SMAC3

User Manual

Version 1.0

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1 Introduction

1.1 About This User Guide

This guide describes the planning, installation, configuration and operation of the SIFY Networks point-to-point and point-to-multipoint wireless radios. It covers SMAC3 KEY. It is intended for use by the system designer, system installer and system administrator.

Introduction

Device Configuration

Quick Guide

Wireless

Network

Management

SIFY TECHNOLOGIES LIMITED

2nd Floor, Tidel Park
4. Rajiv Gandhi Salai, Taramani
Chennai – 600 113
Phone: +91 44 2254 0770-77
Fax: +91 44 2254 077

1.2 FCC User Information

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 165cm between the radiator and your body.

1.3 Professional Antenna Installation Instructions

Installation Personal

This product is designed for specific application and needs to be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting. For complete RF test reports and regulatory power limits, please see documents under FCC-ID: Q5A-SMAC-5700

Installation Location

The product shall be installed at a location where the radiating antenna can be kept 165cm from nearby person in normal operation condition to meet regulatory RF exposure requirement.

External Antenna

Use only the antennas which have been approved in section Certified Antennas. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC limit and is prohibited.

Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.

It is the responsibility of the installer to ensure that when configuring the radio in the United States (or where FCC rules apply), the Tx power is set according to the values for which the product is certified. The use of Tx power values other than those, for which the product is certified, is expressly forbidden by FCC rules 47 CFR part 15.204.

It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden by FCC rules 47 CFR part 15.204.

1.4 Typical Outdoor Installation of Radios

Sify SMAC3 Series products are all outdoor radios installed in one of the following methods:

1. Pole/Tower Mount: Radio installation kit includes two metal hose clamps to support pole sizes from 30mm to 60mm diameter.
2. Wall Mount: With optional wall mount kit, radios can be installed on the side of the building or a structure without any obstruction to the radio antenna.

Please see below typical deployment.

1.5 Certified Antenna Gain & Tx Power Values

Antennas shown in the table below or antennas of the same type with lower gain are approved for Sify Radio deployments.

Operating Frequency Band 5725 – 5850 MHz

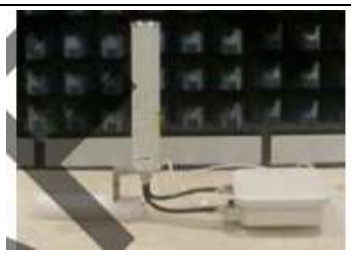
Marketing Model	Antenna P/N	Antenna Type	Antenna Gain (dBi)	Tx Power Per Chain (dBm)
API-18-5G-AC2x2-W2	MA-WC56-DP17	Integrated, dual Pol. Sector - 60°	18	14
APX-EX-5G-AC2x2-W2	MA-WO56-DP10	External, dual pol. Omni - 11°	10	22
SUI-23-5G-AC2x2-W2	MA-WA56-DP23	Integrated dual pol. Panel - 10°	23	23
SUI-18-5G-AC2x2-W2	MT-485053-CVH-B_ICD_KW	Integrated dual pol. Panel - 17°	18	23

Operating Frequency Band 5150 – 5250 MHz

It is the responsibility of the installer to ensure that radios operating in the band 5150-5250 MHz are installed so that they do not exceed 21 dBm EIRP at any elevation angle above 30 degrees as measured from the horizon, as specified in FCC rule 47 CFR Part 15.407 (a)(1)(i).

This compliance can be achieved through proper selection of radio with antenna, angle of elevation, and Tx power control to provide reasonable protection for co-channel NGSO/MSS operations.

As shown in the typical deployment above, the highest antenna gain from the horizon above 30 degree for antenna model 1 & 2 is below. For more detail information, please refer to antenna specifications.

Antenna No	Antenna Gain	Antenna Install Degree
1	0.77dBi	
Due to device restrictions installation position is as above picture, thus consider above 30 degrees highest antenna gain is chosen from E-Plane antenna specification of 30-150 degrees, for H- plane antenna gain will not affect above 30 degrees from the horizon, therefore not required for evaluation.		
2	-4.88dBi	
Due to device restrictions installation position is as above picture, thus consider above 30 degrees highest antenna gain is chosen from E-Plane antenna specification of -60-60 degrees, for H-Plane antenna gain will not affect above 30 degrees from the horizon, therefore not required for evaluation.		

The formula used for the calculation of the Transmit Power is given below:

Tx-Power = EIRP – Gant – Gmimo

EIRP ➔ Equivalent Isotropically Radiated Power

Gant ➔ Antenna Gain at 30° in Elevation plane

Gmimo ➔ Gain for Multi Input Multi Output (SMAC3 Series operate in 2x2 MIMO, in this case the gain is 3 dB.)

Antennas shown in the table below or antennas of the same type with lower gain are approved for deployments in frequency band 5150-5250 MHz with corresponding Transmit Power per chain configuration in the SMAC3 Radios using above formula.

Marketing Model	Antenna P/N	Antenna Type	Antenna Gain (dBi)	Tx Power Per Chain (dBm)
API-18-5G-AC2x2-W2	MA-WC56-DP17	Integrated, dual Pol. Sector - 60°	18	10
APX-EX-5G-AC2x2-W2	MA-WO56-DP10	External, dual pol. Omni - 11°	10	19
SUI-23-5G-AC2x2-W2	MA-WA56-DP23	Integrated dual pol. Panel - 10°	23	10
SUI-18-5G-AC2x2-W2	MT-485053-CVH-B_ICD_KW	Integrated dual pol. Panel - 17°	18	10

1.6 Safety Precautions

Safety Notices

1. Read, follow, and keep these instructions.
2. Heed all warnings.
3. Use attachments or accessories specified by the manufacturer only.

WARNING: Do not use this product in a location that can be submerged by water. Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning

Electrical Safety Information

- Compliance is required with respect to voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.
- There are no operator serviceable parts inside this equipment. Service should be provided only by a qualified service technician.
- This equipment is provided with a detachable power cord, which has an integral safety ground wire intended for connection to a grounded safety outlet.
- Do not substitute the power cord with one that is not the provided approved type. Never use an adapter plug to connect to a 2-wire outlet as this will defeat the continuity of the grounding wire.
- The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.
- Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment.
- Protective Earthling is provided by Listed AC adapter. Building installation shall provide appropriate short-circuit backup protection.
- Protective bonding must be installed in accordance with local national wiring rules and regulations.

1.7 Product Overview

SMAC3 Series of products were tailored for Internet service providers (ISP's) who wish to deliver uninterrupted wireless connectivity to Enterprise campuses, Public Wi-Fi, Hospitality, Educational institutions, Industrial campuses or just about any demanding outdoor environment.

1.8 Product Key Features

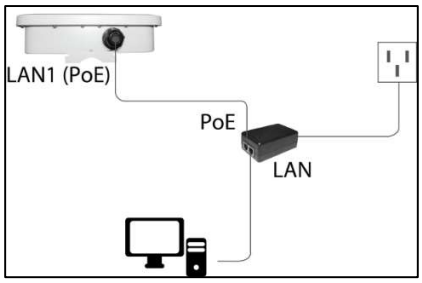
- Supports IEEE802.11ac/a/b/g/n wireless standards with up to 867 Mbps Data rate
- Support Wave 2 MU-MIMO function on 5GHz radio
- Perform 256-QAM to enhance data rate
- Flexible RF planning with 20,40,80 MHz channel size
- Up to 23.5 dBm transmit power enabling long range connectivity
- Support Tx Beam forming to enlarge the transmitting distance
- Robust housing with IP67 enclosure rated to deploy at extreme weather
- Superior QoS with Application aware traffic shaping capability
- AES Encryption and Radius Authentication provides the most secure outdoor wireless communication even in the unlicensed frequency spectrum

Thank you for using SMAC3 Series. It is a powerful, enhanced, enterprise scale product, which functions as outdoor Access Point, Base Station Unit and Subscriber Units.

2 Device Configuration

2.1 Power On-Device

- Connect the PoE Injector to AC power socket using a power cord.
- Now connect PoE In to PC and PoE Out to the device.

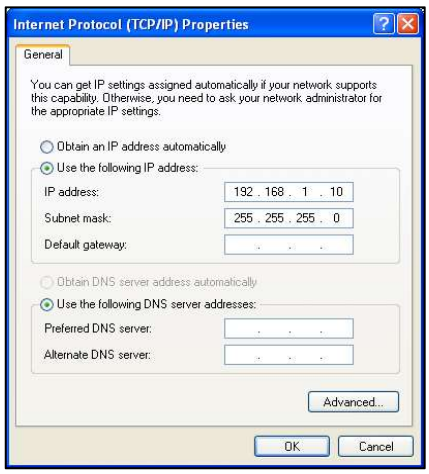


2.2 PC Configuration

Local PC IP Configuration

- Connect the Ethernet LAN cable to the Desktop/Laptop.
- Go to Control Panel> Network and Internet settings> Set up a new connection
- Configure the Desktop/Laptop with a static IP address of 192.168.1.1 and a subnet mask of 255.255.255.0

> The Desktop/Laptop accessing the device must be in the same subnet as that of the device.



2.3 Device Access Types

The Device can be accessed in the following ways:

Access through Ethernet

- During initial setup, use a Wired Ethernet connection from the computer to the device using a PoE.

Access through 2.4GHz Radio Interface

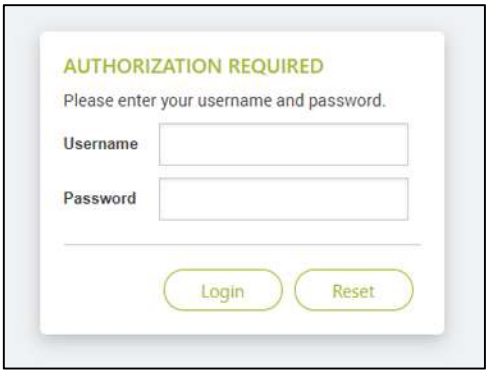
- After the basic network configuration, scan for wireless devices that are available on the network, default SSID is SMAC3_Wi-Fi with a passphrase as sify@1234
- The device can also be accessed using Sify Network Mobile App or using any laptop wireless connection.

Access remotely over a network:

- Once the wireless connection is established, the device can be accessed through a link (PTP or PTMP) within the network.

2.4 Login Process

- Launch any web browser on the PC that is connected to the device.
- In the URL type 192.168.1.1 and enter the default credentials as user name: **admin** and password: **admin**
- Login and access the device settings



A Network administrator can use the following interfaces to configure, manage and monitor the device:

- HTTP / HTTPS
- SNMP
- Telnet
- SSH

HTTP / HTTPS

The Web interface HTTP provides easy access to configure settings and network statistics from any computer on the network. The Web interface can be accessed, through LAN, the Internet, or with an Ethernet cable connected directly to the computer's Ethernet port.

HTTPS: Enabling HTTPS is to transfer and display web content securely

SNMP

The device can also be configured, managed and monitored by using Simple Network Management Protocol (SNMP). SNMP is a networking management protocol used to monitor network-attached devices, which will also collect errors and user statistics.

Telnet

The device can be accessed through CLI by using Telnet, through LAN, or even with an Ethernet cable connected directly to the computer's Ethernet port.

To log on to the device using telnet:

- Confirm that your computer has IP connectivity with the device
- Use telnet client
- Log on by entering username and password. The default login credentials are: Username: admin; Password: admin

- It is recommended to change default passwords after your first login to the device. To change the password.
- Click Management > Services> HTTP > Admin password/ User / Super User/ Installer Password.
- Note that only an admin has a right to change the password
- The username and password are case-sensitive. If you enter an incorrect password, then a message is displayed stating that the password is incorrect.

SSH

Enable Secure Shell (SSH) to make secure, encrypted connections in the network. Secure Shell is a network protocol that allows data to be exchanged using a secure channel between two network devices. The administrators are required to provide a username, password, port number combination for authentication.

User Credentials and Roles

The network operator can configure, manage and monitor the device using HTTP/SNMP/Telnet/SSH protocols. For this, a set of user credentials should be pre-defined for read-write permissions. Based on user roles the access should be granted. There are four types of users: The admin, super user, user and the installer.

Admin

The Admin has full access to all the parameters in the settings of the device; this further prevents unauthorized changes in settings.

Super user

- In case of accessing AP, the Super user has a read-only option, where he cannot create, modify or delete any parameters.
- In case of accessing SU, the Super user has read-only permission, but made few custom- limited read-write permissions for parameters such as Ethernet Speed, VLAN modes (Transparent and Access), Filtering, Traffic shaping, and Device Reboot.

User

While accessing AP and SU devices, the user has read-only permission, where he cannot create, modify or delete any parameters.

Installer

The installer does not have full access to Access Point or Subscriber Unit, but he has read-write permission for a few parameters such as IP configuration, Location parameters, and Radio mode. The installer also can view site survey scan results (to join any AP) and observe the link statistics status.

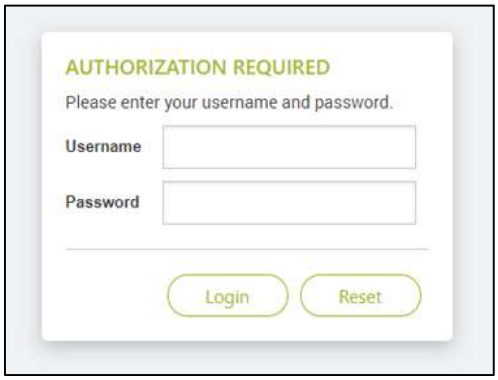
2.5 Quick Configuration

This section will show you how to do a quick configuration for both the outdoor Access Point and Subscriber Units using a web-based configuration interface.
Please refer *Devices Access Types* or use your Ethernet port or wireless network to access the AP/ SU and proceed.

After connecting via any one of the three-device access methods, the GUI will prompt you to login with a password. The default username and password is "admin", and should be changed immediately after login to protect your network since it gives the user read - write privileges.
The password can be changed:
Click Management > Services> HTTP > Admin password/ User / Super User/ Installer Password.

