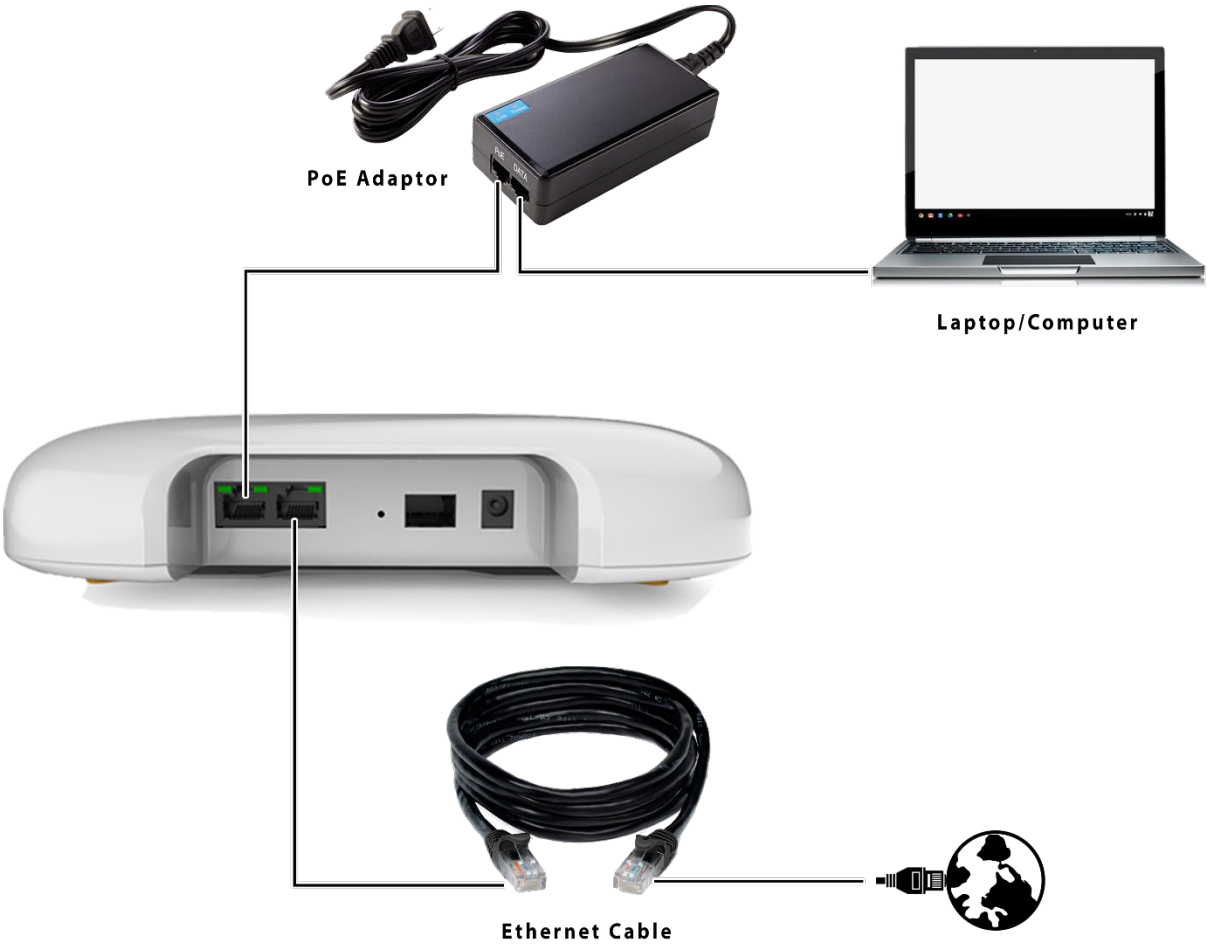

Figure 14: Connect to the network-1

5. Device will be powered On.
6. Open a web browser and enter the "AP static IP address" (**192.168.1.1**) in the address bar.
7. A login screen will appear.

