Broadband Outdoor Access Point
User Manual

Table of Contents

Safety and Regulatory Information

This section describes important safety and regulatory guidelines that must be observed by personnel installing or operating Broadband Outdoor Access Point.

About this Guide

Purpose

This document provides information related to configuration and management of the EnGenius EOC655 Series radios. It is intended to be used by the system administrator.

Definitions, Acronyms and Abbreviations

The following typographic conventions and symbols are used throughout this document.

	Important information that should be observed.
	Important Note
	Quick Start Instructions
Bold	Menu commands buttons input fields configuration keys are displayed in bold.
Bold Italic	Navigation of the menu

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Contact Address: EnGenius Technologies
1580 Scenic Ave.
Costa Mesa, CA 92626

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 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 a minimum distance of 250cm between the radiator and your body.

Declaration of Conformity in Languages of the European Community

Hereby, EnGenius declares that the radio equipment EOC655 is in compliance with Directive 2014/53/EU. For full text of the EU declaration of Conformity, please follow the

https://www.engeniustech.com/eu/downloads#ce-declarations

Product Overview

EOC655 Series of products were tailored for Wireless Internet service providers (WISP's) who wish to deliver uninterrupted wireless connectivity to Enterprise, Campuses, Public Wi-Fi, Smart Cities, Educational institutions, Industrial Security or just about any demanding wireless broadband connectivity.

Product Key Features

- Proprietary polling protocol supporting real time priority-based scheduler.
- Dual 5GHz Radio's with 2 spatial streams for improved transmission speed and coverage that delivers up to 2.4 Gbps data rate.
- Supports IEEE802.11ax wireless standards with up to 2040 Mbps Data rate.
- Support Wave 2 MU-MIMO function on Radio1 and Radio2
- Perform 1024-QAM to enhance data rate.
- Flexible RF planning with 20,40,80 and 160MHz channel size
- Up to 23 dBm transmits 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 256 Encryption provides the most secure outdoor wireless communication even in the unlicensed frequency spectrum.

Professional Antenna Installation Instructions

Installation Personal

This product is designed for specific applications 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: A8J-EOC655

Installation Location

The product shall be installed at a location where the radiating antenna can be kept 250cm from a 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 penalties.

In FCC, there is restriction on total power so we have limit parameter called as Max EIRP which will reduce the radio power to adjust to the configured limit.

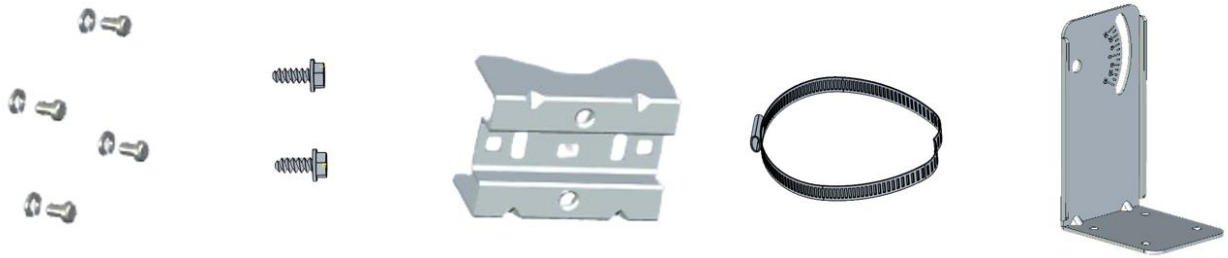
It is the responsibility of the grantee and installer to ensure that when configuring the radio in the United States (or where FCC rules apply), the Tx power is set according to the values for which the product is certified. The use of Tx power values other than those for which the product is certified,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

Installation Kit

EnGenius installation kit consists of the following materials:

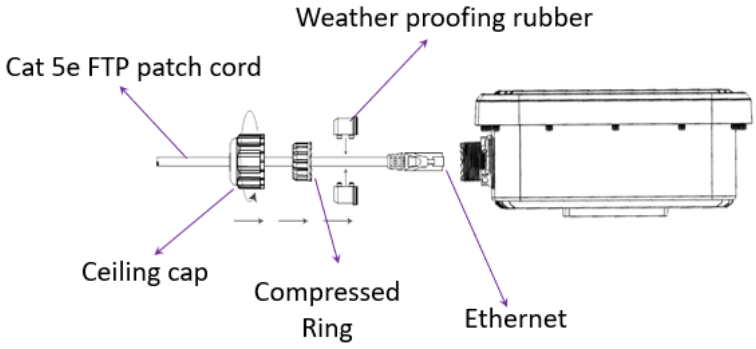
1. Stainless Steel Pole Ring – 4.5inch – 1 piece
2. Screw Type 1 (blue) – 8 x 20 - 2 pieces
3. Screw Type 2 – 4 x 6 – 2 pieces
4. Screw Type 3 – 6 x 10 - 4 pieces
5. Washer – ¼ inch – 4 pieces
6. L Clamp – 1 piece
7. Mounting Bracket – 1 piece

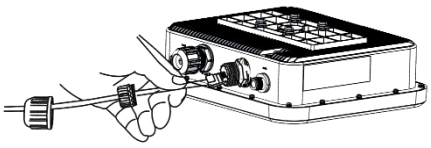


Outdoor Installation of Radios

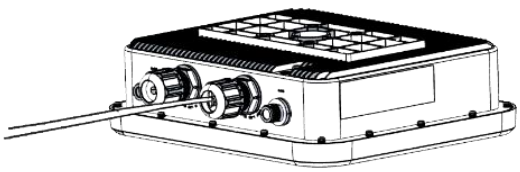
EnGenius EOC655 Series products are all outdoor radios installed in the following method:

1. Pole/Tower Mount: Radio installation kit includes one metal hose clamp to support pole sizes from 30mm to 60mm diameter.





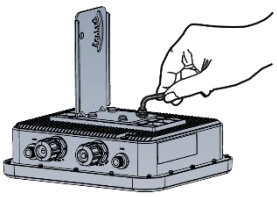
2. But before mounting, cable is properly connected to ensure weatherproofing.



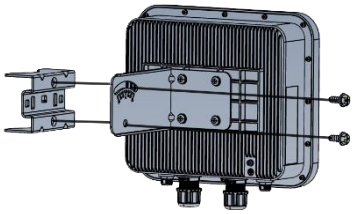
Mounting on Pole

Once cabling has been done, the device is now ready to mount on the pole, use the following below steps to mount the L clamp on the device.

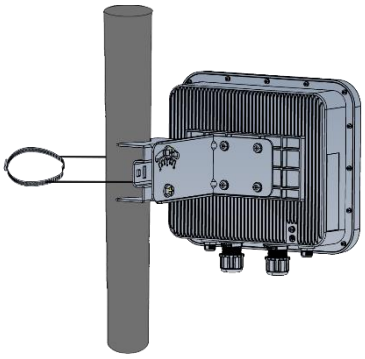
1. Tighten the screws to mount the L clamp on the device.



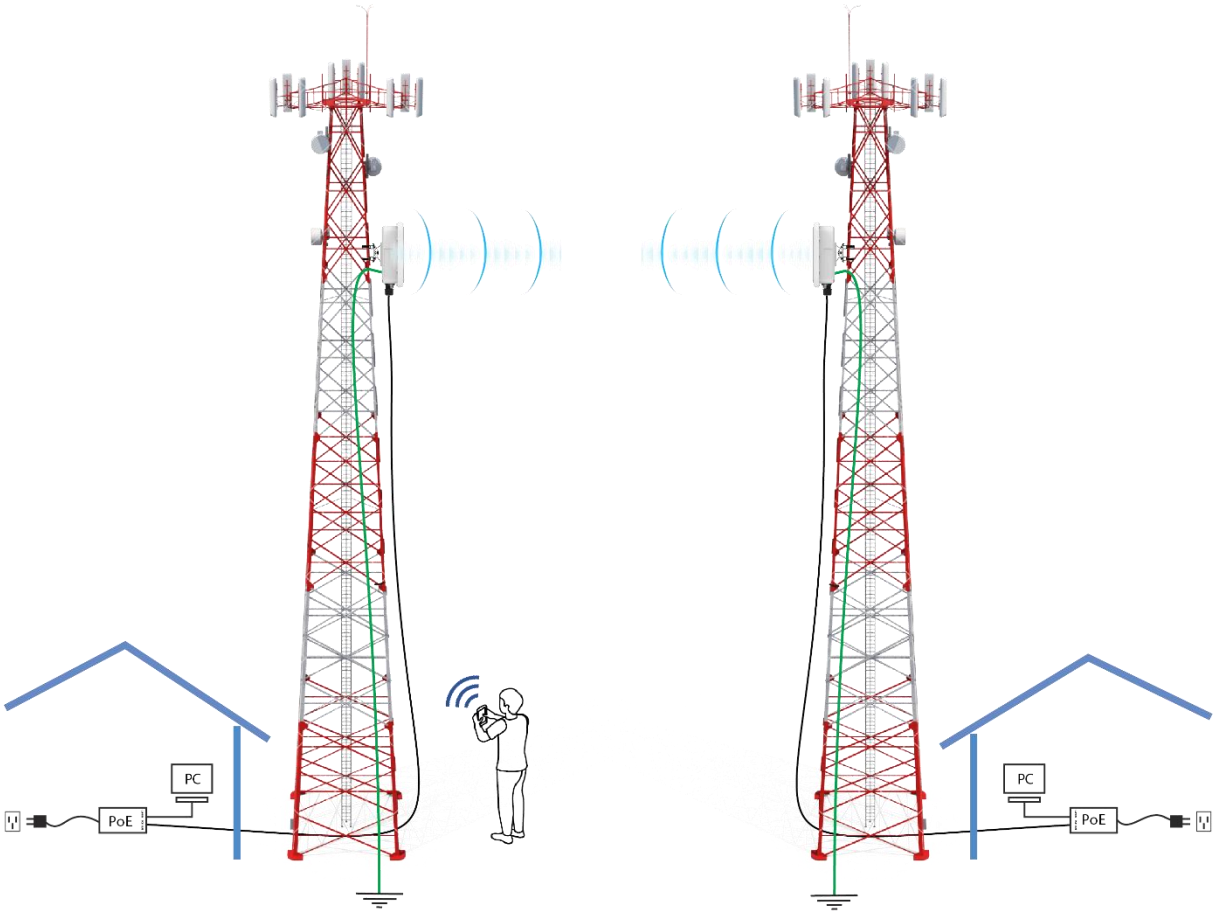
2. Put the Mounting bracket using the other two screws, this bracket helps in moving the device up and down to adjust according to LOS.



3. Once installation of mounting bracket is done, EOC655 is ready to be mounted on top of the pole. Take the device up and install it using the below mechanism.