Web Configuration

- Launch any web browser on the PC that is connected to the device.
- In the URL type 192.168.1.1 and enter default credentials as user name: admin and password: admin
- Login and access the device settings in the GUI



2.6 Graphical User Interface Overview

Power on the Radio to access the Graphical User Interface (GUI). After a successful login, the user notices a title bar on the top, a navigation pane on the left, and a content pane in the center. The default page shown in the content pane is the "Summary".

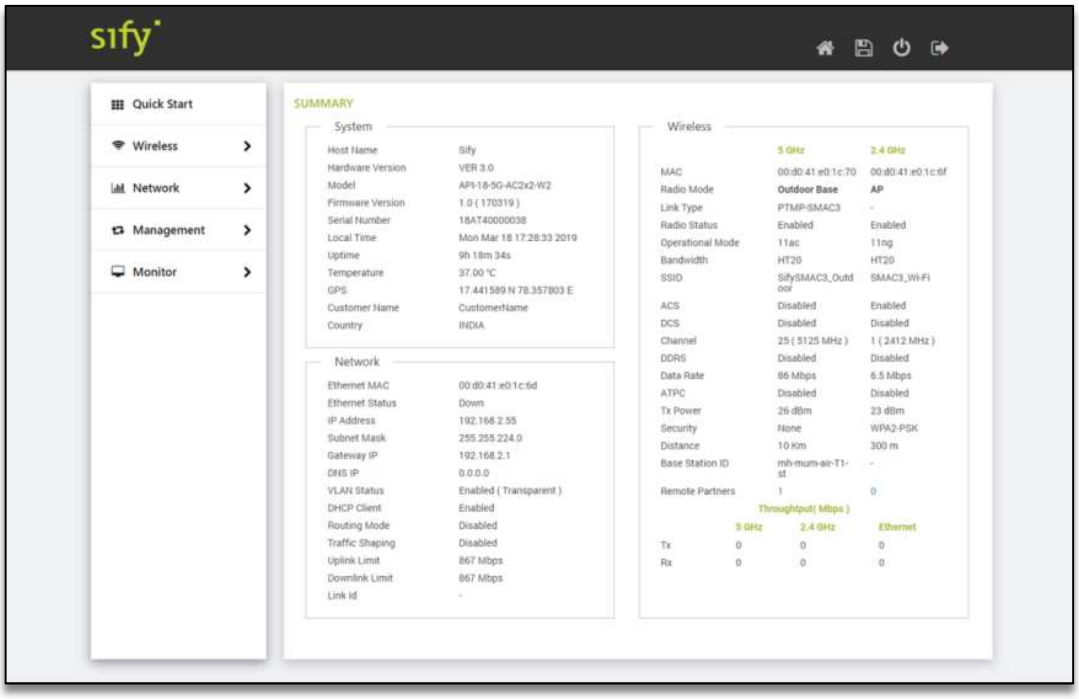
Home: Click Home to return to the summary page, which displays all the key performance parameters such as System, Network, Wireless, and Throughput.

Apply: Click Apply to save all changes made to the configuration parameters

Reboot: Click Reboot for changes made in the configuration parameters to take effect. It is mandatory to click Apply; before Reboot to take effect.

Logout: Click Logout when necessary, make sure to click Apply to save the most recent updates.

Again, the login page is popped-out after a successful logout.



3 Quick Start

3.1 System

3.1.1 IP configuration

To configure the IP Configuration, Click Quick Start> System

Address Type: Dynamic / Static

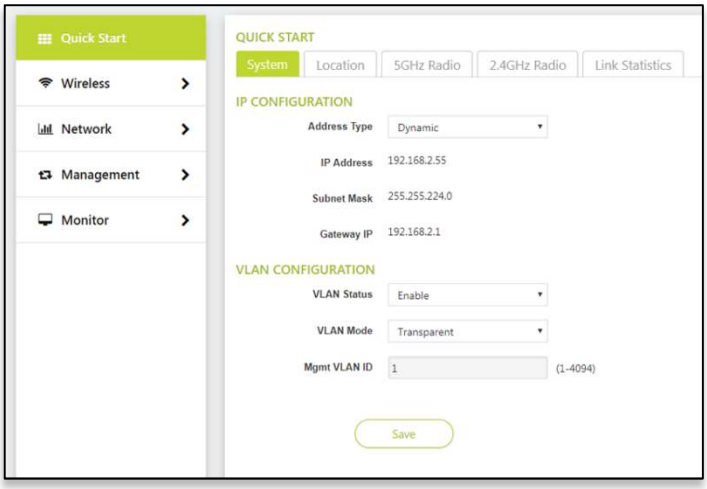
- If **Static** is selected, the user should manually configure the network parameters.
- If **Dynamic** is selected, the device obtains the IPv4 parameters from a DHCP server automatically. According to the current software release, only IPv4 format is supported.

IP Address: 192.168.1.1

- Represents the IP Address of the Ethernet interface
- By default, the **Static IP address** is set to 192.168.1.1
- When the Address Type is set to **Dynamic**, this parameter is read-only and displays the device IP Address obtained from the DHCP server.

Subnet Mask: **255.255.255.0**

- Subnet Mask Represents the subnet mask of the Ethernet interface.
- By default, the subnet mask is 255.255.255.0.
- When the address type is set to **Dynamic**, this parameter is read-only and displays the device current subnet mask obtained from the DHCP server.
- The subnet mask will fall back to 255.255.255.0 if the device cannot obtain the subnet mask from the DHCP server.



Gateway IP:

- Specifies the IP address of the device gateway
- When Address Type is set to **Dynamic**, this parameter is read-only and displays the IP address of the device gateway. The device will be set to the Default Gateway IP address 192.168.1.1 if it cannot obtain the Gateway IP address from a DHCP server.
- If the Address Type is set to **Static** then you have to enter manually the Gateway IP address.

3.1.2 VLAN Configuration

Virtual Local Area Networks (VLANs) are logical groupings of network hosts. Defined by software settings, other VLAN members or resources appear (to connected hosts) to be on the same physical segment, no matter where they are attached on the logical LAN or WAN segment. They simplify traffic flow between clients and their frequently used or restricted resources.
A device can communicate across a VLAN-capable switch that analyses VLAN tagged frames and directs traffic to the appropriate units. The purpose of this network is to provide an easy way of modifying logical groups in the dynamic environment.

To configure the VLAN, Click Quick Start> System

VLAN Status: Enable/ Disable

VLAN Mode:

- By default, VLAN Mode is Transparent in AP/SU
- In case of SU, VLAN Mode can be any mode among the following:
  Transparent / Trunk / Access / Q-in-Q

Management VLAN ID

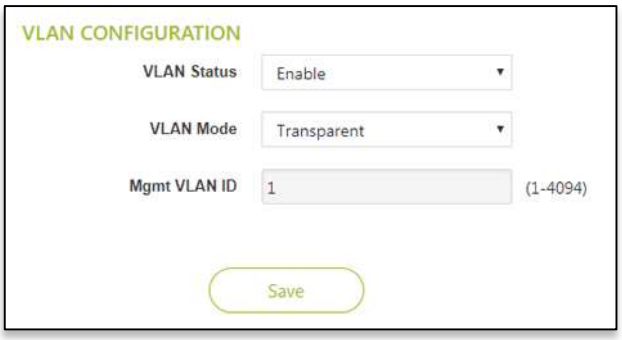
This parameter is used to configure the Management VLAN ID. The management stations must tag the management frames sent to the device with the management VLAN ID specified in the device. The device will tag all the management frames from the device with the specified management VLAN.

- Before setting the Management VLAN ID from 1 to 4094, make sure that the management platform or host is a member of the same VLAN; or else, your access to the device will be lost.
- If Tag Management is disabled, only untagged frames can access the device.

Transparent

To configure the VLAN Transparent Mode in AP or SU, Click *Quick Start> System*

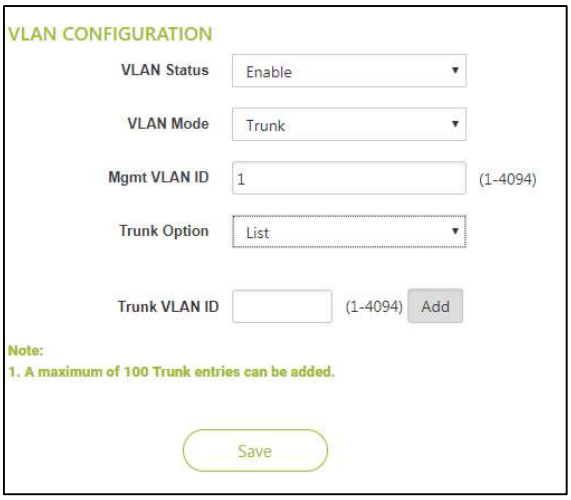
- Transparent Mode is available for the Ethernet and Wireless interfaces for both AP and SU. It is equivalent to NO VLAN support and is the default mode.
- An interface in transparent mode forwards both tagged and untagged frames.
- The Management VLAN ID range can be between (1-4094)



Trunk

To configure the VLAN Trunk Mode in SU, Click *Quick Start> System*

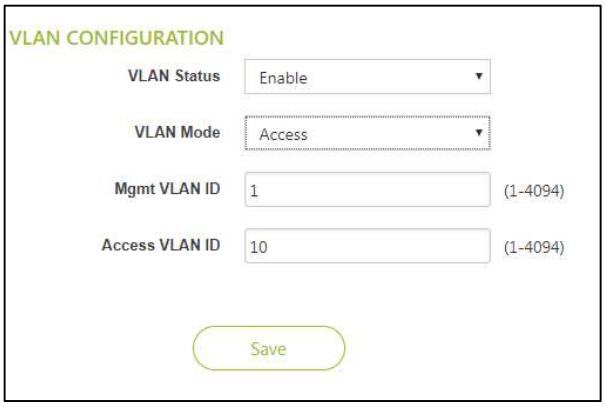
- Trunk mode is configurable only in SU.
- When an interface is in Trunk mode, it forwards only those tagged frames whose VLAN ID matches with a VLAN ID present in trunk table. All other frames will be dropped.



Access

To configure the VLAN Access Mode in SU, Click *Quick Start> System*

- Access mode is available only on the Ethernet interface of SU.
- In access mode, tagged frames with specified Access VLAN ID are going out of the device through the Ethernet interface were untagged and forwarded.
- The untagged frames coming into the device through the Ethernet interface are tagged with specified Access VLAN ID and forwarded.



Q-in-Q

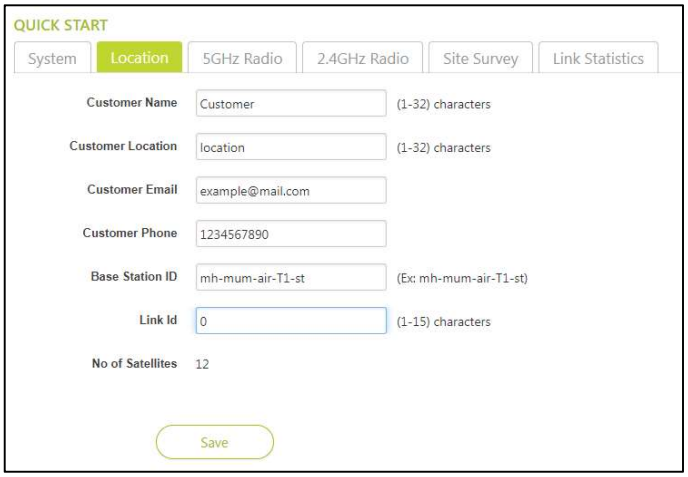
To configure the VLAN Q-in-Q in SU, Click *Quick Start> System*

- This mode is well known for its double tagging or stacking.
- The Q-in-Q mechanism allows Service Providers to maintain customer assigned VLANs while avoiding interference with the Service providers VLANs.
- Using the Q-in-Q mechanism, a SVLAN ID is added to manage VLAN ID, such that interference is avoided and traffic is properly routed.

3.2 Location

To configure the Location, Click *Quick Start> Location*

This section consists of the basic profile information of customer's device, such as Customer name, Customer Location, Customer email, Customer Phone, Base Station ID and Link ID.



The major difference in AP and SU location parameters is that the SU have a Link Id which is used to link to the AP.

3.3 5 GHz Radio configuration

To configure the 5 GHz Radio configuration, Click *Quick Start> 5 GHz Radio*

Link Type

Link type is a mode of selecting a wireless connection between AP and SU radios. A Link type here can be a PTP/ Backhaul/ PTMP. Few mandatory parameters are customized in AP than in SU.

Radio Mode

Outdoor Base / Outdoor Subscriber

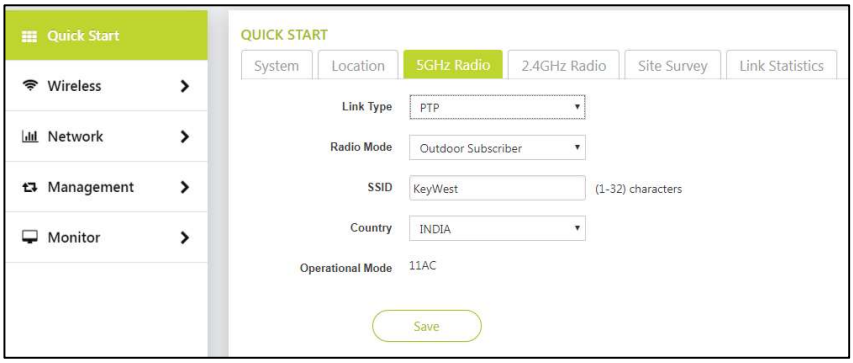
- If the Radio Mode is Outdoor Base, it is considered as AP.
- If the Radio Mode is Outdoor Subscriber, is selected then it is a SU.

Service Set Identifier (SSID)

SSID is simply the technical term for a network name. The SSID is a case-sensitive text string that can be as long as 32 characters consisting of letters and/or numbers. An SSID is publicly visible. Within those rules, the SSID can be anything for quick identification of the network.
Country: India / 5 GHz
Band1 – 5100- 5350 MHz
Band2 – 5470- 5925 MHz
Operational Mode: 11AC

Bandwidth: 20/40/80MHz
Given the above options, the admin has the flexibility to select the bandwidth. In general, 2.4GHz radio can have a bandwidth of 20 MHz i.e. for short distances. A 5GHz radio can have 40 MHz/ 80MHz bandwidth. Advantages of a 5 GHz with 40 MHz/ 80MHz bandwidth are; it is tuned for faster speed; more data can be transferred and less signal interference.