6.2 Dual Band 4x4:4 Outdoor Access Point

Power up the device using PoE Adaptor as shown below:

Figure 15: Power up the device using PoE adaptor

6.2.1 Connect to the Outdoor Access Point

Follow the steps mentioned below and connect to the outdoor AP through GUI:

1. Configure a computer with a 1-domain static IP address e.g. 192.168.1.1 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 adaptor or combo port of the access point.
    a. Connect the other end of the Ethernet cable to the combo port. Use the unused port of PoE adaptor and connect to the backhaul network

Figure 16: Connect to the network-1

(Or)

b. Connect the other end of the Ethernet cable to the PoE adaptor. Use the combo port and connect to the backhaul network.

Figure 17: Connect to the network-1

5. Device will be powered On.
6. Open a web browser and enter the "AP static IP address" (**192.168.1.1**) in the address bar.
7. A login screen will appear.

7 Connect to the Thin Mode Access Point and Log In

You can connect to the access point's web management interface to view or change its LAN and wireless access settings. Refer the procedure mention in "Connect to the Indoor Access Point" and "Connect to the Outdoor Access Point" section and connect to a thin mode access point.

7.1 Login through GUI

This is the 1st 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.

A basic overview of the same is shown below:

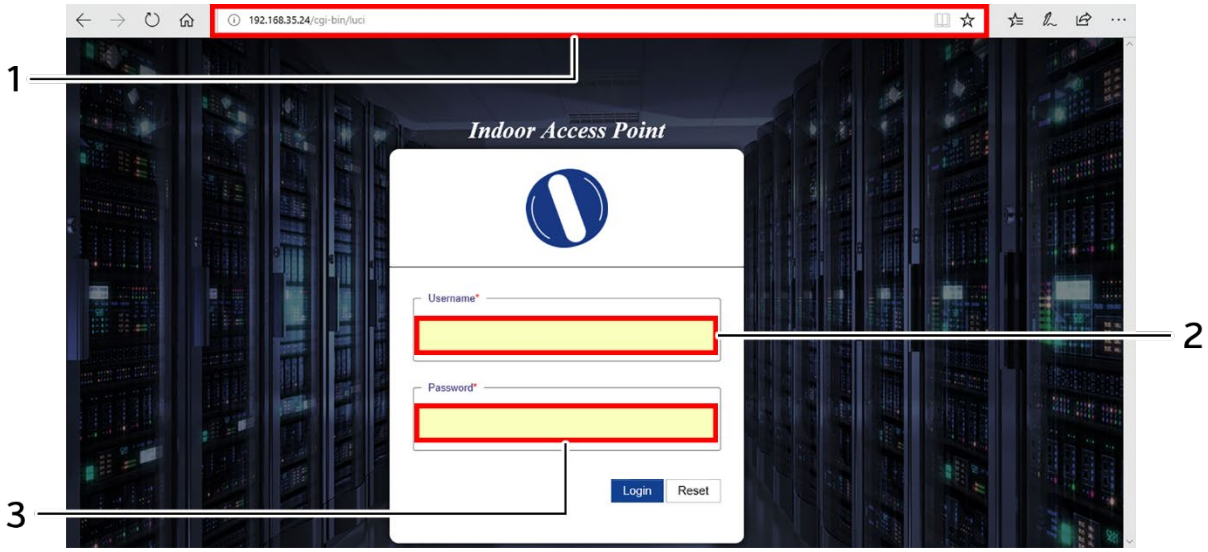

Figure 18: Basic overview of login screen

Follow the steps given below to login through GUI:

Table 6: List of actions to login through GUI

Callout	Name	Description
1.	Web browser	Open a web browser and enter the "IP address of the AP" in the address bar. 192.168.1.1 is the default IP address
2.	User name	Enter the valid "User ID"
3.	Password	Enter the valid "Password"

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

8 Status overview screen

The screen provides the status overview of:

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

8.1 System summary

A basic layout of the system summary is given below:

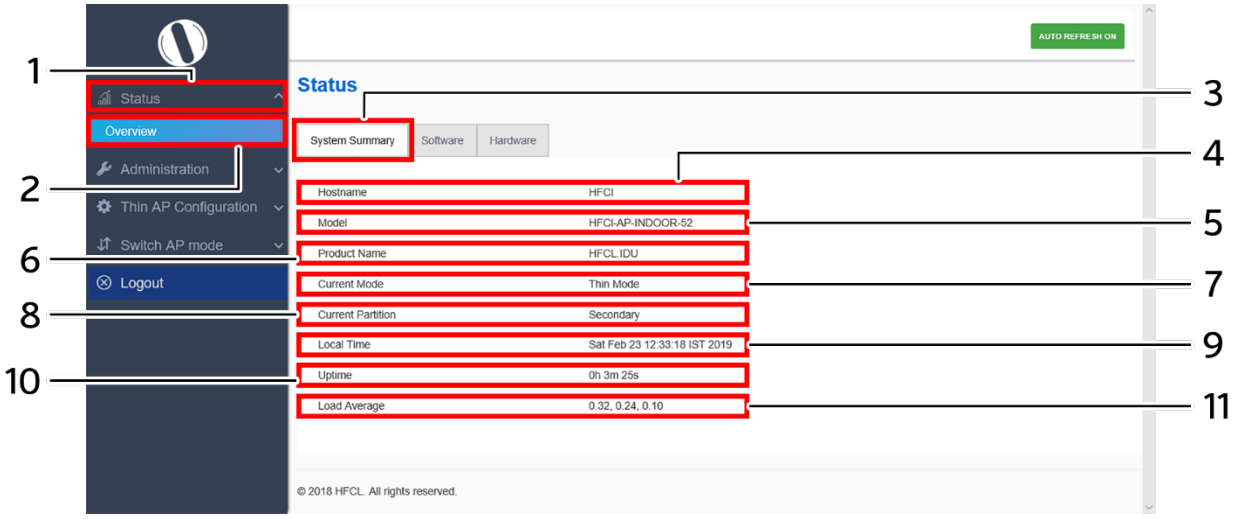

Figure 19: Basic layout of the system summary screen

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
2.	Overview	Click on "Overview" option
3.	System summary	Click on "System summary" option
4.	Hostname	Displays the "Hostname" assigned to the respective AP in the "System Configuration" screen
5.	Model	Displays the model number of the product. The same is configured with the factory settings of the device and reflects in this section on system boot up
6.	Product Name	Displays the name of the product
7.	Current Mode	Displays the current acting mode of the AP (Thick mode or Thin mode)
8.	Current Partition	Displays the current partition in use
9.	Local Time	Displays the date and time details according to the time zone allocated in the "System Configuration" screen

Callout	Name	Description
10.	System uptime	Displays the time duration since the respective AP board is up and successfully running without any shutdown
11.	Average Load	Displays the average load on the device

8.2 System software

A basic layout of the system software is given below:

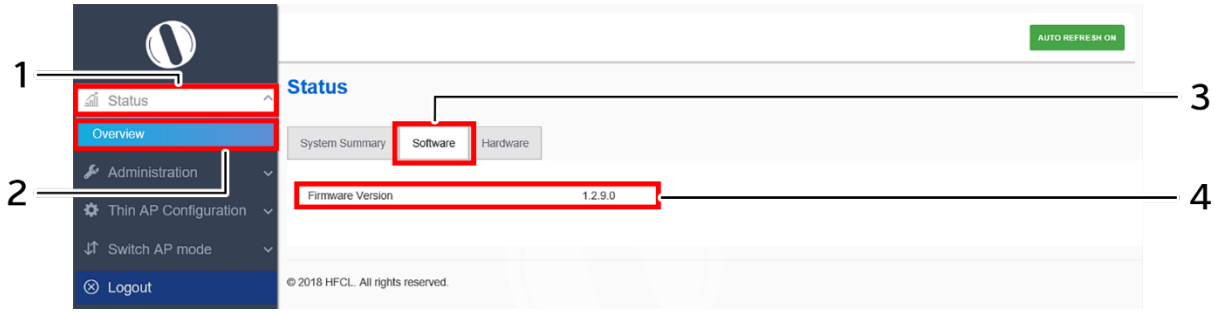

Figure 20: Basic layout of the system software screen

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

Table 8: List of information displayed in the system software screen

Callout	Name	Description
1.	Status	Click on the "Status" dropdown
2.	Overview	Click on "Overview" option
3.	Software	Click on "Software" option
4.	Firmware Version	Displays the current firmware version of the respective AP. The operating system is based on openwrt project model