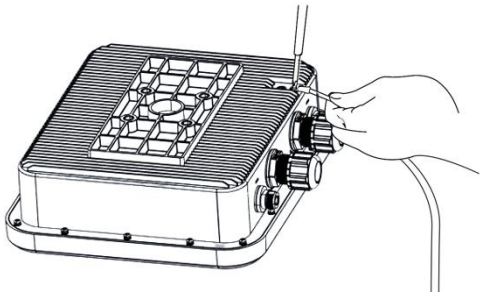
Typical Deployment Scenario.



Grounding Instructions

Warning

Electro-magnetic discharge (lightning) damage is not covered under warranty. The recommendations in this guide, when followed correctly, give the best protection from the harmful effects of EMD to users. However, 100% protection is neither implied nor possible.



Full details of lightning protection methods and requirements can be found in the International Standards IEC 61024-1 and IEC 61312-1, the U.S. National Electric Code ANSI/NFPANo. 70-1984 or section 54 of the Canadian Electric Code.

Note

International and national standards take precedence over the requirements in this guide.

Certified Antenna Gain & Tx Power Values

Antennas shown in the table below are approved for EOC655 series Radio deployments.

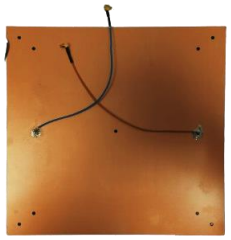
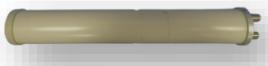
Model Name	Spruce (5G-1)	Pine (5G-2)	Tx Max Power Per Chain (dBm) UNII-1 / UNII-2A / UNII-2C / UNII-3	
			R1	R2
Main Model: EOC655	1. 23 dBi N-type panel ant. (MT465039/NVH) 2. Omni 10 dBi ant. (DFS)	1. Sector 18 dBi ant. (MT055S17VHN) 2. 2 foot 30 dBi Dish ant. (TM55L-DPDISH-30) 3. Omni 10 dBi ant (MT-463036/NVH)	1. 12/0/0/12 2. 12/0/0/12	1. 12/6/6/17 2. 17/-6/-6/16 3. 20/14/14/25
Series model: EOC655-C23	23 dBi MMCX panel ant. (MT-465039/CVH/F)		12/0/0/12	
Series model: EOC655-C18	18 dBi Embedded panel ant. (C18, same antenna type as 23 dBi ant.)		12/0/0/12	
Series model: EOC655-B18	23 dBi N-type panel ant. (MT-465039/NVH)	Sector 18 dBi ant. (MT055S17VHN)	12/0/0/12	12/0/0/12

Operating Frequency Band 5150 – 5850 MHz

It is the responsibility of the installer to ensure that radios operating in the band 5150-5850 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 gains from the horizon above 30 degrees for antenna model 1 & 2 is below. For more detailed information, please refer to antenna specifications.

S.No	Antenna Model	Antenna Gain (dBi)	Antenna Install Degree/Images
1	18 dBi Embedded Panel Antenna	4.67	
2	23dBi N-type Panel Antenna	4.34	
3	Omni 10 dBi Antenna	- 0.04	
4	Sector 18 dBi Antenna	- 2.77	
5	2 foot 30 dBi Dish Antenna	7.63	

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

Tx-Power = EIRP – Ga – Gm

EIRP ➔ Equivalent Isotopically Radiated Power, Ga ➔ Antenna Gain at 30° in Elevation plane. Gm ➔ Gain for Multi Input Multi Output

This equipment complied with the UK and EEA radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance 20cm between the radio and your body. The frequency and the maximum transmitted power in the UK and European Conformity are listed below:

	CE	UKCA
BLE	2402 - 2480MHz 2.85 dBm	2402 - 2480MHz 2.85 dBm
2.4G 802.11	2412 - 2472 MHz 19.9 dBm	2412 - 2472 MHz 19.9 dBm
2.4G BFM 802.11 ac, ax	2412 - 2472 MHz 19.74 dBm	2412 - 2472 MHz 19.74 dBm
wifi 5G Spruce 23 dBi	5500 - 5700 MHz 29.64 dBm	5500 - 5700 MHz 29.64 dBm
wifi 5G Spruce 23 dBi BFM	5500 - 5700 MHz 29.64 dBm	5500 - 5700 MHz 29.64 dBm
wifi 5G Spruce 18 dBi	5500 - 5700 MHz 24.64 dBm	5500 - 5700 MHz 24.64 dBm
wifi 5G Spruce 18 dBi BFM	5500 - 5700 MHz 24.64 dBm	5500 - 5700 MHz 24.64 dBm
wifi 5G Spruce 10 dBi	5500 - 5700 MHz 16.64 dBm	5500 - 5700 MHz 16.64 dBm
wifi 5G Spruce 10 dBi BFM	5500 - 5700 MHz 16.64 dBm	5500 - 5700 MHz 16.64 dBm
wifi 5G PINE 30 dBi	5500 - 5700 MHz 29.95 dBm	5500 - 5700 MHz 29.95 dBm
wifi 5G PINE 30 dBi BFM	5500 - 5700 MHz 29.95 dBm	5500 - 5700 MHz 29.95 dBm
wifi 5G PINE 18 dBi	5500 - 5700 MHz 29.96 dBm	5500 - 5700 MHz 29.96 dBm
wifi 5G PINE 18 dBi BFM	5500 - 5700 MHz 29.96 dBm	5500 - 5700 MHz 29.96 dBm
wifi 5G PINE 10 dBi	5500 - 5700 MHz 29.99 dBm	5500 - 5700 MHz 29.99 dBm
wifi 5G PINE 10 dBi BFM	5500 - 5700 MHz 29.99 dBm	5500 - 5700 MHz 29.99 dBm

NOTE:

To mitigate potential interference between two EOC655 devices, it is recommended to maintain a minimum distance of at least 1 meter between them. This spatial separation helps ensure optimal performance and prevents signal overlap, thereby enhancing the overall reliability and efficiency of the EOC655 devices. The specified distance serves as a practical measure to safeguard against potential electromagnetic interference and maintain the integrity of the communication between the devices

Safety Precautions & Notices

- Read, follow, and keep these instructions.
- Read all warnings.
- 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.

Operating Temperature

This device is designed to operate within a temperature range of -10°C to 60°C (14°F to 140°F).

Operating the device outside of this temperature range may result in suboptimal performance or damage to the device.

Please ensure that the device is used in environments that maintain the ambient temperature within this specified range. Avoid placing the device in direct sunlight, near heat sources, or in extremely cold locations.

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.

POE Safety Instructions :

- Installation: Follow the manufacturer's instructions regarding the POE (Power over Ethernet) adapter, ensuring proper installation techniques are employed. The POE adapter must be installed in an indoor environment only.
- Power Source: Ensure that the POE adapter is connected to a suitable power source as per local electrical regulations. Avoid overloading power outlets and use surge protectors if necessary.
- Wiring: Use appropriate cabling and connectors, such as RJ45 connectors, to extend the distance from the indoor environment to the outdoor area where the device, EOC655, will be powered. Ensure that the wiring is properly insulated and protected from environmental factors.
- Environmental Considerations: The POE adapter should only be used within an ambient temperature range of up to 40 degrees Celsius. Avoid exposing the adapter to extreme temperatures, moisture, dust, or other contaminants that may affect its performance or safety.

- Inspection: Regularly inspect the POE adapter and associated wiring for signs of damage, wear, or overheating. Replace any damaged components immediately and refrain from using the adapter until it has been properly repaired or replaced.
- Ventilation: Ensure adequate ventilation around the POE adapter to prevent overheating. Do not obstruct ventilation openings or place the adapter in enclosed spaces where heat dissipation may be restricted.
- Compliance: Verify that the POE adapter complies with relevant safety standards, such as IEC62368, and that it bears appropriate certification marks from recognized testing laboratories.
- Authorized Personnel: Only qualified personnel should install, operate, or maintain the POE adapter and associated equipment. Training on safety procedures and guidelines should be provided to all individuals involved in handling the equipment.
- Shutdown Procedure: In the event of a malfunction or emergency, immediately disconnect power to the POE adapter and associated equipment. Follow proper shutdown procedures as outlined in the manufacturer's instructions to prevent damage or injury.
- Consultation: If unsure about any aspect of the installation, operation, or maintenance of the POE adapter, seek guidance from the manufacturer or a certified technician. Do not attempt to modify or repair the adapter yourself unless you are qualified to do so.

ISED Statement

Following for general product

This device contains licence-exempt transmitter(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) this device may not cause interference,

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

(3) support of U-NII-3 only in Canada.

L'émetteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) L'appareil ne doit pas produire de brouillage;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

(3) Prise en charge de U-NII-3 uniquement au Canada.

Below for general equipment use above 250cm

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 250 cm between the radiator and a human body.

Cet équipement est conforme aux limites d'exposition aux rayonnements de la ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 250 cm entre le radiateur et un corps humain.

Device Operation – Point to Point Protocol

EOC655 Broadband Outdoor Access series models implements Point to Point protocol designed for Outdoor deployments. The protocol is a polling protocol where the data exchange between BSU and SU is controlled by the BSU. BSU allocates poll slots to the registered subscribers for data exchange. The details of the protocol are mentioned below:

Protocol Operations

- Registration (or) Network Join
- Termination (or) Network Exit
- Data Exchange

Registration (or) Network Join

- BSU will be sending beacons every beacon interval.
- SU will scan all the supported channels for the configured country.
- SU will select best SNR BSU [BSU Information available in Site Survey Tab]
- SU will register with BSU and generates an event log confirming the registration in both BSU and SU

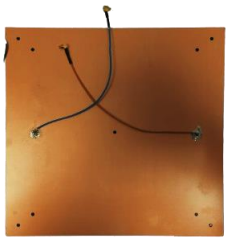
Termination (or) Network Exit

- BSU or SU link disconnection will happen in below scenarios:
    - User disconnecting the link from WEB.
    - Link Timeout due to inactivity or no data exchange.
    - Soft reset [Configuration Change]
    - Soft Reboot [User rebooting the device manually]
    - Hard Reboot [Power On/Off] [Dying Gasp Message]
- BSU or SU will send the termination packet to other partners to disconnect the link.

Data Exchange

- **Classification & Queuing**
    - The packets received on the ethernet interface are bridged to the wireless interfaces.
    - The packets received on the wireless interfaces are classified and queued in the respective data queues.
- **Scheduling**
    - The protocol supports round robin and priority-based scheduler where the packets in the respective data queues will be exchanged between BSU and SU.

To ensure the proper functionality of our PTP protocol, we used the following antenna selection during testing.

S.No	Antenna Model	Antenna Install Degree/Images
1	18 dBi Embedded Panel Antenna (Senao)	
2	23dBi N-type Panel Antenna (MTI)	
3	30 dBi Dish Antenna	

Device Configuration

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.

WARNING:

Based on the power measured, the MPE will pass only if the operating distance is over 250 cm.

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 **192.168.1.125** 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.