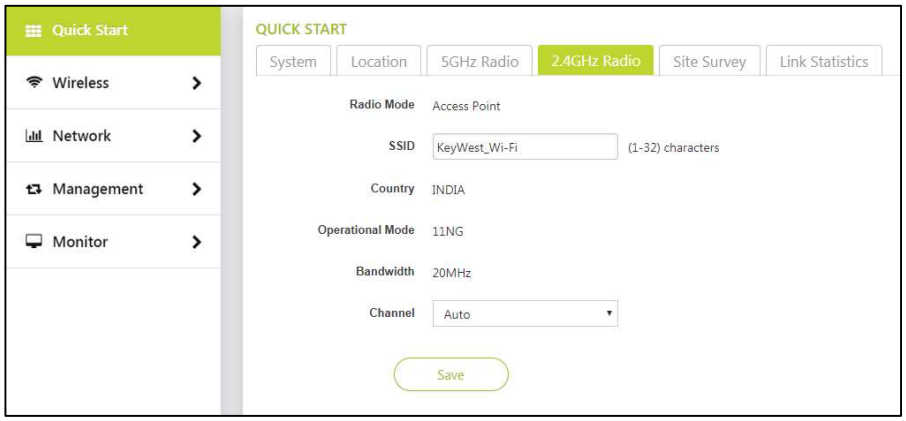
Channel: Several Wi-Fi Channels and their numbers were pre-defined to achieve the best performance.



- Bandwidth and Channel Parameters are available only in AP.
- The default channel is 120(5600 MHz) when Outdoor base is selected in radio mode.
- The SU after scanning should be updated automatically with the same parameters as AP, this is possible only when SSID and Country parameters are same in both AP a SU.

3.4 2.4 GHZ Radio configuration

To configure the 2.4 GHz Radio configuration, Click *Quick Start> 2.4 GHz Radio*



Radio Mode: Access point

Service Set Identifier (SSID):

SSID is simply the technical term for a network name. The SSID is a case-sensitive text string that can be as long as 32 characters consisting of letters and/or numbers. An SSID is publicly visible. Within those rules, the SSID can be anything for quick identification of the network.

Country: India

Operational Mode: 11NG

Bandwidth: 20MHz

In general, 2.4GHz radio can have a bandwidth of 20 MHz i.e. for short distances.

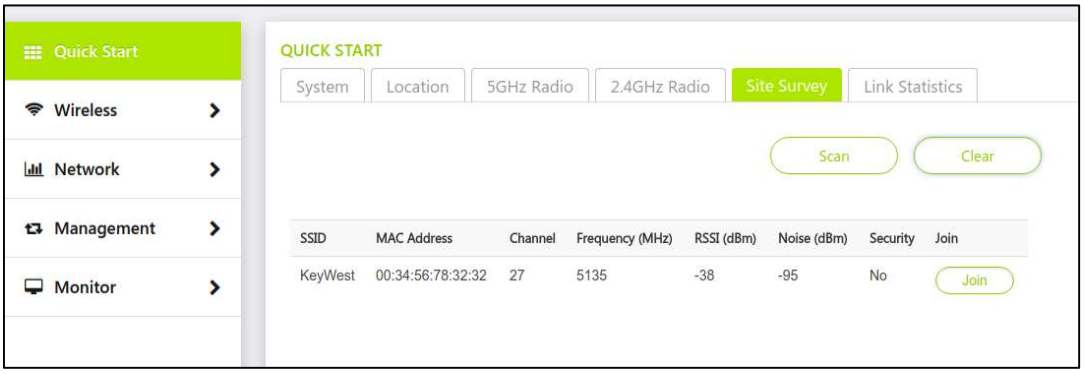
Channel: Auto

When Auto is selected best, Wi-Fi Channel is selected to achieve the best performance.

3.5 Site Survey

To configure the Site Survey, Click *Quick Start> 2.4 GHz Radio*

- Site Survey tab is custom-created for SU 5GHz Radio where it can scan and join the AP with the same SSID.



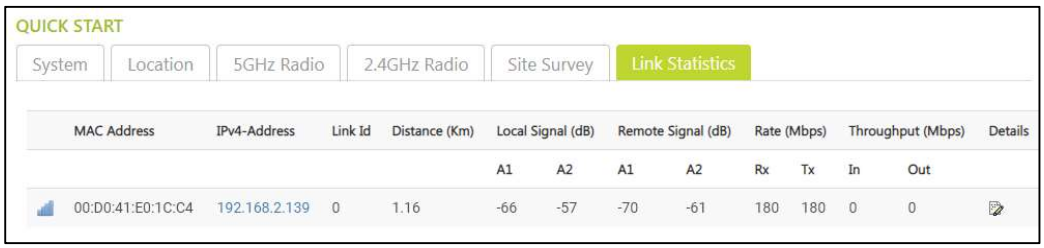
- Once the Access Point parameters were configured, the subscriber unit will scan and get parameters updated from the AP. This way SU's basic configuration will be updated and further need to be monitored.

- Once the System and Location Tabs are configured in both AP and SU.
- Go to SU web interface
- Quick Start> Site Survey tab> Join AP
- To verify whether the SU is linked to AP or not go to home button in the AP/SU and see the Remote partners value 1 or 0. If 1, successfully linked.

3.6 Link Statistics

To configure Link Statistics, Click Quick Start> Link Statistics

- This is only for 5 GHz
- Wireless PTP and PTMP link parameters are summarized in this tab. click the edit symbol below the details. You will be directed to another window with detail statistics where you can find a disconnect option and conduct a link test.



Link Test:

Link test in AP:

Navigate to Quick Start>Link Statistics> edit symbol

Here the Link test can be between AP to SU (or) SU to AP either downlink or bi -directional, also input the packet size and duration before starting the test. The results of various parameters are displayed in the same screen.

Link test in SU:

Navigate to Quick Start>Link Statistics> edit symbolHere the Link test can be between SU to AP (or) AP to SU either uplink or bi -directional, also input the packet size and duration before starting the test. The results of various parameters are displayed in the same screen.

4 Wireless

SMAC3 Series devices are Dual-Band radio's that support (5GHz, 2.4GHz)

5GHz Radio Configuration

To configure 5GHz Radio Configuration, Click Wireless > 5 GHz Radio Configuration> Properties

4.1 Properties

Link Type

Link type is a mode of choosing a wireless connection between AP and SU radios. A Link type here can be a PTP/ Backhaul/ PTMP

Radio Mode: Outdoor Base / Outdoor Subscriber

- If the Radio Mode is Outdoor Base, it is considered as AP.
- If the Radio Mode is Outdoor Subscriber, is selected then it is a SU.

Service Set Identifier (SSID)

SSID is simply the technical term for a network name. The SSID is a case-sensitive text string that can be as long as 32 characters consisting of letters and/or numbers. An SSID is publicly visible. Within those rules, the SSID can be anything for quick identification of the network.

Country: India / 5 GHz Band 1: [5100- 5350 MHz]; Band 2[5470-5925 MHz]

Operational Mode: 11AC

Bandwidth: 20/40/80MHz

Given the above options, the admin has the flexibility to select the bandwidth. In general, 2.4GHz radio can have a bandwidth of 20 MHz i.e. for short distances. A 5GHz radio can have 40 MHz/ 80MHz bandwidth. Advantages of a 5 GHz with 40 MHz/ 80MHz bandwidth are; it is tuned for faster speed; more data can be transferred and less signal interference. This option is available only in Access Point, but not in Subscriber Unit.

Channel

Several Wi-Fi Channels and their numbers are predefined to achieve the best performance. This is available only in Access Point, but not in Subscriber Unit.

Distance

The distance between Access Point and Subscriber Unit should be mentioned in this section and the distance can be (1-30) Km

Traffic Shaping

By default traffic shaping is disabled, the operator can create shaping policies if required to limit traffic and then enable the traffic shaping and configure the uplink/downlink limit values.

Uplink Limit

The administrator can set this limit only when traffic shaping in enabled, and the limit range is (64-867000) Kbps that is from SU to AP.

Downlink Limit

The administrator can set this limit only when traffic shaping in enabled, and the limit range is (64-867000) Kbps that is from AP to SU.

Hide ESSID

Extended Service Set Identifier (ESSID):
This should be unchecked when 5GHz radio (AP) is configured; which allows SU to identify the AP with the configured network name.

Wireless Inactivity Timer

This parameter is configured only in SU, if there is no activity on wireless interface of SU in a specified time interval, reset the wireless interface. The value should be configured in minutes. An event log is generated when wireless inactivity triggers.

Link Inactivity Timer

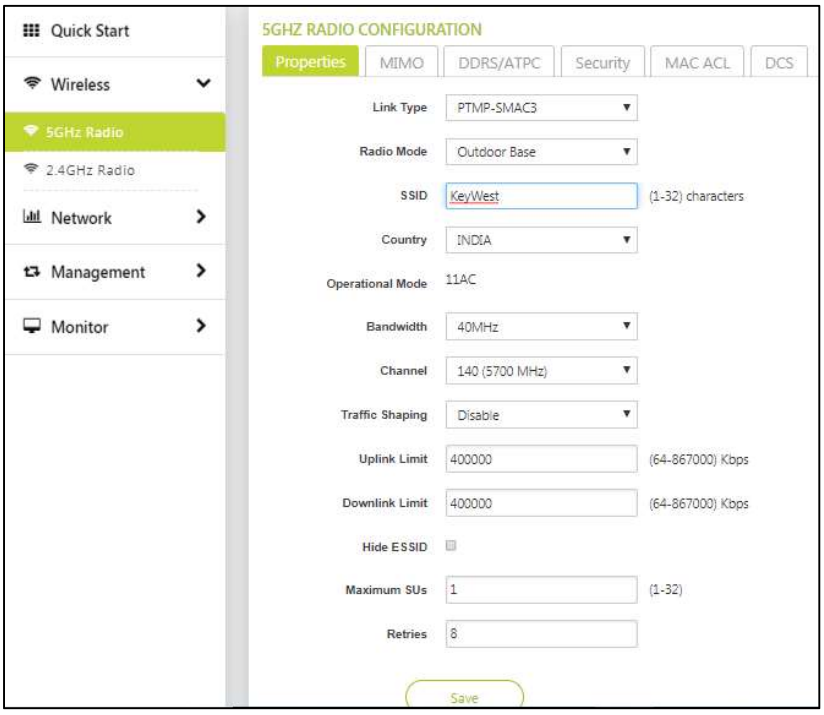
If there is no activity on Wireless link on SU in a specified time, reset the wireless interface. An event log is generated when link inactivity triggers. The value should be configured in minutes. An event log is generated when Link inactivity triggers.

Max SUs

This range defines how many SU's are linked to AP. The range can be (1-32).

Retries

This can be configured to allow a packet to be re-transmitted in specified attempts.



4.2 MIMO

To configure MIMO, Click *Wireless> 5 GHz Radio Configuration > MIMO*

SMAC3 Series devices support Multiple-Input-Multiple-Output (MIMO) antenna technology that uses multiple antennas at both the transmitting end and receiving end to improve communication performance.

The transmitting antenna uses multiple radio TX chains and signal paths to simultaneously transmit different data streams, whereas the receiver combines the Rx signals resulting in higher throughput.

By increasing the number of receiving and transmitting antennas, the throughput of the channel increases linearly resulting in high spectral efficiency.

4.3 DDRS

Dynamic Data Rate Selection (DDRS) feature adjusts the transmission data rate to an optimal value and provides the best possible throughput according to the current communication conditions and link quality.

To configure DDRS, Click *Wireless> 5 GHz Radio Configuration > DDRS*

Select the Spatial stream as either as Auto, Single, or Dual.

Dual Stream: Select Dual for higher throughput.
Single Stream: Select Single for reliability and longer range.
Auto Stream: When you select Auto, DDRS decides the stream modes based on the environmental conditions.

> The data rate can be varied from min to max based on SNR and Retransmission percentage.

ATPC

To configure ATPC, Click Wireless> 5 GHz Radio Configuration > ATPC
When you enable the Adaptive Transmit Power Control (ATPC), the device automatically adjusts the transmit power to avoid saturation of remote receiver which could cause data errors leading to lower throughput and link outage.
When you disable the ATPC, manually adjust the transmit power. The range should be between (1-26) dbm

4.4 Security

The Wireless Security feature helps to configure security mechanisms between AP and SU.
To configure Security, Click Wireless> 5 GHz Radio Configuration > Security

Encryption Type: Select WPA2-PSK

Key: Select any desired key considering the note below.

None: If the encryption type is selected as none, then there exists any security to the data frames transmitted over the wireless medium

4.5 MAC-ACL

MAC Access Control List is an additional security mechanism in a wireless network.
To configure MAC ACL in AP (5GHz), Click Wireless> 5 GHz Radio Configuration> MAC ACL
This section has MAC status: Allow/ Deny/Disable and a MAC ACL table: MAC Address

Disable: By, default MAC ACL is disabled in AP (5GHz) Configuration, i.e. all SU's are linked to AP

Allow: If Allow is selected, the MAC ACL feature allows only the authenticated SU's to access the wireless network of AP by adding their MAC addresses

Deny: If Deny is selected, only a particular SU is restricted.