8.3 System hardware

A basic layout of the system hardware is given below:

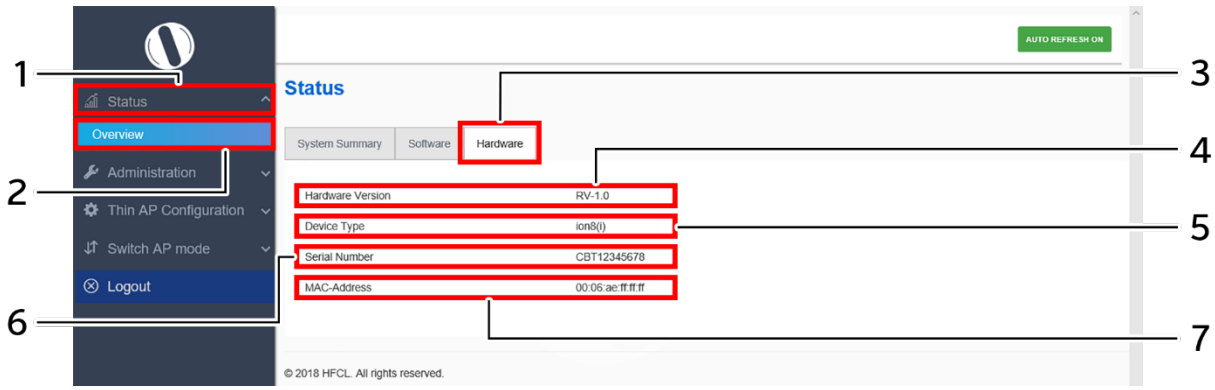

Figure 21: Basic layout of the system hardware screen

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

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

Callout	Name	Description
1.	Status	Click on the "Status" dropdown
2.	Overview	Click on "Overview" option
3.	Hardware	Click on "Hardware" option
4.	Hardware Version	Displays the current hardware version of the respective AP
5.	Device Type	Displays the device type (Indoor or Outdoor)
6.	Serial Number	Displays the serial number of the respective AP. 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

9 Administration

The user can perform following admin activities for thin AP:

9.1 Set AP Password

This screen provides the user with options to change the default password. The default username is "root" and the default admin password is "root".

A basic overview of the screen is given below:

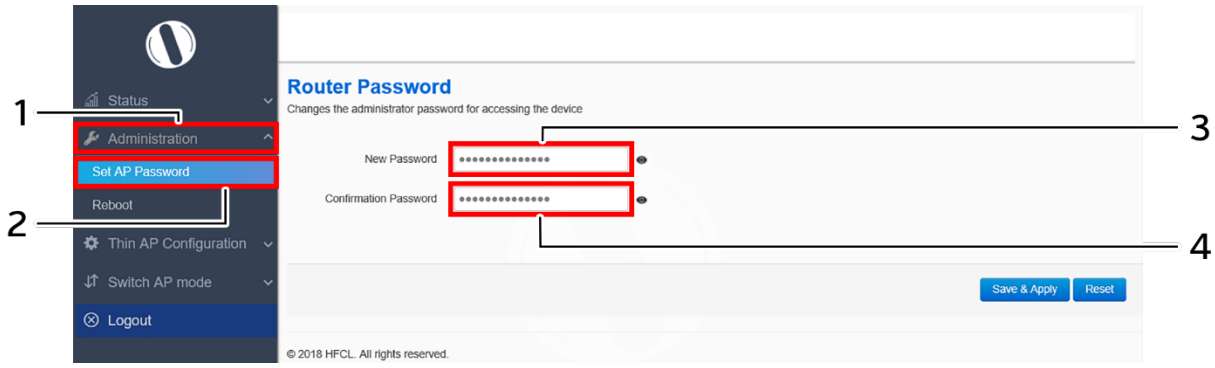

Figure 22: Basic overview of the system admin password configuration screen

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

Table 10: List of actions to configure the system settings

Callout	Name	Description
1.	Administration	Click on "Administration" dropdown
2.	Set AP Password	Click on "Set AP Password" option
3.	Password	Enter the new "Password"
4.	Confirm Password	Enter the password again for "Confirm Password"