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 EOC655<last 2 digits of ethernet MAC> with a passphrase as eoc@1234

The device can also be accessed using EnGenius 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.

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
- *username*: **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
- SNMP
- Telnet
- SSH

HTTP

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.

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.

SSH - admin

The device can be accessed through CLI by using **ssh-admin**, 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 SSH client with username as **admin**.
- 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/ Root 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.

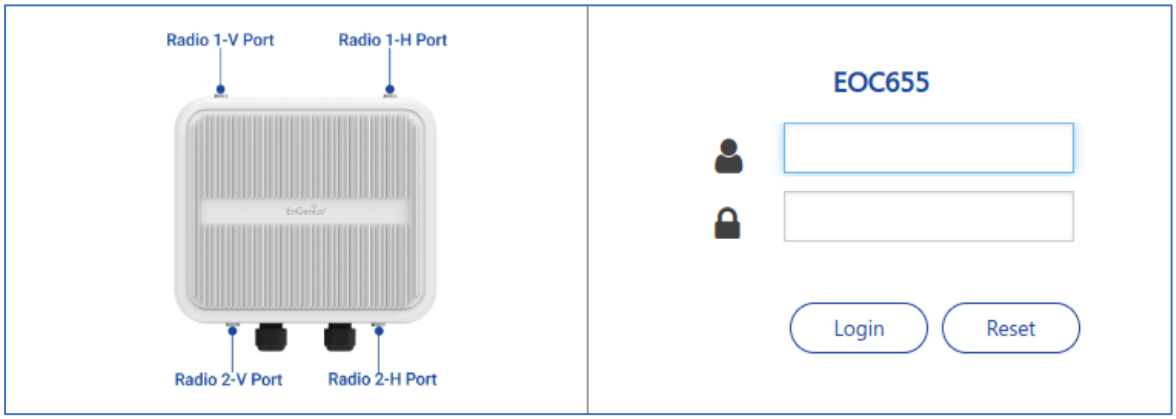
SSH - root

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.

The root users have full access to all the parameters in the settings of the device, this further prevents unauthorized changes in settings.



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 are "admin" and should be changed immediately after login to protect your network since it gives the user read - write privileges.

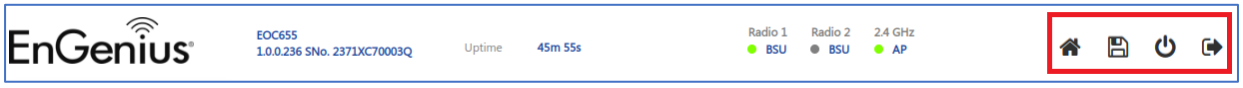
The password can be changed.

Click Management > Services> HTTP > Admin password/ Root Password.

Graphical User Interface Overview

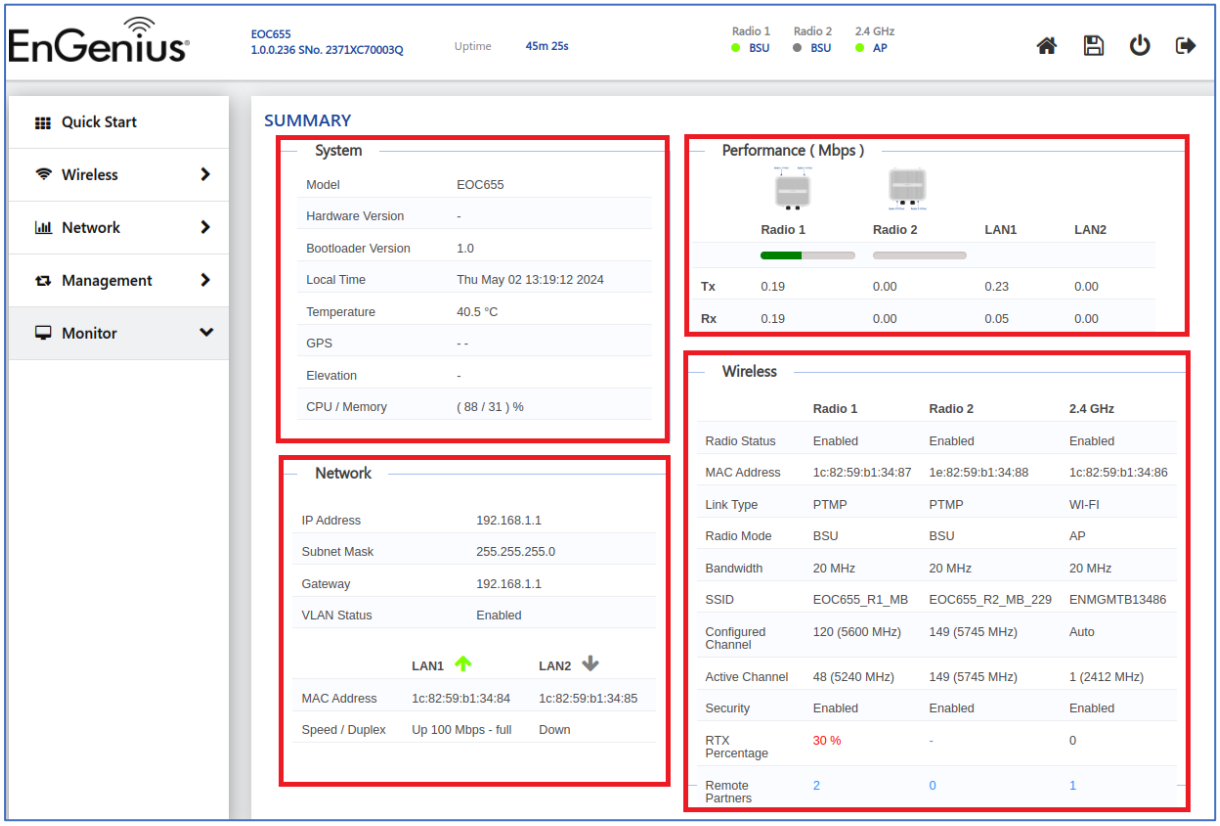
Power on the Radio to access the Graphical User Interface (GUI). After a successful login, the user notices a title bar on the top, a navigation pane on the left, and a content pane in the center. The default page shown in the content pane is the “Summary”.

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 to restart the device.
Logout: Click Logout, when necessary, make sure to click Apply to save the most recent updates. Again, the login page pops-out after a successful logout.



Summary

The Summary page shows the complete overall status of the device showing the details of System, Network, Performance, Wireless. The summary page will appear once the user logs in to the device page.



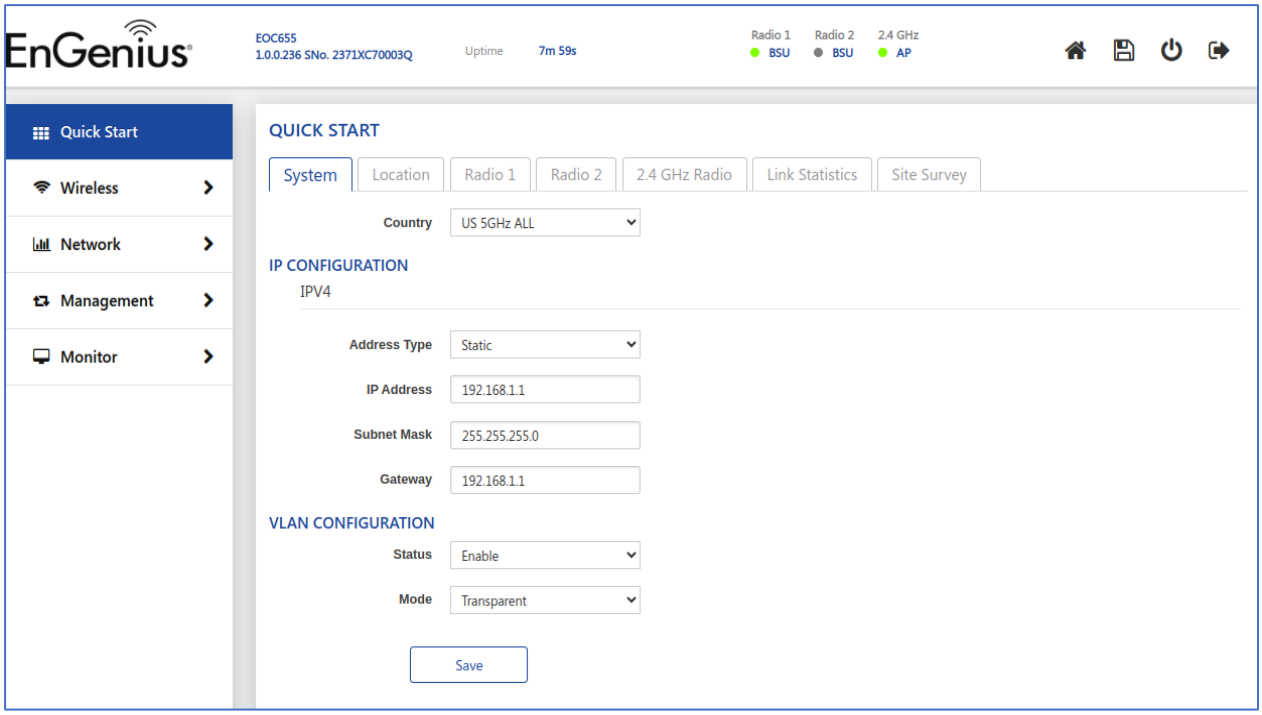
Quick Start

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.

System

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 must enter manually the Gateway IP address.

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*

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.

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

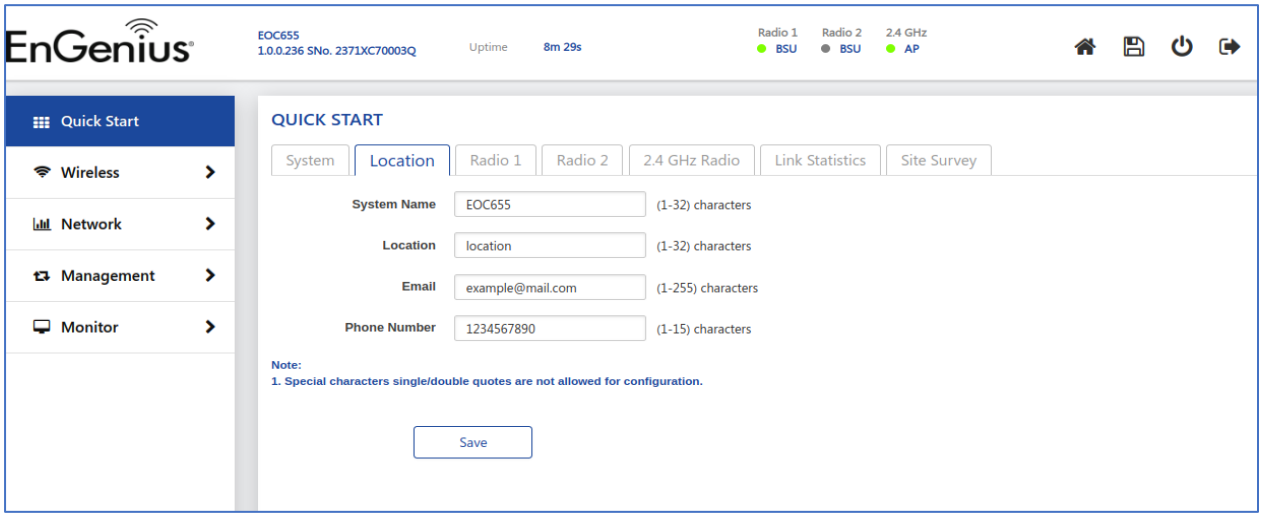
To configure the VLAN Access Mode in SU, ***Click Quick Start> System***

- 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.