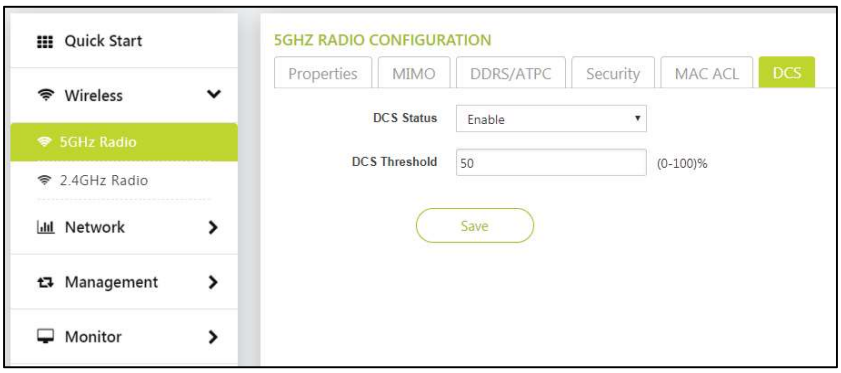
> The maximum number of SU's that can be added to the MAC ACL table is 32
> MAC ACL feature is applicable only in AP with 5 GHz / 2.4 GHz

4.6 DCS (Dynamic Channel Selection)

To enable DCS, *Click Wireless> 5 GHz Radio> DCS*
The DCS parameter allows an AP to monitor the retransmissions of packets transmitted to the associated SU on the current operating channel.
When the average of Local RTX percentage of associated SU crosses user configured value, before switching to new channel, AP evaluates local RTX percentage for 30 sec and triggers Spectrum Analyser to scan the medium.
The Spectrum Analyser scans for less interference channel and associates the high priority SU to the best channel available.

- This feature is available only in AP with 5GHz.
- The DCS threshold is user selectable range (0-100)% and is activated only when DCS is enabled.
- Default chosen DCS threshold is 50%, when this percentage limit exceeds, the AP activates spectrum analyser and assigns best channel to the desired SU.
- Respective logs will be generated under Monitor> Logs> Wireless section as
  For example: <time stamp>: DCS triggered (when SU request AP)
  <Time stamp>: DCS selected best channel (When AP assigns new channel to SU)

SSS



2.4GHz Radio Configurations

4.7 Properties

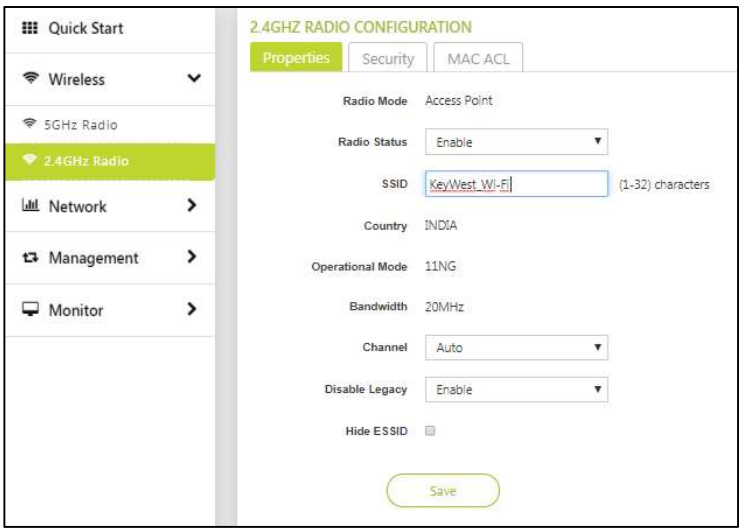
To configure properties, Click Wireless > 2.4 GHz Radio Configuration> Properties

Radio Mode: Access Point

Radio Status: Enable/ Disable

Service Set Identifier (SSID)

SSID is simply the technical term for a network name. The SSID is a case-sensitive text string that can be as long as 32 characters consisting of letters and/or numbers. An SSID is publicly visible. Within those rules, the SSID can be anything for quick identification of the network.



Country: India Band1: [2402-2482 MHz]
Operational Mode: 11NG
Bandwidth: 20MHz
Channel: Several Wi-Fi Channels and their numbers are predefined to achieve the best performance. This is available only in Access Point, but not in SU
Disable Legacy: Enable/ Disable
Hide ESSID:
Extended Service Set Identifier (ESSID):
This should be checked when 2.4GHz radio (SU) is configured, when checked ESSID is not visible in the wireless network.
Max Clients: Maximum number of clients permissible to 2.4 GHz Radio can be between (1-10).

4.8 Security

The Wireless Security feature helps to configure security mechanisms between AP and SU.

To configure Security, Click *Wireless> 2.4 GHz Radio Configuration > Security*

Encryption Type: Select WPA2-PSK

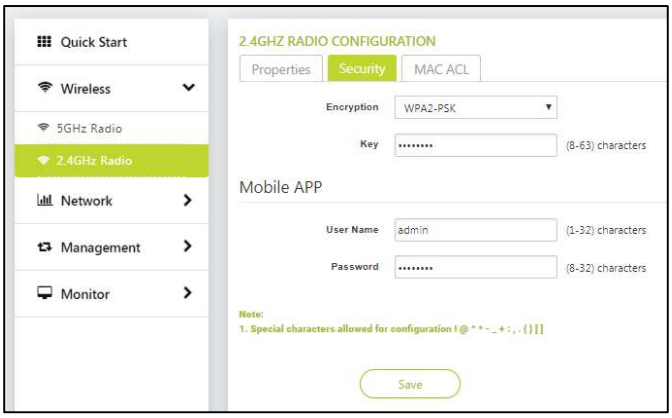
Key: Select any desired key considering the note below.

None: If the encryption type is selected as none, then there exists any security to the data frames transmitted over the wireless medium

Mobile App: Mobile App is used to configure the Access point remotely

Username: admin (1-32) characters

Password: XXXXXXXX (8-32) characters



> 1. Special characters allowed for configuration! @ ^ * - _ + : , . { } [ ]

4.9 MAC-ACL

To configure MAC ACL in AP, click *Wireless> 2.4 GHz Radio Configuration> MAC ACL*

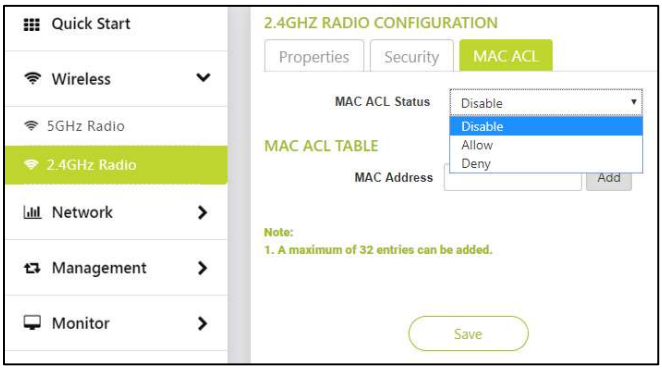
This section has MAC status: Allow/ Deny/Disable and a MAC ACL table: MAC Address

Disable: By, default MAC ACL is disabled in AP (2.4 GHz) Configuration, i.e. all clients are linked to AP

Allow: If Allow is selected, the MAC ACL feature allows only the authenticated clients to access the wireless network of AP by adding their MAC addresses

Deny: If Deny is selected, only a particular client is restricted.

> The maximum number of clients that can be added to the MAC ACL table is 32 MAC ACL feature is applicable only in AP with 5 GHz / 2.4 GHz



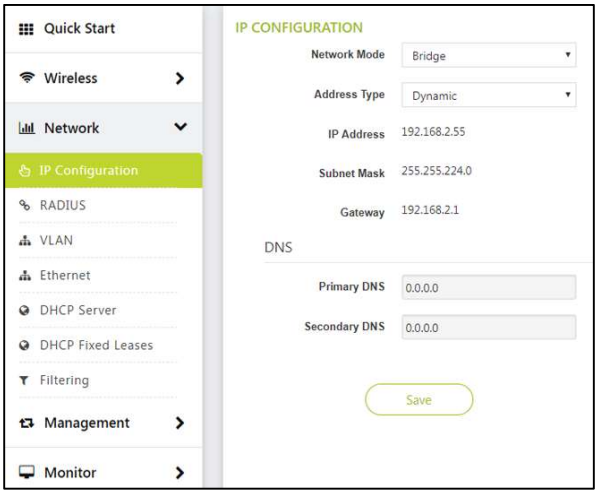
5 Network

5.1 IP Configuration in AP/SU

To configure the IP Configuration, *Click Network > IP Configuration*

Network mode: Bridge

For Detailed IP Configuration explanation, click IP Configuration



DNS

A domain name server is an Internet service that translates domain names into IP addresses.

Primary DNS and Secondary DNS

In most cases, a primary and a secondary DNS server are configured on a PC that is connected to an internet service provider (ISP). There are two DNS servers in case one of them happens to fail, in which case the second is used to resolve hostnames you enter.

- Note: If the DNS server could not find the correct IP address that's associated with the host name you enter, the website can't be located and loaded
- While configuring IP in SU few other parameters are to be considered such as:

Network mode: Routing
Nat Status: Enable/Disable
If NAT is turned off, the device will work on pure-router mode.

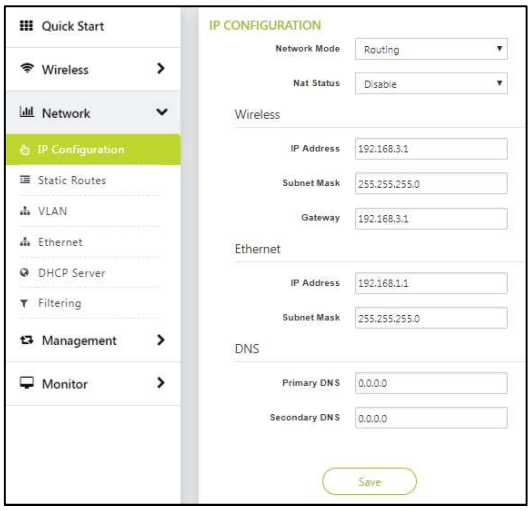
> The default status of NAT is disabled, so without special demand, please don't select the enable option.

Wireless

IP Address: 192.168.1.1
Subnet Mask: 255.255.255.0
Gateway IP: 192.168.3.1

Ethernet

IP Address: 192.168.2.55
Subnet Mask: 255.255.255.0



5.2 Radius

To configure RADIUS, Click Network > RADIUS > RADIUS Configuration

The RADIUS server is a background process that serves the following functions:

- Remote Authentication Dial In User Service (RADIUS) is a client/server networking protocol.
- It provides centralized Authentication, Authorization, and Accounting (AAA) management for computers to connect and use a network service
- To authenticate users or devices before granting them access to a network

> - Radius configuration is possible only in AP.
> - A RADIUS server profile consists of a Primary and a Secondary Servers that can act as Authentication servers.

Configure Primary and Secondary parameters

Primary Server: IP address of RADIUS server

Primary Server Port: The port number on which the RADIUS server is operating

Primary shared secret: An Authentication is required to connect the RADIUS Server to Client

If Primary Server fails, then secondary parameter configuration is used. Configuration of Secondary Authentication Server is optional.

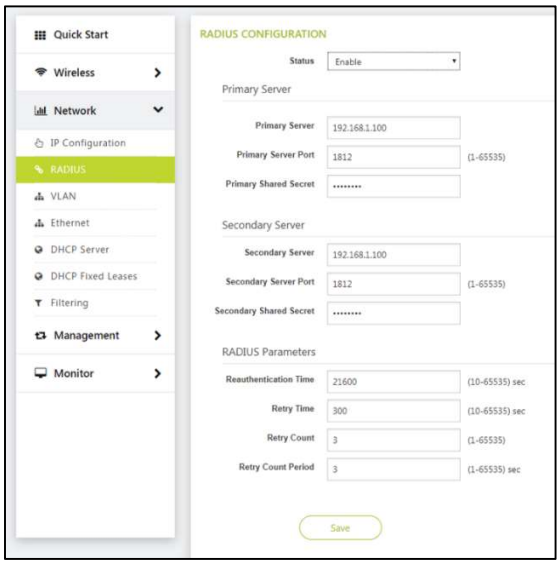
Radius Parameters

Reauthentication Time: Represents the maximum number of times an authentication request may be retransmitted to the configured RADIUS server. The time range can be between (10-65535) sec

Retry Time: Represents the response time for which the AP should wait for the RADIUS server to respond to a request. The retry time range can be between (10-65535) sec

Retry count: When a client tries to establish a connection to a RADIUS server, the number of retry counts is mentioned here. The retry count period can be between (1-65535) sec

Retry count period: Represents the time after which the RADIUS server should re-authenticate a SU. The retry count period can be between (1-65535) sec

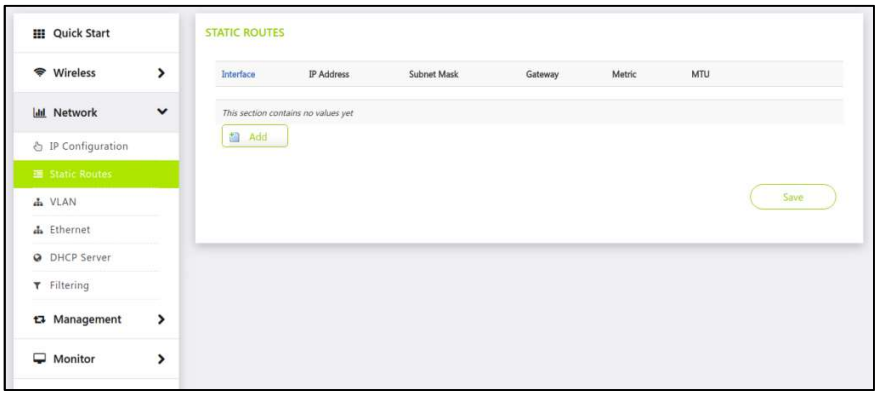


5.3 Static Routes

Note: This is available only in SU

To configure Static Routes, Click Network > Static Routes

Static Routing is manually configured by a network administrator. Static routes are normally implemented in those situations where the choices in route selections are limited, or there is only a single default route available.