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

9.2 Reboot Thin AP

Reboot restarts the device from current partition (Primary or Secondary partition) with existing configuration. A basic overview of the Reboot screen is given below:

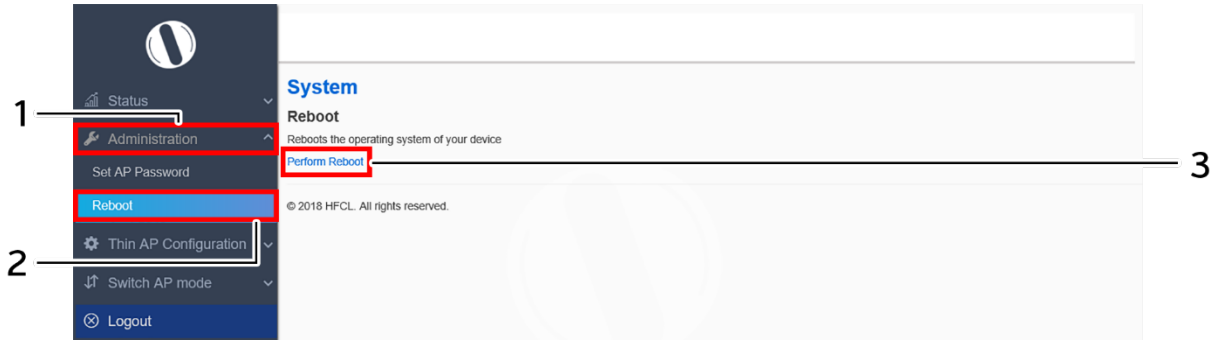

Figure 23: Basic overview of the reboot screen

Follow the steps given below and reboot the AP:

Table 11: List of actions to reboot the AP

Callout	Name	Description
1.	Administration	Click on "Administration" dropdown
2.	Reboot	Click on "Reboot" option
3.	Perform Reboot	Click on "Perform Reboot" option. Device will boot from current partition, and the firmware version present in the current partition will be in use

10 Thin AP Configuration

The user can configure the network interface of the thin AP and the same is discussed in further section.

10.1 Interfaces

A basic overview of the interface screen is given below:

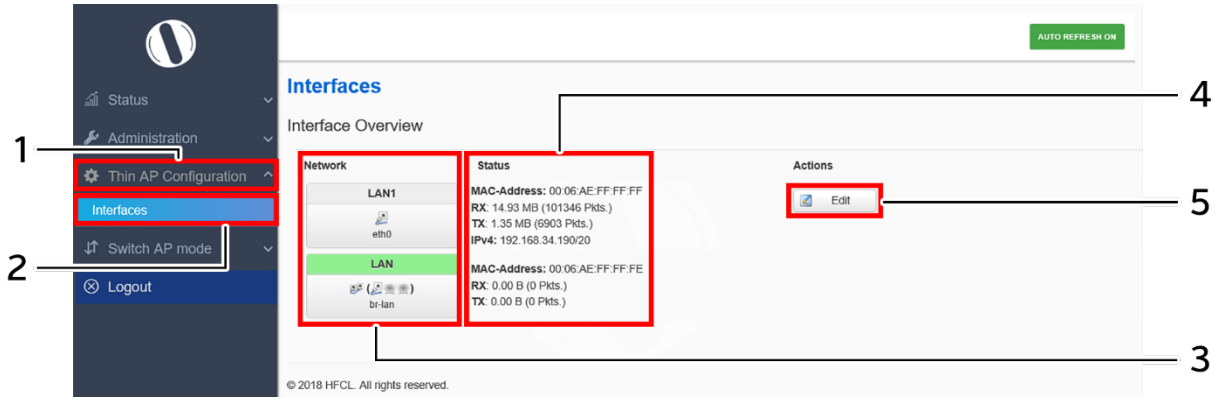

Figure 24: Basic overview of the interface configuration screen

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

Table 12: List of actions to view/edit the network configuration

Callout	Name	Description
1.	Thin AP Configuration	Click on "Thin AP Configuration" dropdown
2.	Interfaces	Click on "Interfaces" option
3.	Network/Interface overview	Displays the type of network interface available in the device. 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

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

1. General setup
2. Advanced settings