Location

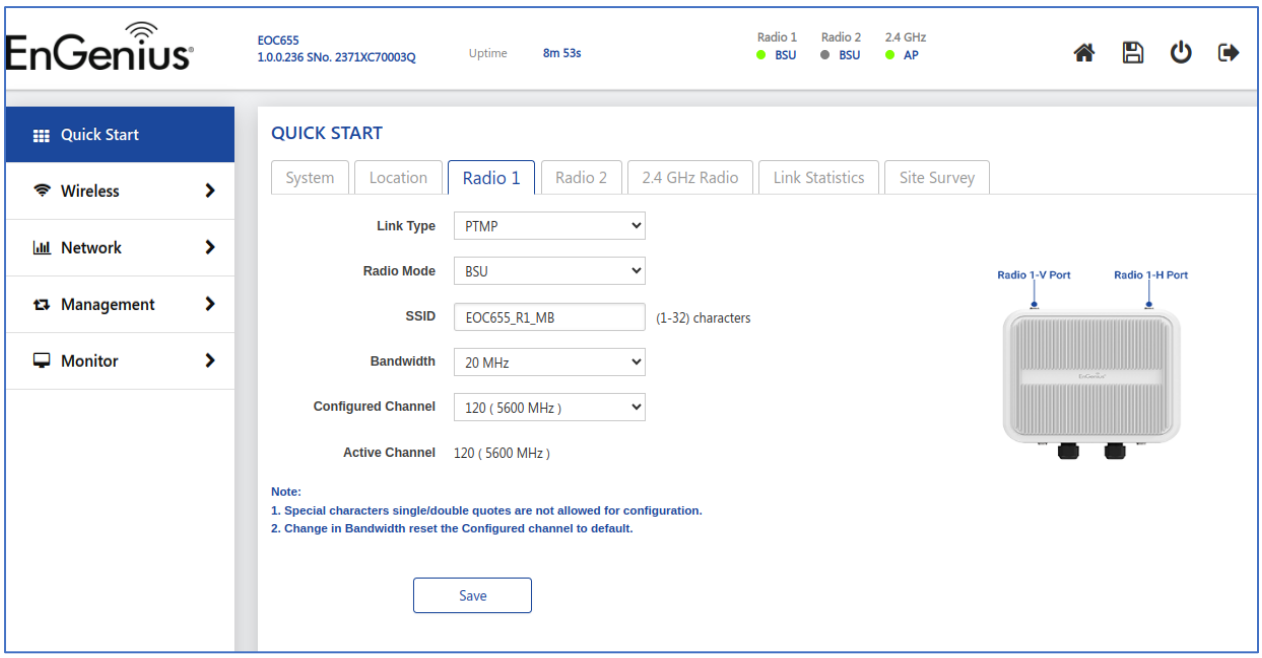
To configure the Location, ***Click Quick Start> Location***

This section consists of the basic profile information of a customer's device, such as **System Name**, **Customer Location**, **Customer Email** and **Customer Phone Number**.



Radio 1/ Radio 2

To configure the Radios, ***Click Quick Start> Radio 1 or Quick Start> Radio 2***



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/ PTMP. Few mandatory parameters are customized in AP than in SU.

Radio Mode

BSU / SU

- If the Radio Mode is BSU, it is considered as AP.
- If the Radio Mode is SU, it is considered as SU.

Service Set Identifier (SSID)

SSID is simply the technical term for a network name. The SSID is a string with 32 characters, supports configuration of alpha-numeric and special characters. An SSID is publicly visible. Within those rules, the SSID can be anything for quick identification of the network.

Country: US 5 GHz ALL

Band1: 5170 - 5250 MHz

Band2: 5250- 5330 MHz

Band3: 5490 - 5710 MHz

Band4: 5735- 5835 MHz

Operational Mode: 11AX

Bandwidth: 20/40/80/160MHz

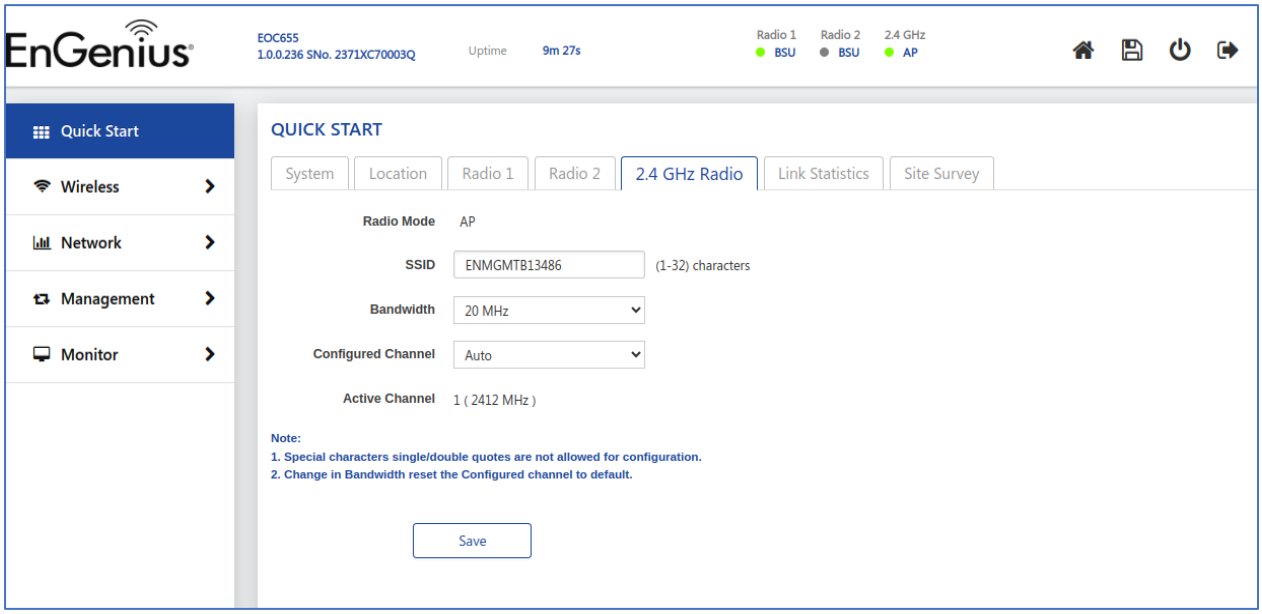
Given the above options, the admin has the flexibility to select the bandwidth. In general, 2.4GHz radio can have a bandwidth of 20 MHz i.e., for short distances. 5GHz radio can have 40 MHz/ 80MHz bandwidth. Advantages of a 5 GHz with 40 MHz/ 80MHz and 160MHz bandwidth are; it is tuned for faster speed; more data can be transferred and less signal interference.

Channel: A channel refers either to a physical transmission medium such as a wire, or to a logical connection over a multiplexed medium such as a wireless radio channel through which a message is sent to its intended receiver. Several Wi-Fi Channels and their numbers were pre-defined to achieve the best performance.

- The default channel is 36 (5180 MHz) when BSU is selected as 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 and SU.

2.4 GHz Radio

To configure the 2.4 GHz Radio, ***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.

Country: US

Operational Mode: 11NG

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

Channel: Auto

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

Site Survey

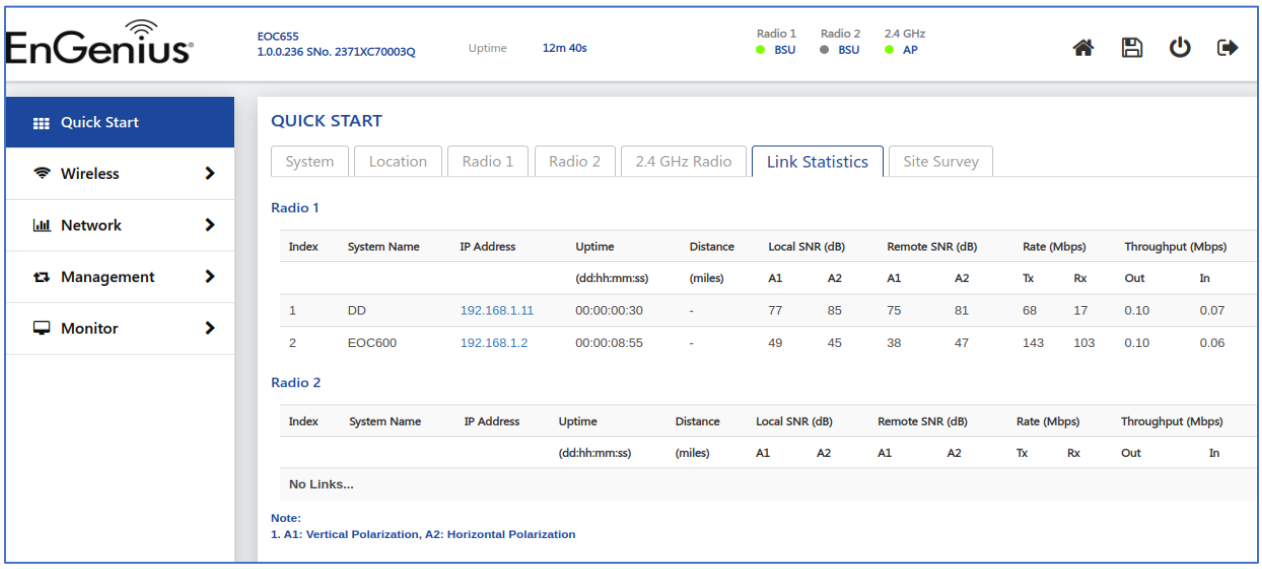
To configure the Site Survey, ***Click Quick Start> Site Survey***

- A Site Survey tab is created for Radio 1 and Radio 2 where it can scan and join the AP with the same SSID.
- Once the Access Point parameters are configured, the subscriber unit will scan and get parameters updated from the AP. This way SU's basic configuration will be updated and further needs 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 the home button in the AP/SU and see the Remote partners value. If greater than or equal to 1, successfully linked.