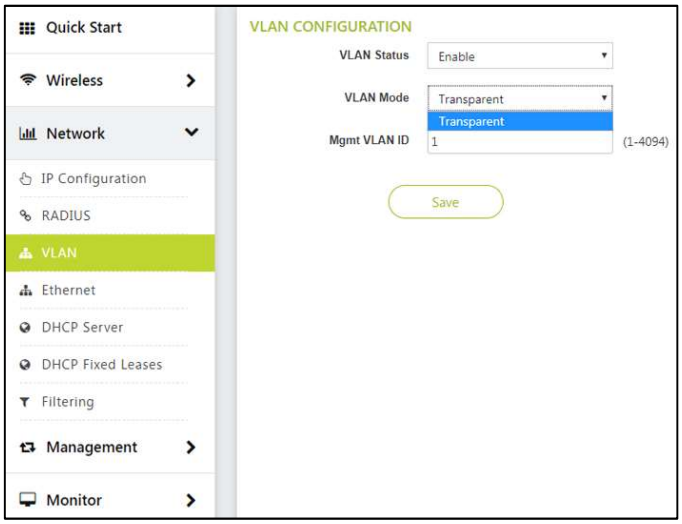


5.4 VLAN

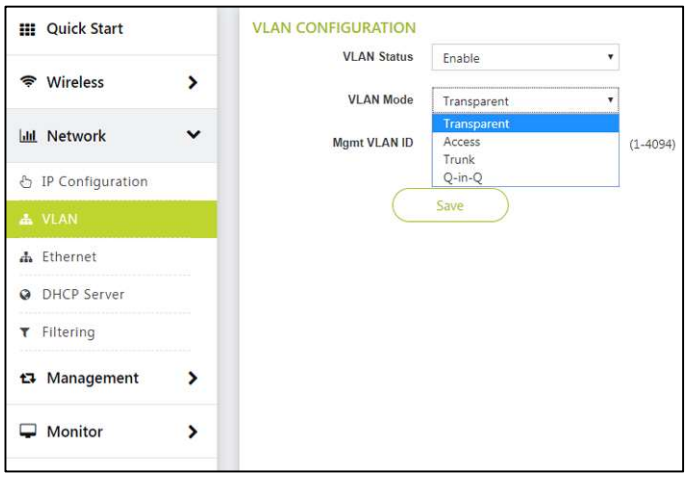
To configure VLAN, Click Network>VLAN> VLAN Configuration

For Detailed explanation, click VLAN

VLAN in AP



VLAN in SU



5.5 Ethernet

To configure Ethernet, Click Networks> Ethernet > Ethernet Configuration

Ethernet Speed

- **Auto Negotiation**
  When this option is chosen in AP/SU, the Ethernet configuration tries to auto negotiate. Based on connected switch/router to send the optimal mode for speed connection.

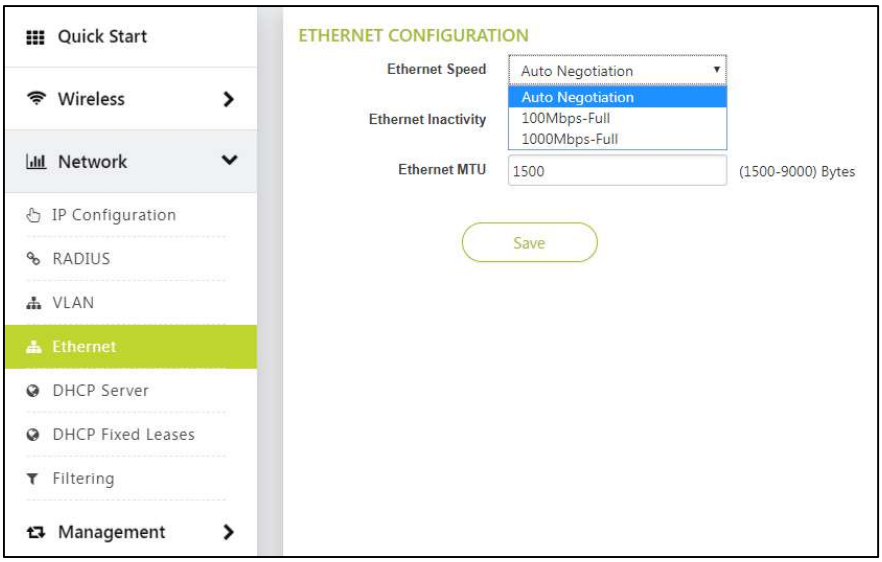
- **100 Mbps- Full and 1000 Mbps–Full**
  Allows two-way transmission simultaneously
  Displays whether 100 Mbps- Full or 1000 Mbps–Full Ethernet transmission mode

Ethernet Inactivity

By default, it is disabled where no activity takes place.
If Enabled and no activity is happening for 5 min, it will reset the Ethernet interface automatically and a log is generated.

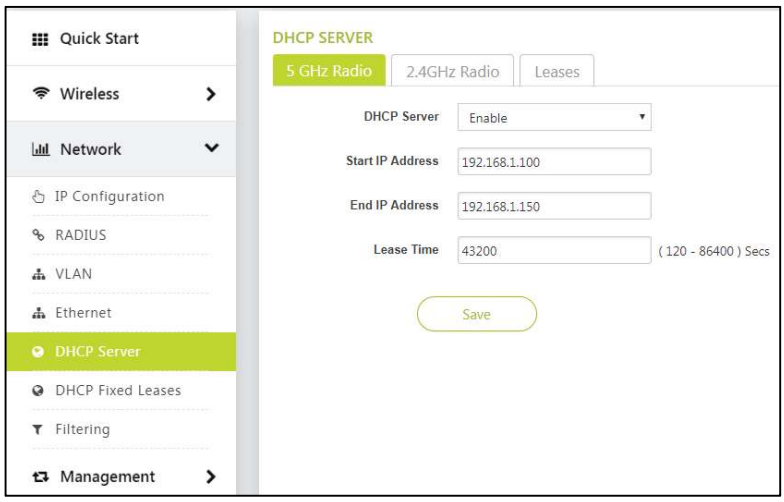
Ethernet MTU

This parameter determines the limit of transmission allowed for a data packet sent or received on the wireless interface. The MTU size varies from 1500 to 9000 bytes.



5.6 DHCP Server

Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to assign an IP address to the DHCP client from a defined range of IP addresses configured for a given network. Allocating IP addresses from a central location simplifies the process of configuring IP addresses to individual DHCP clients, and also avoids IP conflicts.



If DHCP Server is enabled, it picks automatically the IP addresses from the specific interface address and assigns them to the respective DHCP clients.

5.6.1 5 GHz Radio

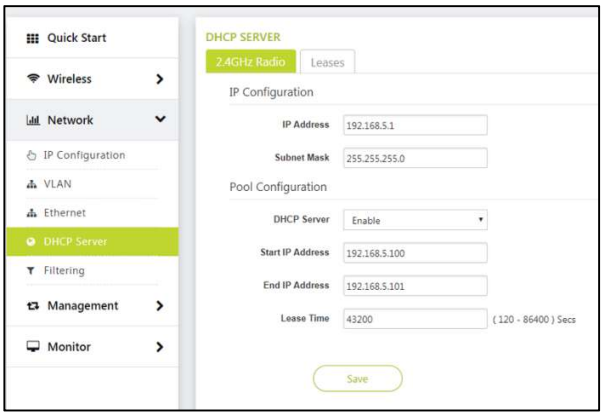
To configure the DHCP server parameters, Click Network > DHCP Server > 5 GHz Radio

DHCP Server Status by default disabled, when enabled one should enter the Start IP Address and End IP Address so that it will save the IP Addresses in the given range.

5.6.2 2.4 GHz Radio

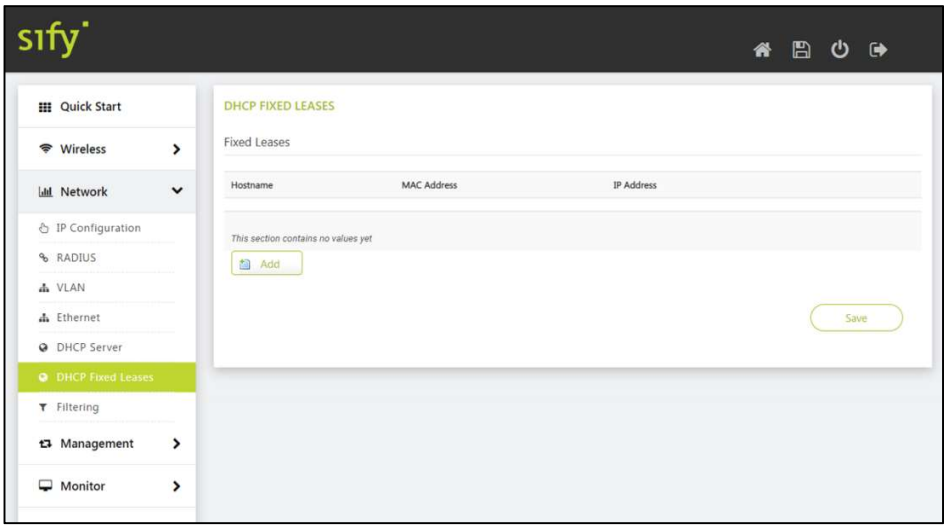
To configure the DHCP server parameters, Click Network > DHCP Server> 2.4 GHz Radio A DHCP server is configured with a pool of available IP addresses and assigns one of them to the DHCP client.

Lease time: Specifies the maximum lease time for which the DHCP client can use the IP address provided by the DHCP Server. The value ranges from 120 - 86400 seconds.



5.7 DHCP fixed Leases

Here the MAC address and IP address are binded and listed down



5.8 Filtering

Filtering is useful in controlling the amount of traffic exchanged between the wired and wireless networks. By using filtering methods, we can restrict any unauthorized packets from accessing the network. This is used to drop broadcast and multicast packets. Hence filtering can increase the amount of bandwidth available on the network and increase the network security.

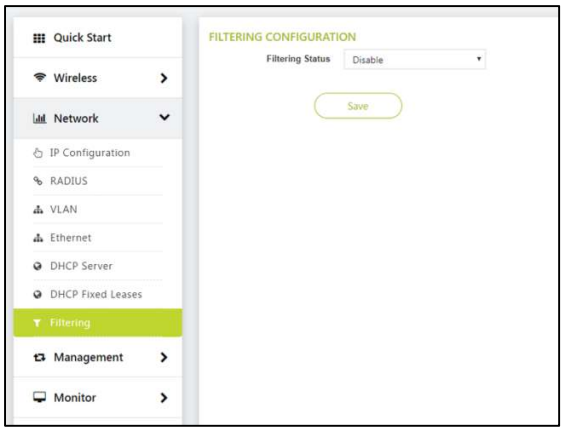
Filtering is available in bridge mode and routing mode.

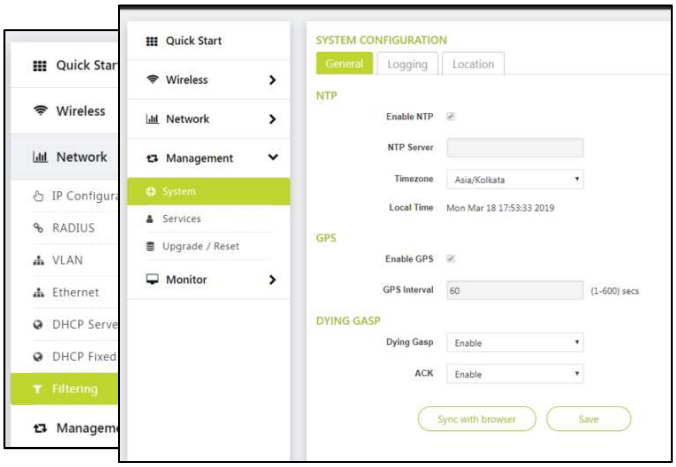
Filters are activated only when they are globally enabled on the device.

To Configure Filtering, Click *Network > Filtering > Filtering Configuration*

Filtering Status: Default status is enabled

- If Layer 2 Multicast is enabled, entire Layer 2 multicast (MAC layer) traffic will be dropped.
- If Layer 2 Broadcast is enabled, entire Layer 2 Broadcast (IP layer) traffic will be dropped.
- If Layer 3 Multicast is enabled, entire Layer 3 multicast (MAC layer) traffic will be dropped.
- If Layer 3 Broadcast is enabled, entire Layer 3 Broadcast (IP layer) traffic will be dropped.





6 Management

This chapter provides information on how to manage the device by using Web interface. It contains information on the following:

6.1 System Configuration

To configure General, Click *Management > System > System Configuration> General*

6.1.1 General

NTP

This option allows user to enable or disable NTP feature. If enabled, user has to configure the NTP server. The device will synchronize its local time with NTP server.

GPS

- This option allows user to enable and disable the GPS feature. GPS feature will trigger the 1PPS pulses to retrieve the GPS information like latitude, longitude, number of satellites and local time.
- The device will configure its local time if NTP is not enabled.
- The GPS information is also used for calculating the distance between AP and SU.

Dying Gasp

This option allows user to enable or disable the Dying gasp feature. Dying Gasp feature will trigger a TRAP in the event of power failure to inform the remote device that it is shutting down due to power failure. The device can hold its power maximum for 20ms to allow the TRAP to be sent out in either wireless or wired interfaces.

ACK

When Dying Gasp is enabled in AP and a power failure happens in a SU. The SU informs the wireless AP.

Once the AP receives Dying Gasp packet form SU, the AP sends acknowledgement to SU. When the SU receive acknowledgement (ACK) from AP, it will stop sending Dying Gasp packets to AP.

6.2 Logging

To configure logging, Click Management > System > System Configuration> logging

System log

System logs can be stored in external syslog server on PC

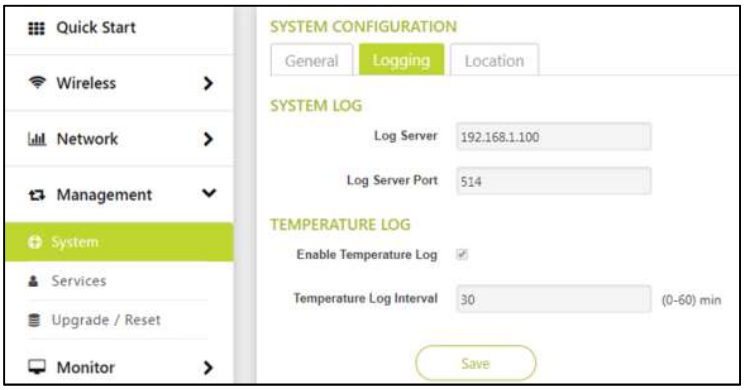
Log Server IP

Configure the PC IP Address on which syslog server is running
Log Server Port: The port on which the current log server is operating

Temperature log

Temperature Log feature is used to log the internal temperature of the device for the configured temperature logging interval (By default, it is 30 minutes). For every 30 min, new log is generated with temperature in °C.
To access this feature, navigate to Management >System> logging > Temperature and configure the following parameters:

- Enable Temperature Log
- Temperature log interval (0- 60) minutes



6.3 Location

To configure location, Click *Management > System > System Configuration> location*
This section consists of the basic profile information of customer's device, such as Customer name, Customer Location, Customer email, Customer Phone, Base Station ID and Link ID. The major difference in AP and SU location parameters is that the SU have a Link Id which is used to link to the AP.