Link Statistics

To configure Link Statistics, ***Click Quick Start> Link Statistics***



Note*: This is only for Radio 1 and Radio 2*

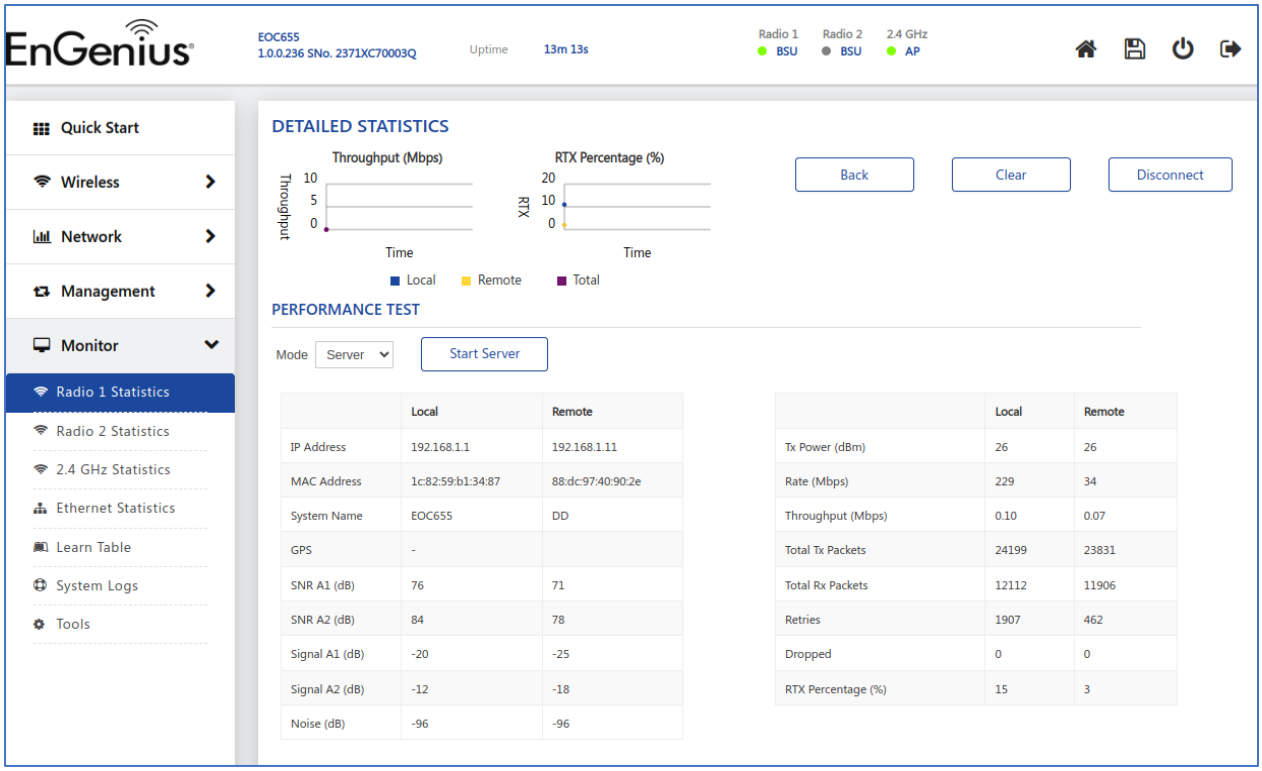
Wireless PTP and PTMP link parameters are summarized in this tab. Click on any entry redirects to another window with detailed statistics where you can find a disconnect option and to conduct a link test.

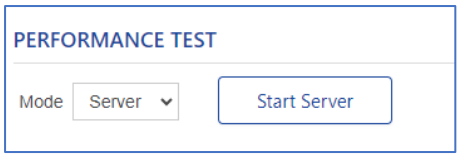
Performance Test

Performance test in Radios

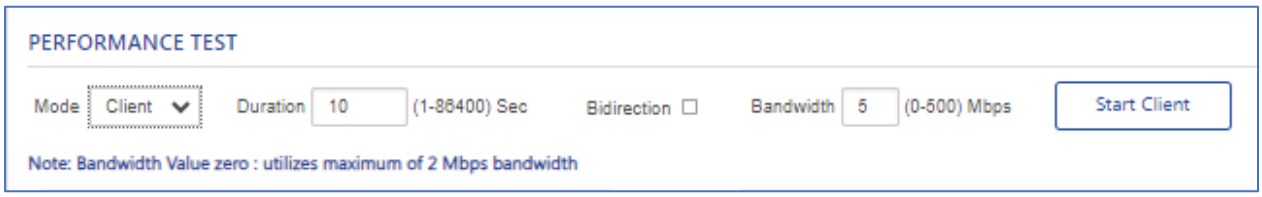
*Navigate to **Quick Start> Link Statistics> Click on Any Link***

*Need to keep the mode as **Server** on one side and **Client** on other side.*





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



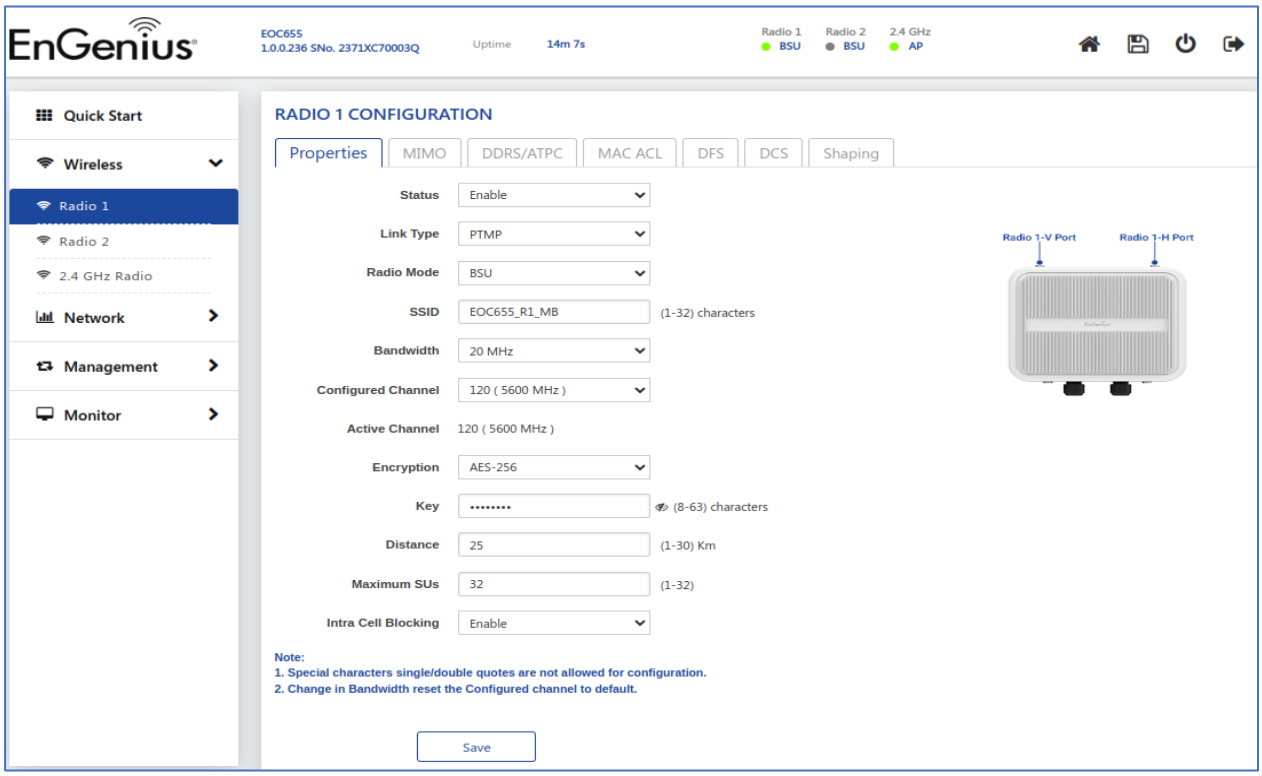
Wireless

EOC655 Series devices are Dual-Band radio's that support 5GHz and 2.4GHz operating frequencies.

Radio 1/Radio 2 Configuration

To configure Radio 1 or Radio 2 Configuration,

Click Wireless > Radio 1/Radio 2 Configuration> Properties



Properties

Status – Enable/Disable the Radio.

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/ PTMP

Radio Mode: BSU / SU

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

Service Set Identifier (SSID)

SSID is simply the technical term for a network name.

Country: US 5 GHz

Band1: 5170 - 5250 MHz

Band2: 5250- 5330 MHz

Band3: 5490 - 5710 MHz

Band4: 5735- 5835 MHz

Operational Mode: 11AX

Bandwidth: 20/40/80/160MHz

Given the above options, the admin has the flexibility to select the bandwidth. In general, 2.4 GHz 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 and 160MHz 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

A channel refers either to a physical transmission medium such as a wire, or to a logical connection over a multiplexed medium such as a wireless radio channel through which a message is sent to its intended receiver. Several Wi-Fi Channels and their numbers are predefined to achieve the best performance.

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.

Security

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

Encryption Type: Select AES-256

Key: Select any desired key considering the note below.

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

Max SUs

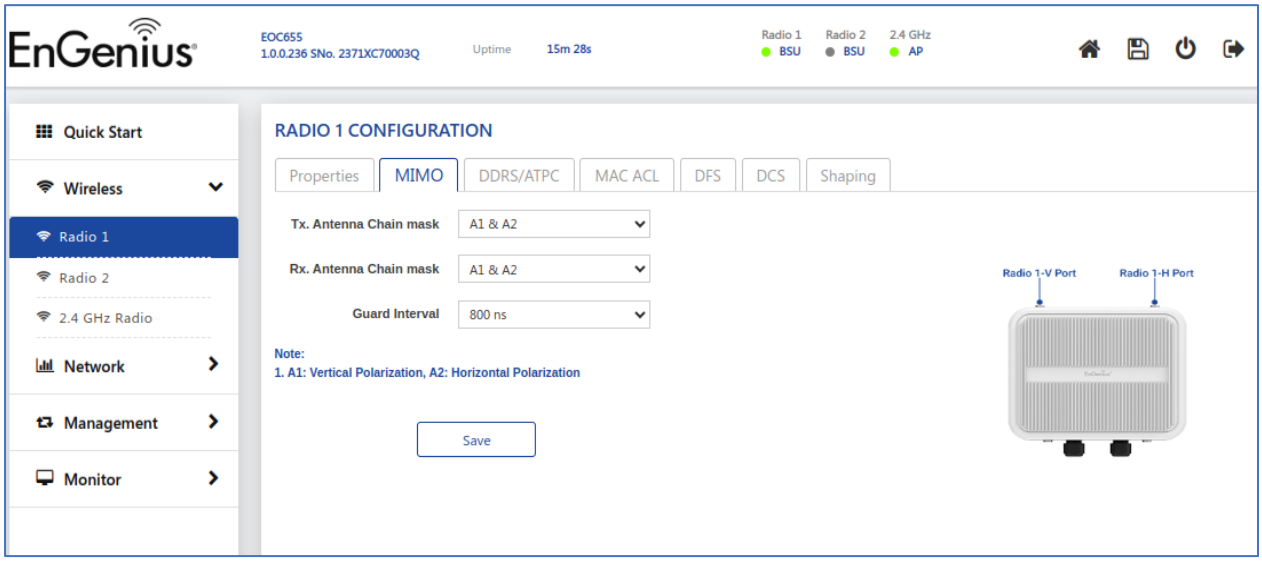
This parameter is configurable only in AP and allows value from 1-32.

Retries

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

MIMO

*To configure MIMO, **Click Wireless> Radio 1 or Radio 2 Configuration > MIMO***



EOC655 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.

DDRS

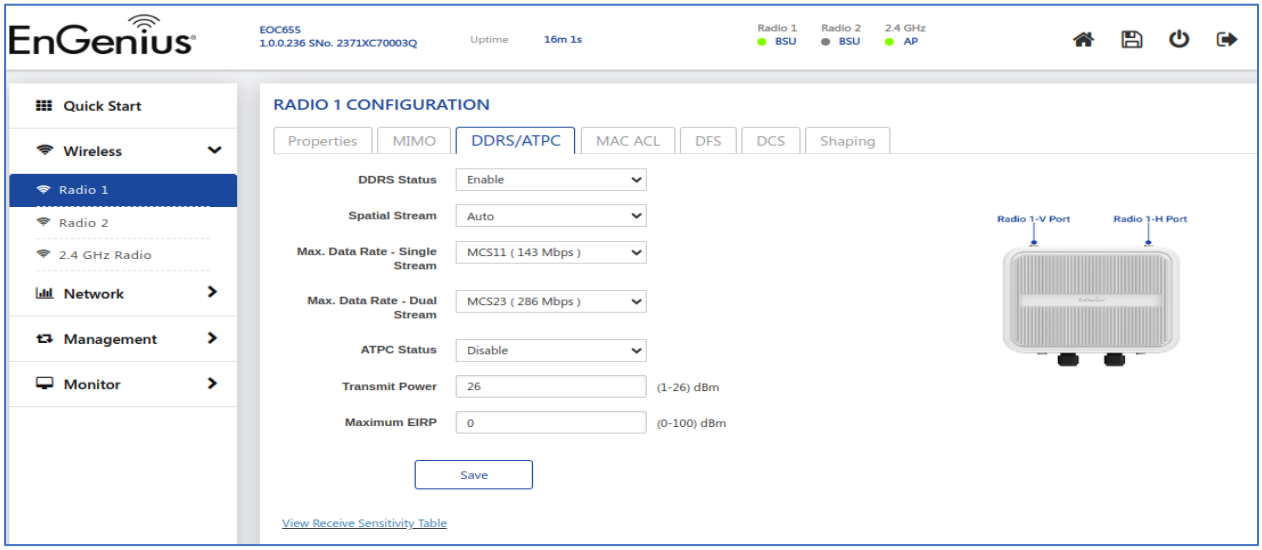
*To configure DDRS/ATPC, **Click Wireless> Radio 1 or Radio 2 Configuration > DDRS/ATPC***

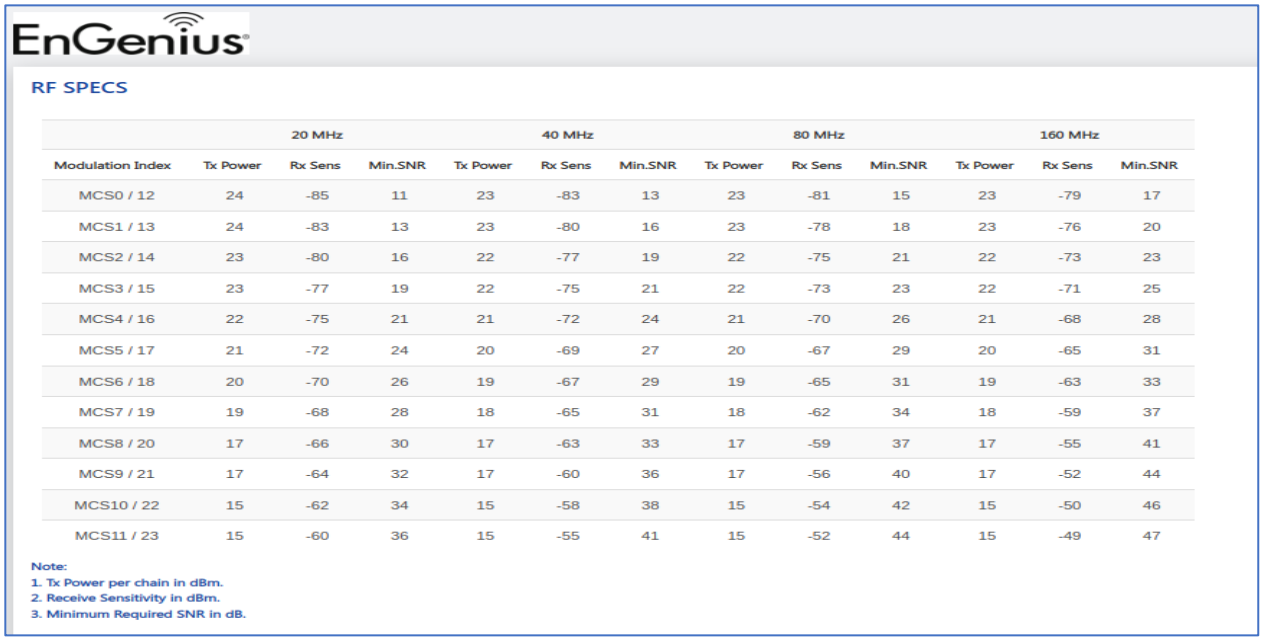
Dynamic Data Rate Selection (DDRS) feature adjusts the transmission data rate to an optimal value and provides the best possible throughput according to the current communication conditions and link quality.

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

Dual Stream: Select Dual for higher throughput.

Single Stream: Select Single for reliability and longer range.





	20 MHz			40 MHz			80 MHz			160 MHz		
Modulation Index	Tx Power	Rx Sens	Min.SNR	Tx Power	Rx Sens	Min.SNR	Tx Power	Rx Sens	Min.SNR	Tx Power	Rx Sens	Min.SNR
MCS0 / 12	24	-85	11	23	-83	13	23	-81	15	23	-79	17
MCS1 / 13	24	-83	13	23	-80	16	23	-78	18	23	-76	20
MCS2 / 14	23	-80	16	22	-77	19	22	-75	21	22	-73	23
MCS3 / 15	23	-77	19	22	-75	21	22	-73	23	22	-71	25
MCS4 / 16	22	-75	21	21	-72	24	21	-70	26	21	-68	28
MCS5 / 17	21	-72	24	20	-69	27	20	-67	29	20	-65	31
MCS6 / 18	20	-70	26	19	-67	29	19	-65	31	19	-63	33
MCS7 / 19	19	-68	28	18	-65	31	18	-62	34	18	-59	37
MCS8 / 20	17	-66	30	17	-63	33	17	-59	37	17	-55	41
MCS9 / 21	17	-64	32	17	-60	36	17	-56	40	17	-52	44
MCS10 / 22	15	-62	34	15	-58	38	15	-54	42	15	-50	46
MCS11 / 23	15	-60	36	15	-55	41	15	-52	44	15	-49	47

Note:
1. Tx Power per chain in dBm.
2. Receive Sensitivity in dBm.
3. Minimum Required SNR in dB.

Auto Stream: When you select Auto, DDRS decides the stream modes based on the environmental conditions.

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

ATPC

To configure ATPC, ***Click Wireless> Radio 1 or Radio 2 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

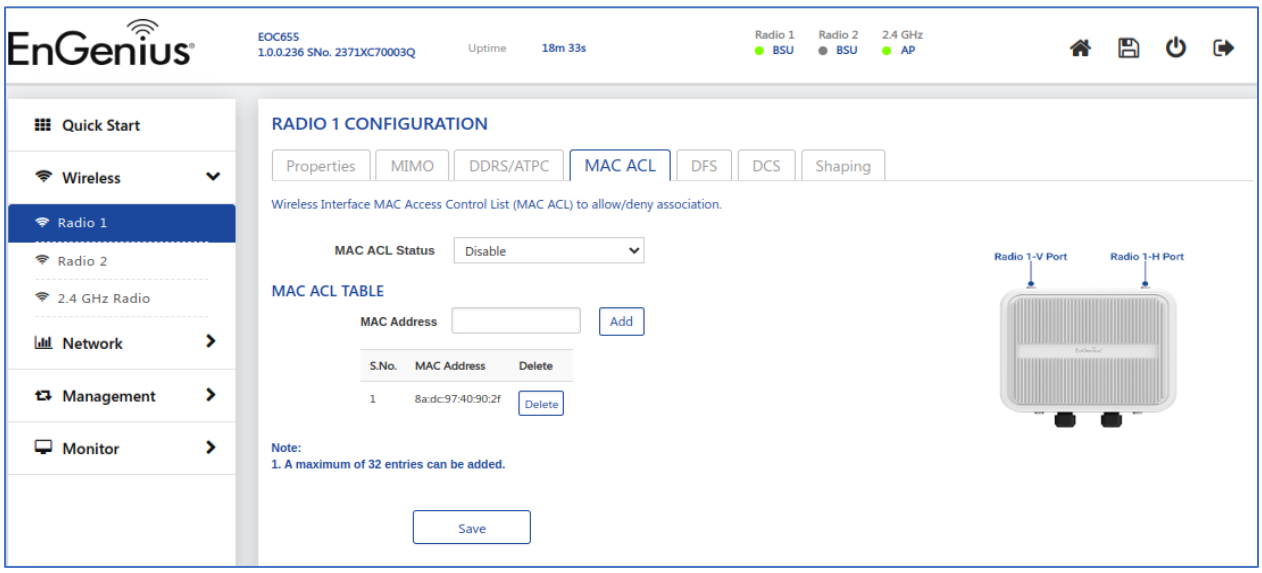
MAC-ACL

MAC Access Control List is an additional security mechanism in a wireless network.
To configure MAC ACL in AP (5GHz), ***Click Wireless> Radio 1 or Radio 2 Configuration > MAC ACL***