6.4 Services

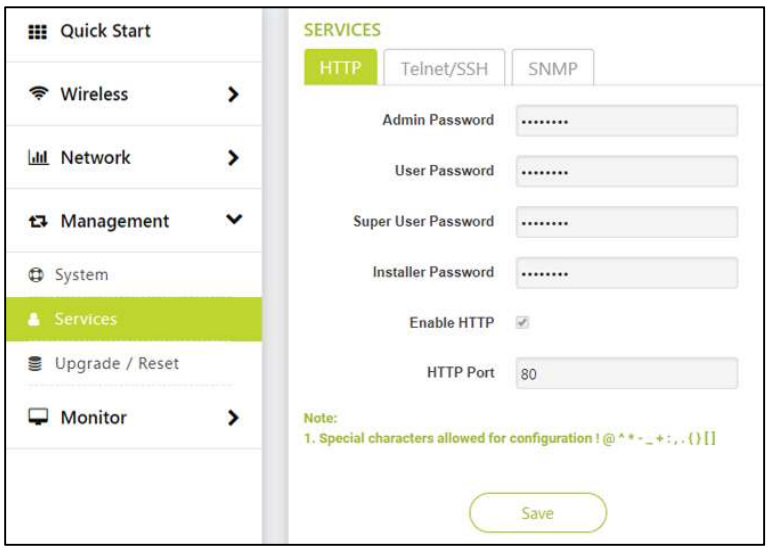
The device can be managed using different management protocols. The supported protocols are HTTP, Telnet/SSH, SNMP.
To configure the Services, *Click Management > Services*

6.4.1 HTTP: Passwords setting or modification can be done in this section. Only Admin has a privilege to change the passwords.

6.4.2 Telnet/ SSH: Enable Telnet/SSH and specify number of sessions. Here default is 2 sessions

6.4.3 SNMP: Enable SNMP

- SNMP version: SNMP v1, SNMPv1-v2
- SNMP Read Password: Here only Read password is available in order to read the configuration from the SNMP.
- SNMP Trap Host IP Address: Here the IP address of a Trap Server is specified
- SNMP Trap Host Password: The password is set to secure the Trap sent.



6.5 Upgrade/Reset

6.5.1 HTTP

- **Backup & Restore**

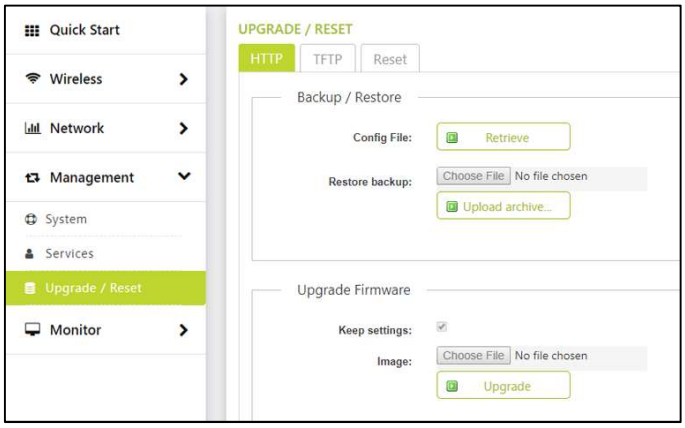
  To configure Backup & Restore, Click *Management > Upgrade/ Reset> HTTP > Backup & Restore*

  - This back-up option allows user to either download the device configuration locally
  - The restore option allows user to restore the device configuration to the uploaded configuration file.
  - Restoring the config file to the device will take 30 sec approx.
  - After uploading the configuration file, the device will load with the new configuration

- **Upgrade Firmware**

  To configure Upgrade Firmware, Click Management > Upgrade/ Reset > HTTP > Upgrade Firmware
  The firmware upgrade process happens in four phases:

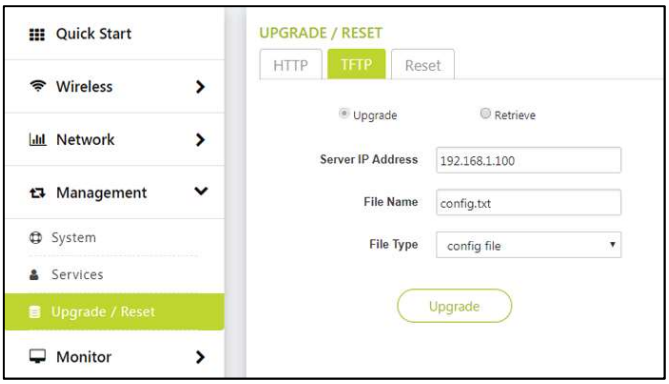
  - Upload: Select firmware to be uploaded
  - Verification: Verify the firmware to validate the checksum
  - Upgrade: Write the new firmware into flash memory
  - Reboot: Once flash write processes is completed, and then automatically reboot the device.
  - The whole firmware upgrade process takes around 6.30 minutes to complete.
  - When upgrade process starts, all the existing links will be disconnected until it reboots with new firmware.
  - Due to the above fact, it is recommended to upgrade all remote devices and then upgrade the local devices.



6.5.2 TFTP

To configure TFTP, Click Management > Upgrade/ Reset> TFTP > Upgrade / Retrieve

A Trivial File Transfer Protocol (TFTP) server lets you transfer files across a network. By using TFTP, you can retrieve files from the device for backup or copying, and you can upgrade the firmware or the configuration files onto the device.



Upgrade

- Select Image from the drop down of file type and upgrade.
- The firmware upgrade process happens in four phases:
- The TFTP firmware is uploaded from PC TFTP server path to the device.
- Verification: Verify the firmware to validate the checksum
- Upgrade: Write the new firmware into flash memory
- Reboot: Once flash write processes is completed, and then automatically reboot the device.
- The whole firmware upgrade process takes around 6.30 minutes to complete.
- When upgrade process starts, all the existing links will be disconnected until it reboots with new firmware.
- Due to the above fact, it is recommended to upgrade all remote devices and then upgrade the local devices.

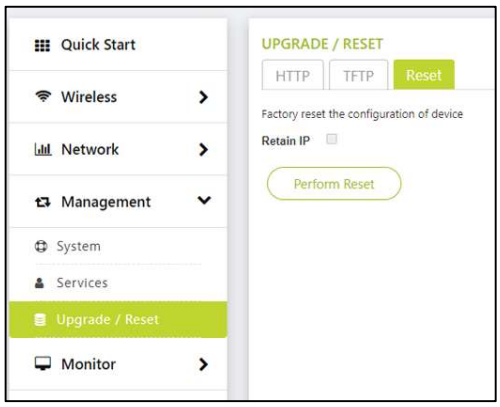
Retrieve

- The retrieved device config file will be stored in the PC TFTP Server path.

6.5.3 Reset

To Reset, Click Management > Upgrade/ Reset> Reset
This option allows user to reset all device configuration to factory defaults.
After reset, the device has to be accessed using the LAN interface locally and has to be re-configured to allow the device to join into the network again.

Retain IP: If Retain IP is checked, the last IP before the reset will be recalled.



7 Monitor

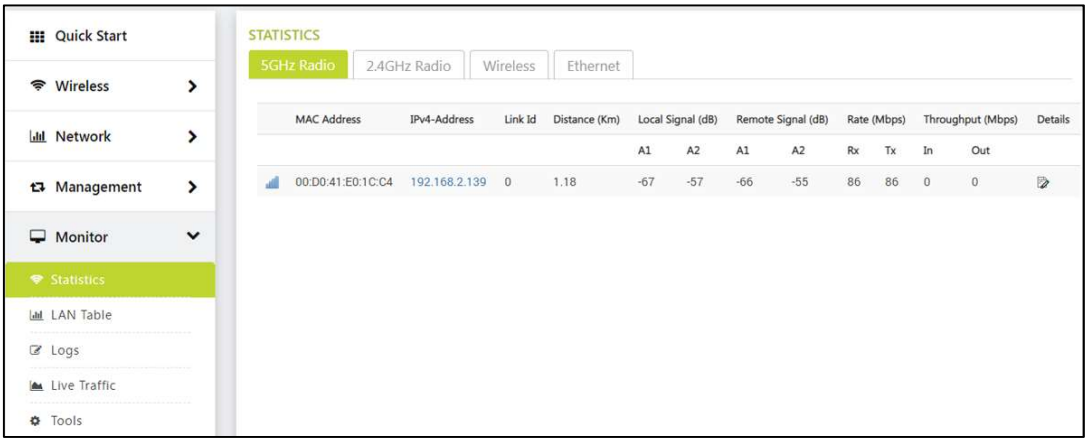
7.1 Statistics

The objective of statistics page is to allow an administrator to view the state of wired and wireless interfaces. These statistics assist the network administrator to troubleshoot the devices.

7.1.1 5 GHz Radio:

You can view the details of associated devices connected to the 5 GHz Radio.
To view the 5 GHz Radio Statistics, click Monitor > Statistics > 5 GHz Radio

- MAC Address: Displays the MAC address of the linked remote device
- IPv4-Address: Displays the IP address of the remote device
- Link Id: Displays the link Id of remote device
- Distance (Km): Displays the distance between the AP and SU.
- Local Signal (dB): Displays the local signal strength
- Remote Signal (dB): Displays the Signal strength of the remote device
- Rate (Mbps): Displays the Transmit (Tx) and Receive (Rx) rate of a al device
- Throughput (Mbps): Displays the current Input and Output bandwidth

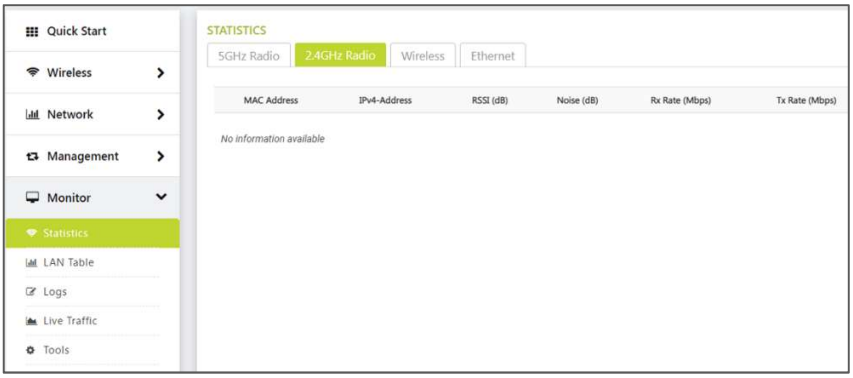


7.1.2 2.4 GHz Radio:

You can view the details of associated clients connected to the 2.4 GHz Radio

To view the 2.4 GHz Radio Statistics, click Monitor > Statistics > 2.4 GHz Radio

- MAC Address: Displays the MAC address of the client that is connected to the AP
- IPv4-Address: Displays the IP address of the client
- RSSI (dB): RSSI stands for Received Signal Strength Indicator. For receiving strong signal, the RSSI should be high. This section displays the Receiver statistics. It indicates the power viewed across the receiver input.
- Noise (dB): Refers to the noise level with which the AP received wireless frames from the client
- Rx Rate (Mbps): Rx Rate of received wireless from the Client to AP
- TX Rate (Mbps): Tx rate of transmitted wireless from AP to Client



7.1.3 Wireless Statistics

You can view information about wireless network traffic.
To view the Wireless Statistics, click Monitor > Statistics > Wireless

Log Type:

- Display Wireless Advance statistics
- Display Wireless statistics: A summary of basic wireless statistics
- MAC Id, RSSI and SNR for remote device associated

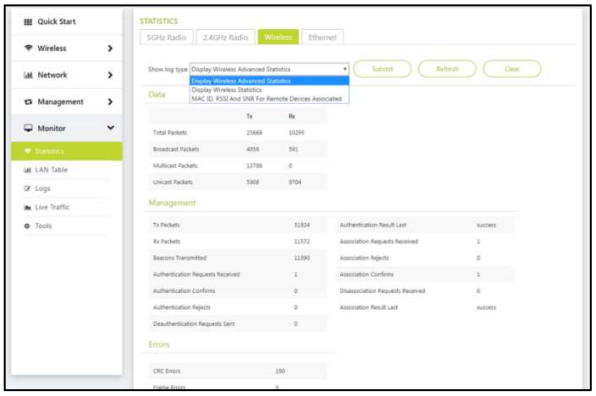
Display Wireless Advance statistics:

- **Data:** Specifies the total number of packets, broadcast packets; multicast packets, unicast packets of both Tx and Rx.
- **Management:** Device Management features are summarized
- **Errors:** Displays CRC and Frame Errors
  - **CRC Errors:** Specifies the number of received packets with invalid CRC.
  - **Frame Errors:** Too many frame errors cause network connection slow.

Display Wireless statistics:

This consists of the values of Tx and Rx Packets, Number of errors occurred, Link Quality, SNR, Number of retries etc.

MAC Id, RSSI and SNR for remote device associated



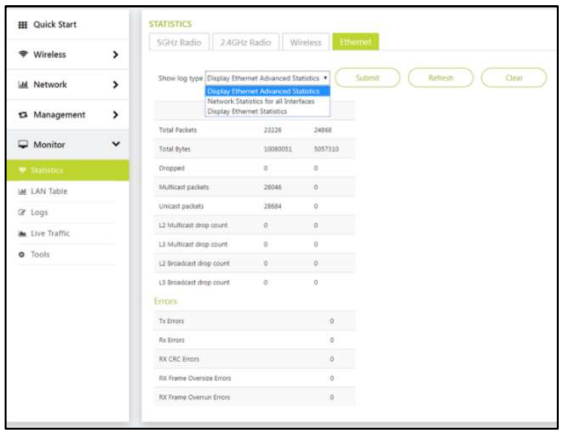
7.1.4 Ethernet

You can view information about wired Ethernet network traffic.