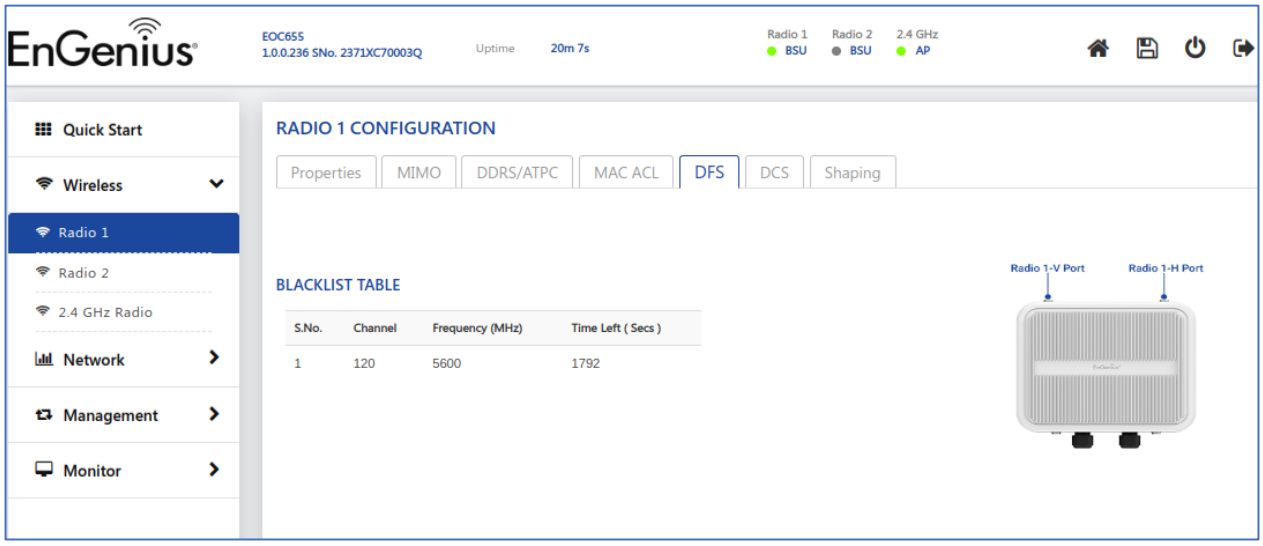
This section has MAC status: **Allow/ Deny/Disable** and a MAC ACL table: MAC Address

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

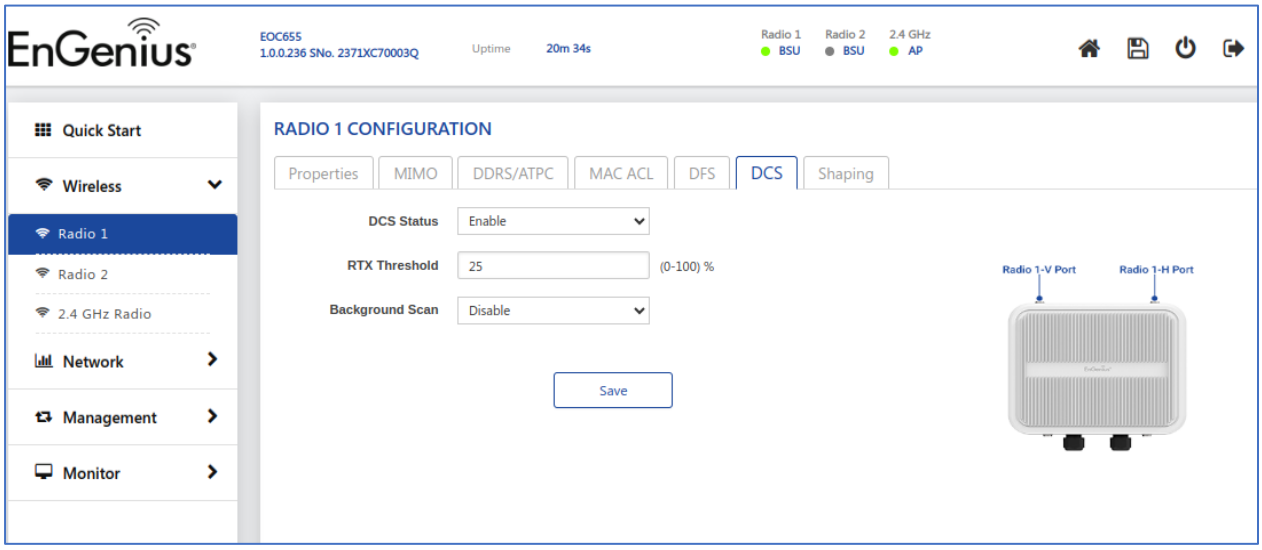


DFS(Dynamic Frequency Selection)



DCS (Dynamic Channel Selection)

To enable DCS, ***Click Wireless> 5 GHz Radio Configuration> 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 Local RTx percentage of associated SU crosses user configured DCS threshold value, before switching to new channel, AP evaluates local RTx percentage for 30 sec and triggers Spectrum Analyzer to scan the medium.

The Spectrum Analyzer scans for less interference channel and associates with 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.*
- *The default chosen DCS threshold is 20%, when this percentage limit exceeds, the AP activates spectrum analyzer.*
- *Respective logs will be generated under Monitor> Link Statistics > Logs> Wireless section for example: <time stamp>: DCS triggered* ***(when SU request AP)*** *<Time stamp>: DCS selected best channel* ***(When AP assigns new channel to SU)***

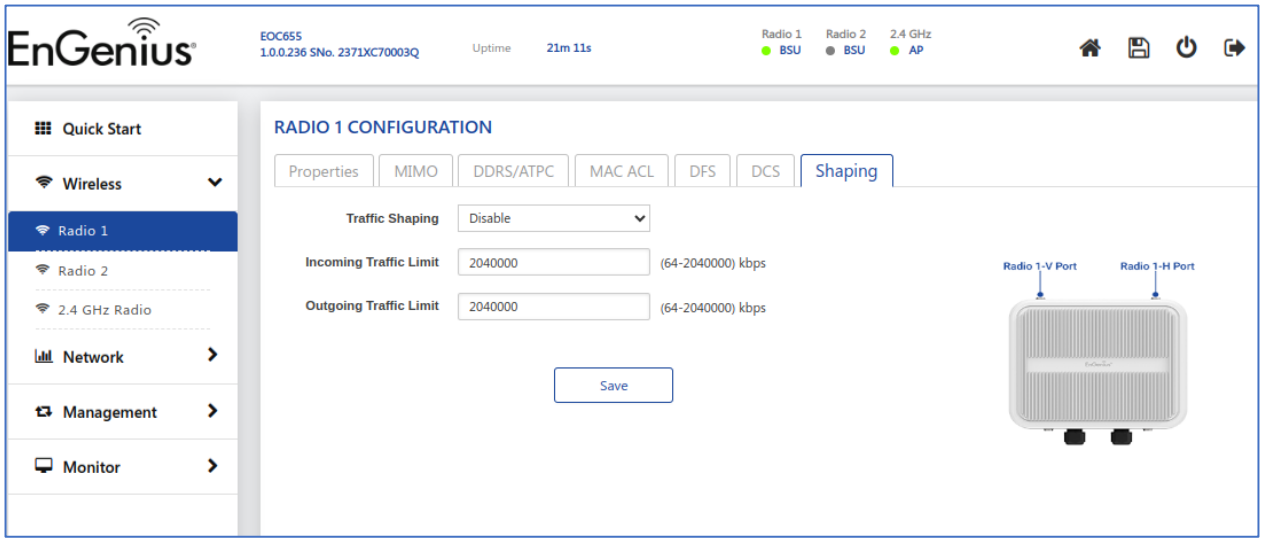
Shaping

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

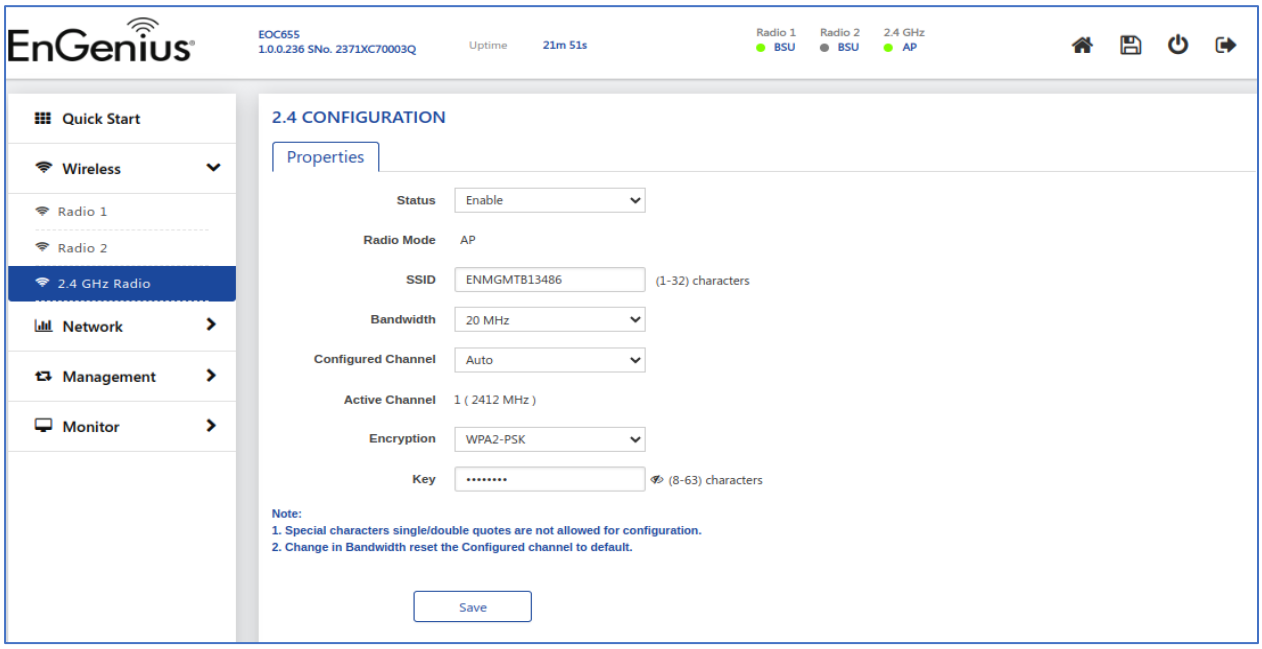
The administrator can set this limit only when traffic shaping in enabled, and the limit range is (64-867000) Kbps that is from AP to SU.



2.4GHz Radio Configurations

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.

Country: US 2.4GHz

Operational Mode: 11NG

Bandwidth: 20MHz

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

Channel: Auto

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

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

Encryption Type: Select WPA2-PSK

Key: Select any desired key considering the note below.