To view the Ethernet Statistics, click Monitor> Statistics > Ethernet

Log Type

1. Display Ethernet Advance statistics: Displays a summary of Tx, Rx, Errors, L2, L3- Multicast& Broadcast drop count.
2. Display Ethernet statistics: A summary of basic Ethernet statistics (Tx, Rx, collisions etc.)
3. Network statistics for all Interfaces: A summary of all wired and wireless interfaces



7.2 LAN Table

To view the LAN Table Statistics, click Monitor > Statistics > LAN Table

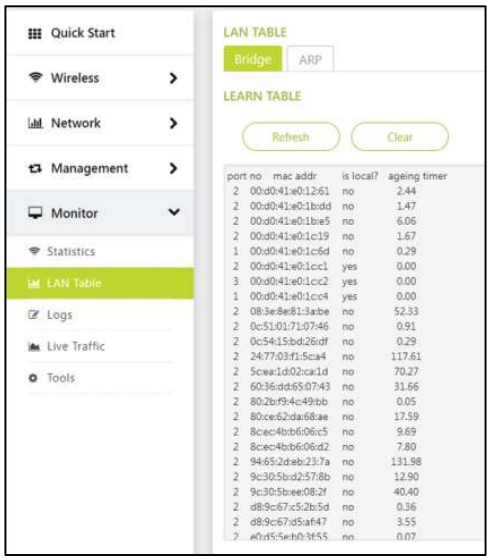
7.2.1 Bridge

Learn Table:

Learn Table is used to view all the MAC addresses of a device on both wired and wireless interfaces. The Learn Table displays the information of port no, MAC addresses, whether the type of interface is local interface or not and finally the aging timer as shown.

Click Refresh to get the updated or latest Learn Table.

Click Clear to delete all entries of the Learn Table.

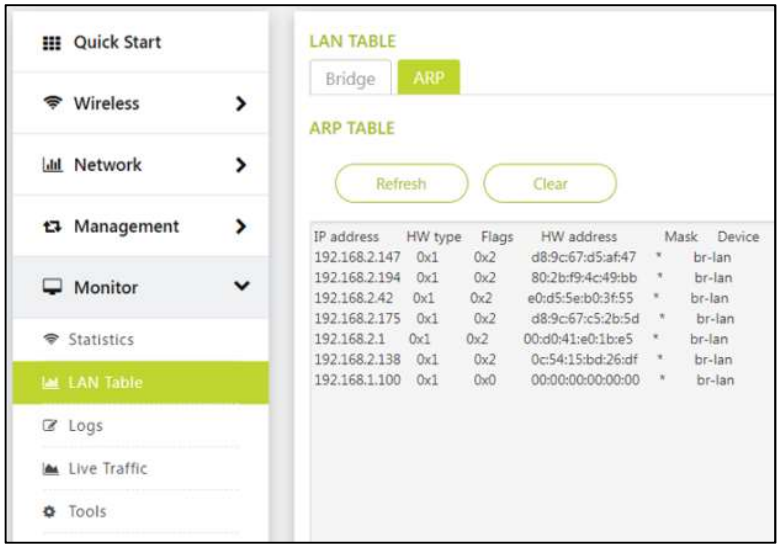


7.2.2 ARP

This section displays the mapping of the IP and MAC addresses of all nodes in the network. This information is based upon the Address Resolution Protocol (ARP). ARP is a L2 neighboring protocol which converts the IP address into a physical address on the Ethernet network.

Click Refresh to get the updated or latest ARP Table.

Click Clear to delete all entries of the ARP Table.



7.3 Logs

Logs are the entries of wired and wireless interfaces.

7.3.1 Wireless

To view the Wireless logs, click Monitor > Logs> Wireless

The Log types are classified into

1. Wireless Events
2. Wireless Events Last Boot Log

I. Wireless Events:

Here the latest wireless event entries are displayed. Different types of Logs are generated:

a) **Associated Log:** When an AP is connected to an SU or vice versa, a log is generated which is called as Associated log. This log consists of MAC Addresses of the remote device.

For example:

Sat Apr 13 07:12:53 2019: Associated (MAC: 00:d0:41:e0:1c:1c) in SU

Sat Apr 13 07:12:51 2019: Associated (MAC: 00:d0:41:e0:1c:04) in AP

b) Disassociated log: When an AP is disconnected with an SU or vice versa due to a reboot/soft reset/ a manual disconnect then a log is generated which is called a disassociated log. This log consists of MAC Addresses and a reason for disconnection of the device.

For example:

Sat Apr 13 07:15:46 2019: Disassociated (MAC: 00:d0:41:e0:1c:1c) in SU/ Remote Device

Sat Apr 13 07:15:45 2019: Disassociated (MAC: 00:d0:41:e0:1c:04, Reason: Local Terminated) in AP or BSU

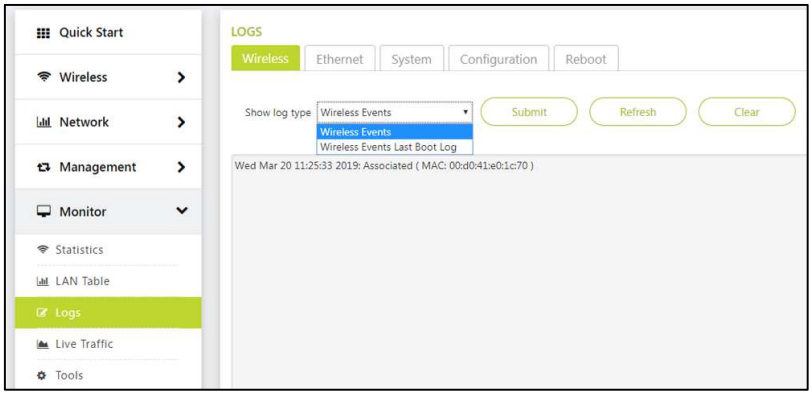
Reasons that are displayed in the log are:

Locally terminated: If an AP is a local device and loses SU link or vice versa due to a reboot/soft reset/ a manual disconnect, then the termination reason is said to be locally terminated.

Remote terminated: if an SU is unable to connect to an AP, due to a reboot/soft reset/ a manual disconnect, then the termination reason is said to be Remote terminated.

Power Off: (Remote Device): If there is a power failure either in a AP or SU. The termination reason is said to be Poweroff.

c) Wireless Inactivity: This parameter is configured only in SU, if there is no activity on wireless interface of SU in a specified time interval, reset the wireless interface. The value should be configured in minutes. An event log is generated when wireless inactivity triggers and this is visible in wireless events log.



d) Link Inactivity: If there is no activity on Wireless link on SU in a specified time, reset the wireless interface. The value should be configured in minutes. An event log is generated when Link inactivity triggers and this is visible in wireless events log.

e) DCS logs:

- This feature is available only in AP with 5GHz.
- Default chosen DCS threshold is 50%, when this percentage limit exceeds, then a log is triggered and the AP activates spectrum analyser and assigns best channel to the desired SU.

There are two types of logs generated:

- DCS Triggered log
- DCS best channel selection
- For example : <time stamp>: DCS triggered

<Time stamp>: DCS selected best channel

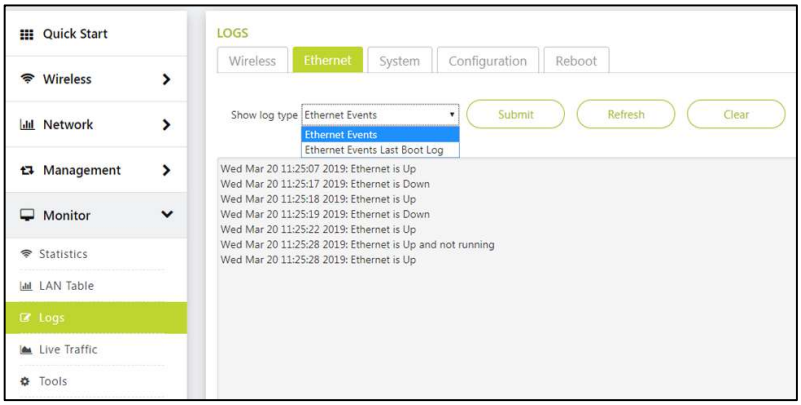
f) Spectrum Analyzer: has a start log and end log

II. Wireless Events Last Boot Log

When a proper reboot of a device takes place. The last saved logs are displayed in the Wireless Events Last Boot Log.

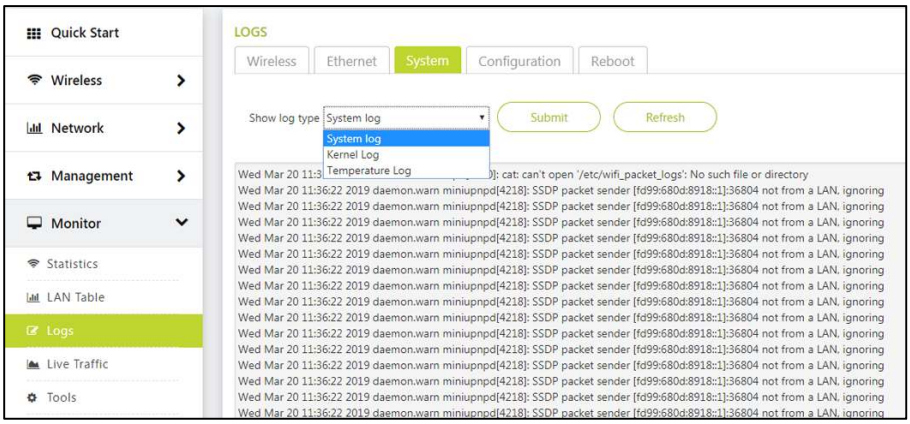
7.3.2 Ethernet

To view the Ethernet logs, click *Monitor > Logs> Ethernet*
Current Ethernet events and last reboot Ethernet events are logged in the Ethernet log.
It consists of wired connection up, down and Ethernet inactivity.



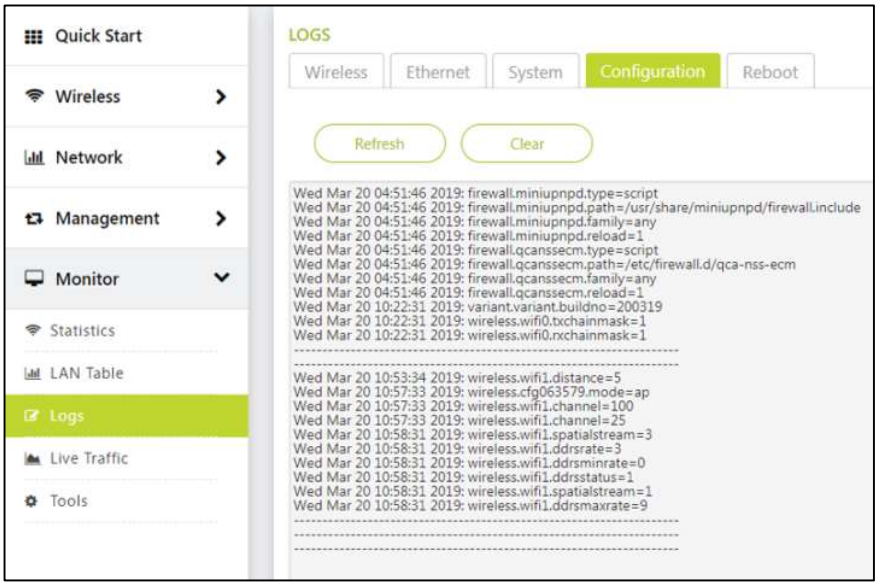
7.3.3 System

To view the System, click Monitor > Logs> System
All the system level, kernel level, temperature logs are displayed here.
Note: Temperature logs are recorded only after a certain temperature login interval.



7.3.4 Configuration

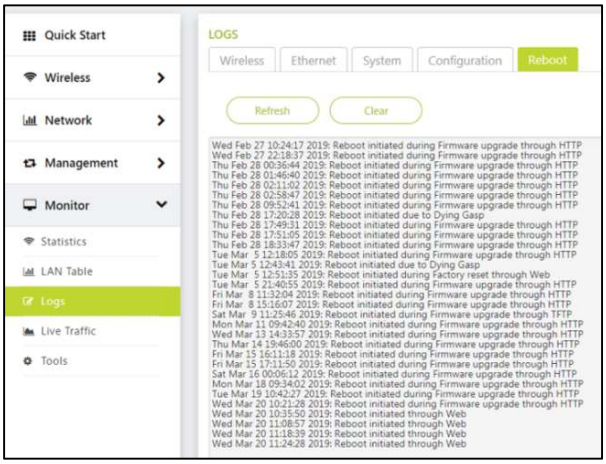
To view the Configuration log, click *Monitor > Logs> Configuration*
Any recent changes in the device configuration are reflected here.



7.3.5 Reboot

To view the Reboot log, click Monitor > Logs > Reboot
A log is generated when the below condition takes place

- When a device is manually rebooted through: Web, CLI, SNMP
- When a device is reset to factory defaults through: Web, CLI, SNMP
- When a device is upgraded firmware through: HTTP, TFTP
- When a device is power off

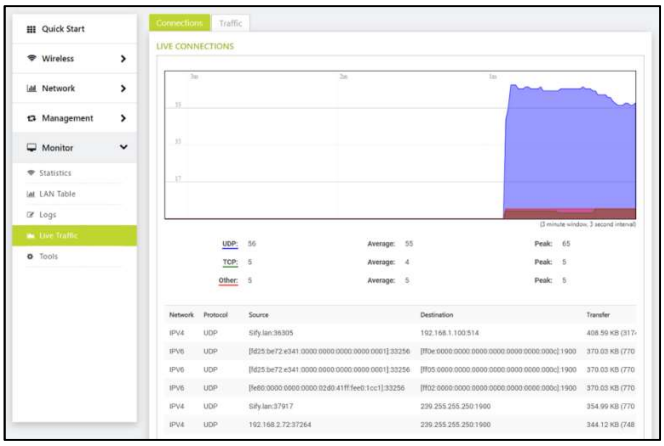


7.4 Live Traffic

To view the Live Traffic, click Monitor > Statistics > Live Traffic

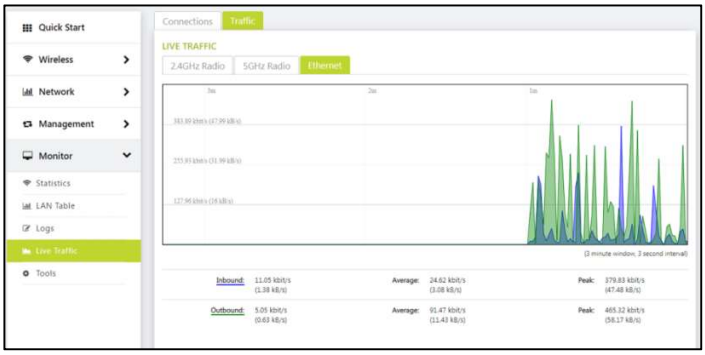
7.4.1 Live connections

Live TCP, UDP are summarized in a graphical representation



7.4.2 Traffic

- 2.4GHz Radio wireless traffic is graphed
- 5 GHz Radio wireless traffic is graphed
- Ethernet Traffic on Ethernet is summarized



7.5 Tools

To view the Tools, click Monitor> Statistics > Tools

7.5.1 Diagnostics

Few popular network utilities are used to determine the network connections.

Ping: The main purpose of using this command is to verify the device can connect over the network to another device or not.

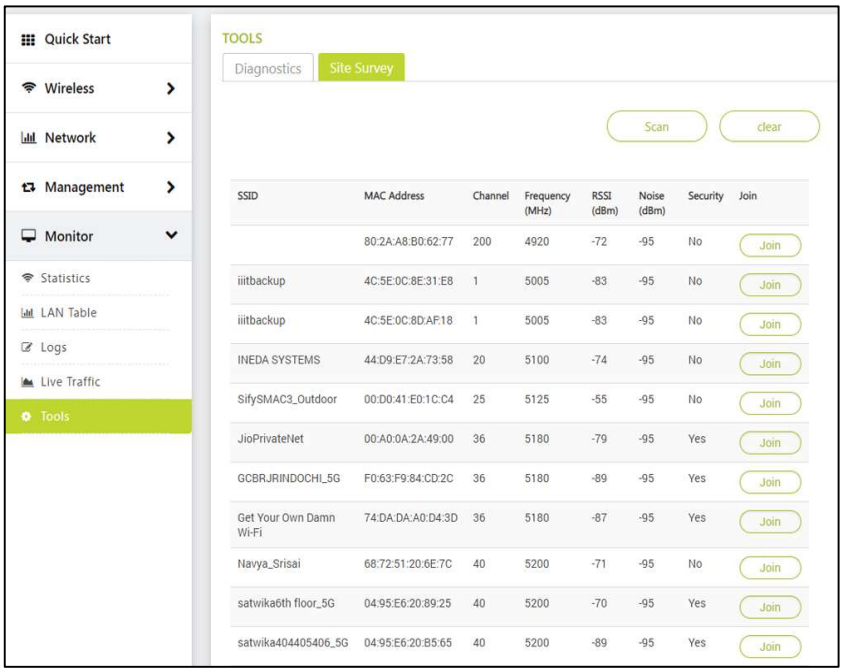
Trace route: Trace route determines that the packet has reached the destination by including a port number that is outside the normal range. When it is reached, the Port Unreachable message is sent in return, which defines the time length of the final hop. Trace route provides you with the information hop by hop. Each hop is determined three times. When a website is unreachable or slow, trace route allows you to see where the connection fails or has delays.

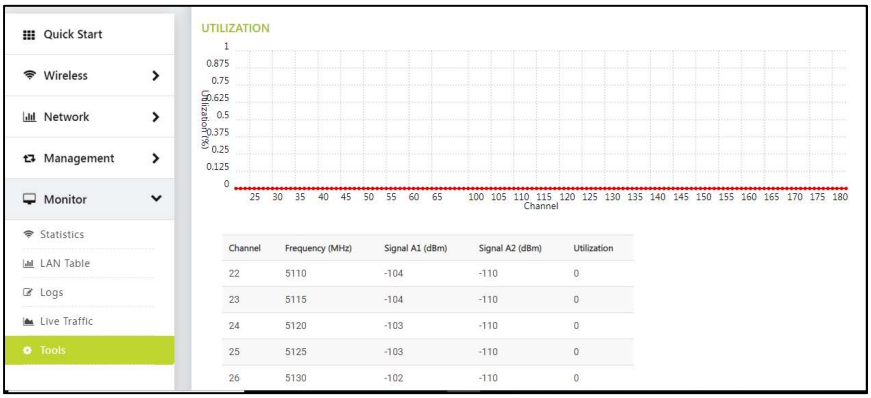
Nslookup: The Nslookup command is a DNS lookup utility
Example: nslookup hostname nameserver (nameserver address or nameserver IP address) - provides you with a DNS record stored in the specified DNS server.

7.5.2 Site Survey: This is available only in SU

Site Survey is for SU 5GHz Radio where it can scan and join the AP with the same SSID.

Once the Access Point parameters were configured, the subscriber unit will scan and get parameters updated from the AP. This way SU's basic configuration will be updated and further need to be monitored





7.5.3 Spectrum Analyser: This is available only in AP

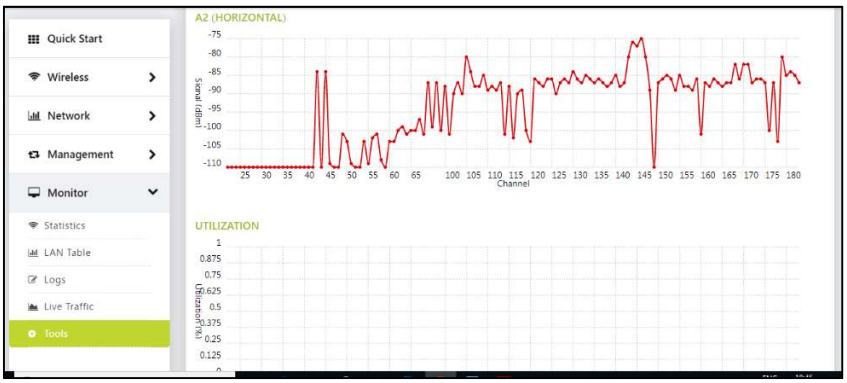
Scans all the frequencies from the configured start frequency to end frequency for a specified scan time.

Click Start button and the results will be displayed in a graph:

A1 Vertical shows signal strength received on antenna A1 at each frequency.

A2 Horizontal shows signal strength received on antenna A2 at each frequency.

Utilization: This shows the max utilization of the medium at each frequency in percentage.



Technical Specifications

Product Models	Part Numbers	Descriptions
SMAC3	API-18-5G-AC2x2-W2	Outdoor AP with 18 dBi 60-degree sector antenna
	APX-EX-5G-AC2x2-W2	Outdoor AP with 2 N-Type connectors
	SUI-18-5G-AC2x2-W2	Outdoor AP with 18 dBi panel antenna
	SUI-23-5G-AC2x2-W2	Outdoor AP with 23 dBi panel antenna
Hardware		
Chip set	Qualcomm IPQ4018, Quad-Core 717 MHz CPU, 4x ARM Cortex A7	
Memory	DDR 256 MB, Flash 32 MB	
GPS	On board GPS info via I2C,1PPS pulse	
Dying Gasp	20ms (Max)	
Thermal Sensor	Supported	
PoE Injector	Passive 48V, 0.5A, +50C, 6KV Surge Protection	
On Side LEDs	Green colour LEDs	
Ethernet Connector	Supported with LED indication (2 LEDs on RJ-45)	
Enclosure Material	ROHS compliant (non-metallic)	
Ethernet		
Ethernet	1 x GbE Port, 6KV Surge Protection	
Speed	10/100/1000Mbps, Half/Full Duplex, Auto Negotiation	
Power source	48V 0.5A	
STP Cat5e Cable length	Max 130 meters	
FTP Cat6 Cable length	Max 180 meters	
Wireless		
MIMO	2 X 2 :2	
Modulation Scheme	BSPK, QPSK, 16QAM, 64QAM, 256QAM	
Frequency Band	4.9 GHz Public Safety	5.1 GHz - 5.925 GHz Broadband Connectivity	2.4 GHz Radio Management
Channel Bandwidth	20 / 40 / 80 MHz	
Channel Spacing	5 MHz	
Max Transmit Power	Upto 26 dBm (Combined)	
Transmit Power Control	1 - 26 dB, in 1 dB steps. Automatic TPC with configurable EIRP limit	
Max. Throughput	Up to 650 Mbps (5 GHz)	
Antenna		
Integrated	18 dBi 60 degree sector | 18 dBi panel antenna | 23 dBi panel antenna	
External	2 N-Type connectors	
Security		
Encryption	AES 128 / 256	
Authentication	Internal MAC Address Control List, Radius based Authentication	
QoS		

Asymmetric Bandwidth Control	Asymmetric UL/DL committed and maximum information rate per SU			
Packet Classification Capabilities	802.1p priority, IPTOS, VLAN ID, IP addresses, ports, Ethernet addresses, IP protocol, and Ether Type			
Scheduling	Best Effort, Real Time Polling Services			
Management				
Remote	Telnet, SSH, Web, TFTP			
SNMP	SNMP v1 / v2c / v3, RFC-1213, Private MIB			
Network				
Modes	Bridging, Routing			
IP Stack	IPv4, IPv6			
Gateway Features	DHCP Server, NAT, IP sec			
VLAN	802.1Q: Management VLAN, Transparent, Access, Trunk, QinQ			
Physical Specs				
Models	API-18-5G-AC2x2-W2	APX-EX-5G-AC2x2-W2	SUI-18-5G-AC2x2-W2	SUI-23-5G-AC2x2-W2
Dimensions	371.3 x 371.3 x 101.5mm	229.2 x 250 x 80 mm	229.2 x 250 x 80 mm	305.5x305.5x79.5mm
Weight	2.4 kgs/ 5.48 lbs	1 .2Kgs / 2.7 lbs	1.2Kgs / 2.7 lbs	1.68 kgs/ 3.7lbs
Environmental	Operating Temperature	Storage Temperature	Humidity & IP Rating	Wind loading
	-20 to +65 °C	-50° to +70 °C	95% maximum	180 kmph
		(-58° to 158° F)	Non-Condensing, IP67	
Maximum Transmit Power (20/40 MHz)	2.4 GHz		5 GHz	
	MCS0: 23 dBm	MCS8: 23 dBm	MCS0: 23 dBm	MCS8: 23 dBm
	MCS1: 23 dBm	MCS9: 23 dBm	MCS1: 23 dBm	MCS9: 23 dBm
	MCS2: 23 dBm	MCS10: 23 dBm	MCS2: 23 dBm	MCS10: 23 dBm
	MCS3: 23 dBm	MCS11: 23 dBm	MCS3: 23 dBm	MCS11: 23 dBm
	MCS4: 23 dBm	MCS12: 23 dBm	MCS4: 23 dBm	MCS12: 23 dBm
	MCS5: 22 dBm	MCS13: 22 dBm	MCS5: 22 dBm	MCS13: 20 dBm
	MCS6: 21 dBm	MCS14: 20 dBm	MCS6: 21 dBm	MCS14: 20 dBm
	MCS7: 20 dBm	MCS15: 20 dBm	MCS7: 20 dBm	MCS15: 20 dBm
Receiver Sensitivity 20/40 MHz				
	2.4 GHz		5 GHz	
	MCS0: -92 dBm	MCS8: -90 dBm	MCS0: -92 dBm	MCS8: -90 dBm
	MCS1: -90 dBm	MCS9: -88 dBm	MCS1: -90 dBm	MCS9: -88 dBm
	MCS2: -87 dBm	MCS10: -86 dBm	MCS2: -87 dBm	MCS10: -86 dBm
	MCS3: -84 dBm	MCS11: -83 dBm	MCS3: -84 dBm	MCS11: -83 dBm
	MCS4: -81 dBm	MCS12: -80 dBm	MCS4: -81 dBm	MCS12: -80 dBm
	MCS5: -78 dBm	MCS13: -76 dBm	MCS5: -78 dBm	MCS13: -76 dBm
	MCS6: -75 dBm	MCS14: -73 dBm	MCS6: -75 dBm	MCS14: -73 dBm
	MCS7: -72 dBm	MCS15: -70 dBm	MCS7: -72 dBm	MCS15: -70 dBm
Package Contents				
	1 Radio			
	1 PoE Injector with AC Power Cable			
	1 Ethernet Cable Cat5e 1.5 mts			
	1 Grounding Cable 1.8 mts AWG10			

	1 Pole Mounting Kit or Axis Mounting Kit (Based on the radio model)
	1 Quick Installation Guide
Certification	
	FCC: 47 CFR Part 90, Sections 90.1201 through 90.1217
	FCC: 47 CFR Part 15, Subpart C (Section 15.247)
	FCC: 47 CFR Part 15, Subpart E (Section 15.407)
	FCC: Part 2(Section 2.1091)
	IEC 61000-4-2: 2008, IEC 61000-4-4: 2012, IEC 61000-4-6: 2013
	CISPR 22: 2008 Class A: Radiated Disturbance
	IEC 61000-4-3 Class A: Radiated Susceptibility
	IEC 61000-4-11 Class A: Voltage Dips & Interruption
	IEC 61000-4-5 +/-6kV Class A: Surge Test on AC-Input and PoE Data lines
MTBF & Warranty	MTBF over 250 000 hours & 1-year warranty
Ordering Information	
Part Number	Description
API-18-5G-AC2x2-W2	Outdoor AP with 18 dBi 60 degree sector antenna
APX-EX-5G-AC2x2-W2	Outdoor AP with 2 N-Type connectors
SUI-18-5G-AC2x2-W2	Outdoor AP with 18 dBi panel antenna
SUI-23-5G-AC2x2-W2	Outdoor AP with 23 dBi panel antenna

SIFY TECHNOLOGIES LIMITED

2nd Floor, Tidel Park
4. Rajiv Gandhi Salai, Taramani
Chennai – 600 113
Phone: +91 44 2254 0770-77
Fax: +91 44 2254 077