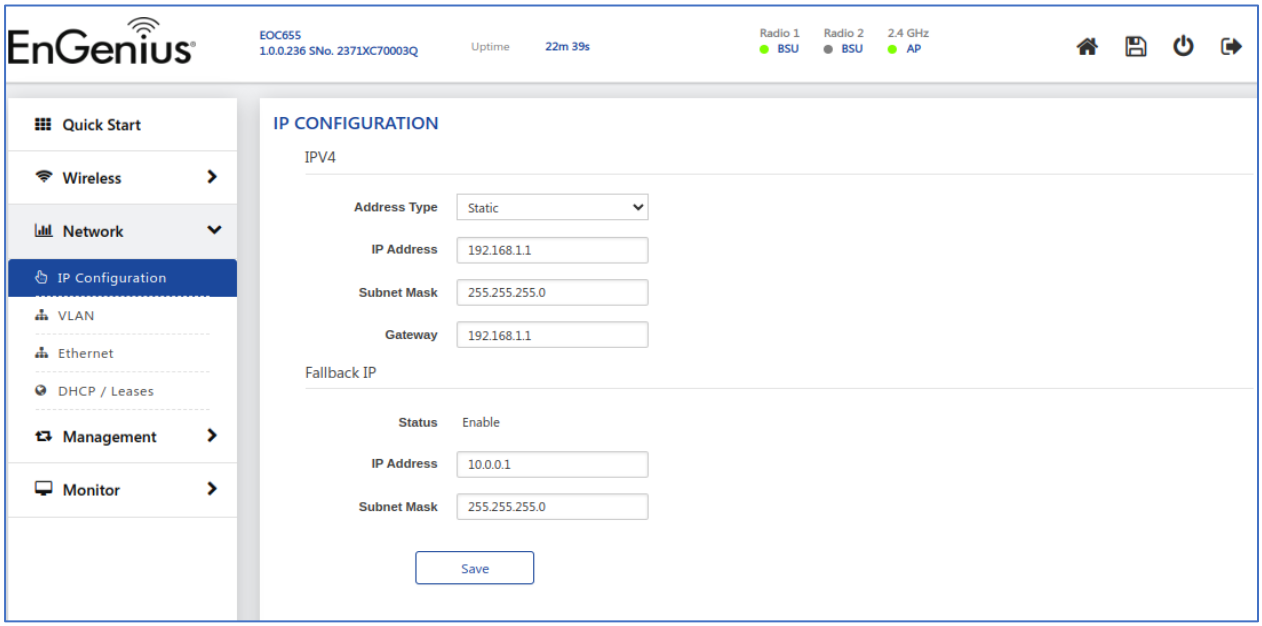
None: *If the encryption type is selected as none, then there doesn't exist any security to the data frames transmitted over the wireless medium*

Mobile App: Mobile App is used to configure the radio.

Network

IP Configuration in AP/SU

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



Address Type *Static*

A static IP address is simply an address that does not change until the device is decommissioned or your network architecture changes

Address Type *Dynamic*

Dynamic addresses are assigned, as needed, by Dynamic Host Configuration Protocol (DHCP) servers and are subjected to change periodically.

IP Address

An IP address (internet protocol address) is a numerical representation that uniquely identifies a specific interface on the network.

Subnet Mask

The subnet mask number helps to define the relationship between the host (computers, routers, switches, etc.) and the rest of the network.

Gateway IP

A gateway IP refers to a device on a network which sends local network traffic to other networks.

Fallback IP

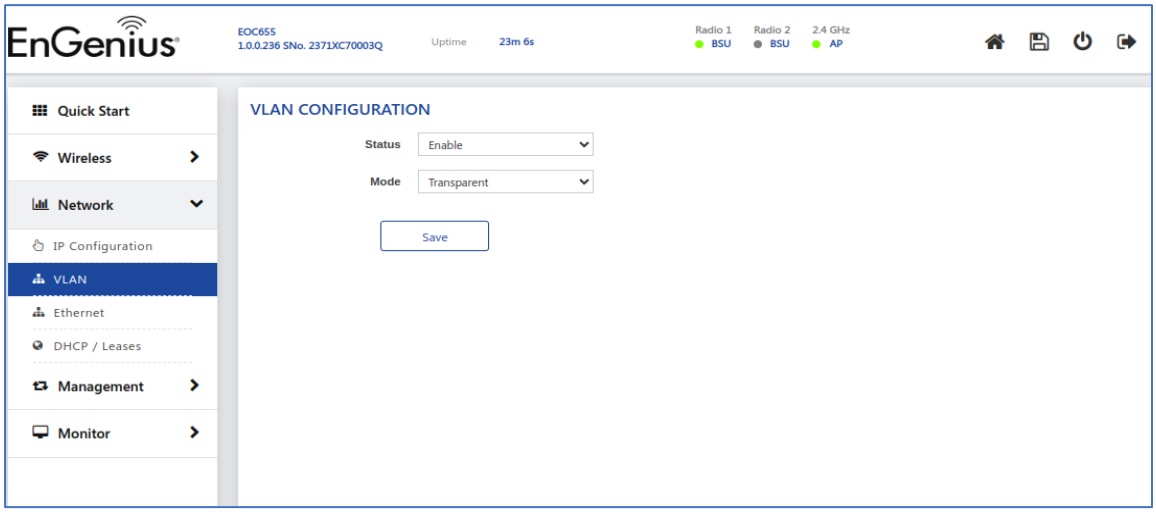
The Administrative Web Interface is available via the fallback IP address when there is no DHCP server. A Static IP address can be configured when in fallback mode.

In Fallback IP Select the Status **Enable/Disable**, and enter the **IP Address**, **Subnet Mask**, **Gateway**

Enable: The administrative can access radio web interface via the fallback IP address in any case.

VLAN

To configure VLAN, **Click Network>VLAN> VLAN Configuration**



VLAN Status Enable/Disable

To enable or disable the VLAN functionality.

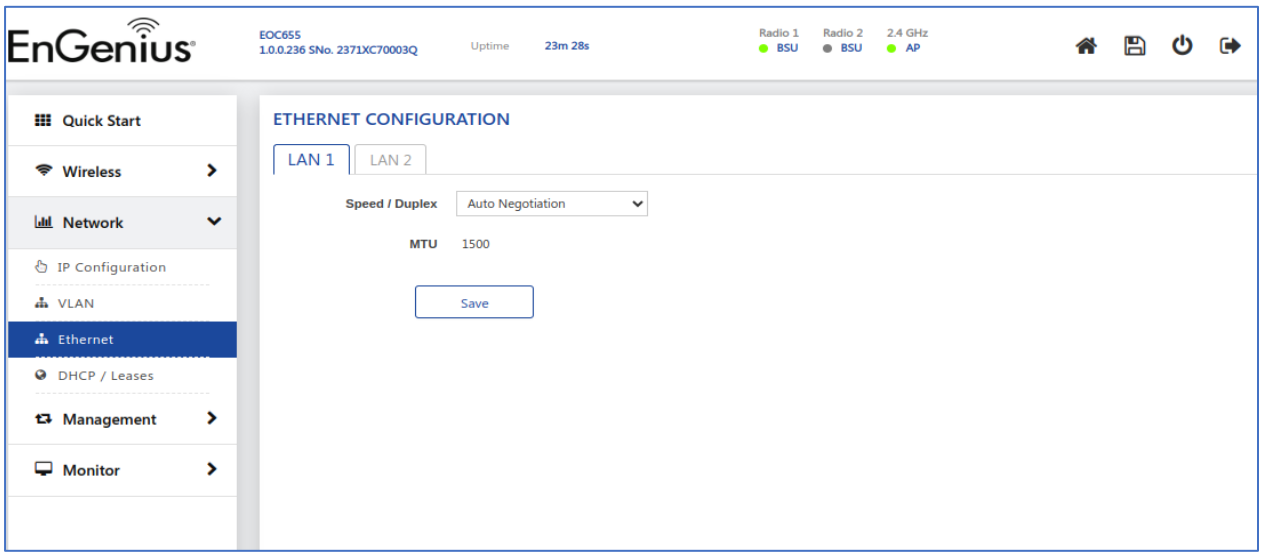
VLAN Mode Transparent

Virtual LAN is a custom network created from one or more existing LANs. It enables groups of devices from multiple networks (both wired and wireless) to be combined into a single logical network. Transparent mode allows to pass tag traffic.

Ethernet

*To configure Ethernet, **Click Networks> Ethernet > Ethernet Configuration***

Ethernet Configuration can be done for both LAN1 and LAN2



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.

- **Specific Ethernet Negotiation Speed**
  Allows two-way transmission simultaneously.
  LAN 1: Supports 100 Mbps- Full or 1000 Mbps–Full Ethernet transmission mode.

  LAN 2: Supports 100 Mbps- Full, 1000 Mbps-Full or 2500 Mbps –Full Ethernet transmission mode.

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.

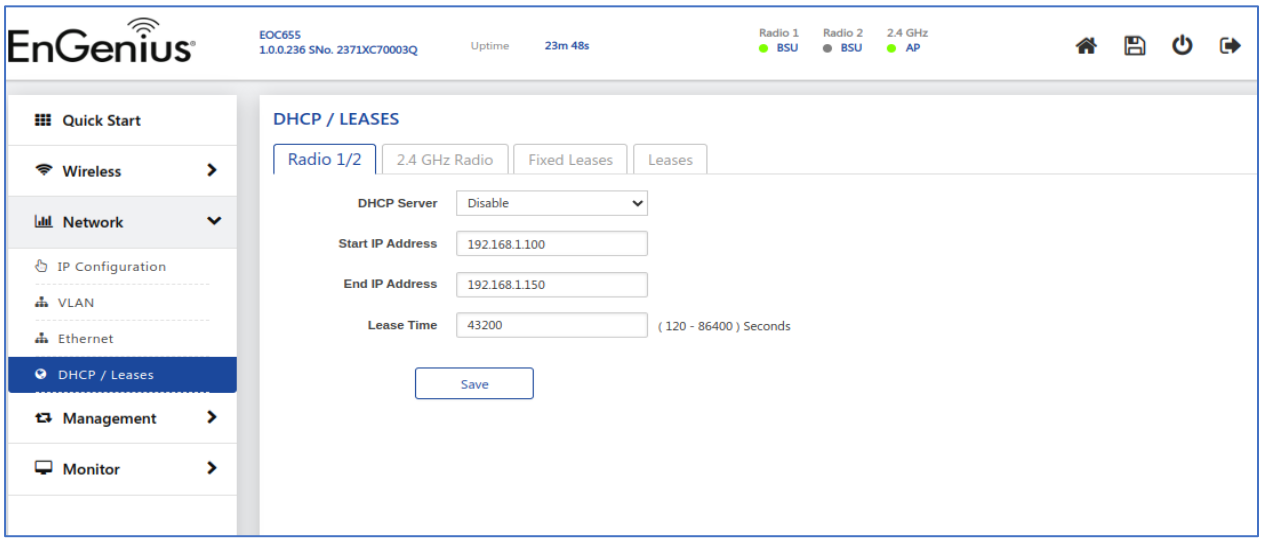
DHCP Server

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 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.

Radio 1/2

*To configure the parameters, **Click Network > DHCP / Leases > Radio 1/2***



DHCP Server Enable/Disable

DHCP Server is a network server that automatically provides and assigns IP addresses, default gateways and other network parameters to client devices.

Start IP Address/End IP Address

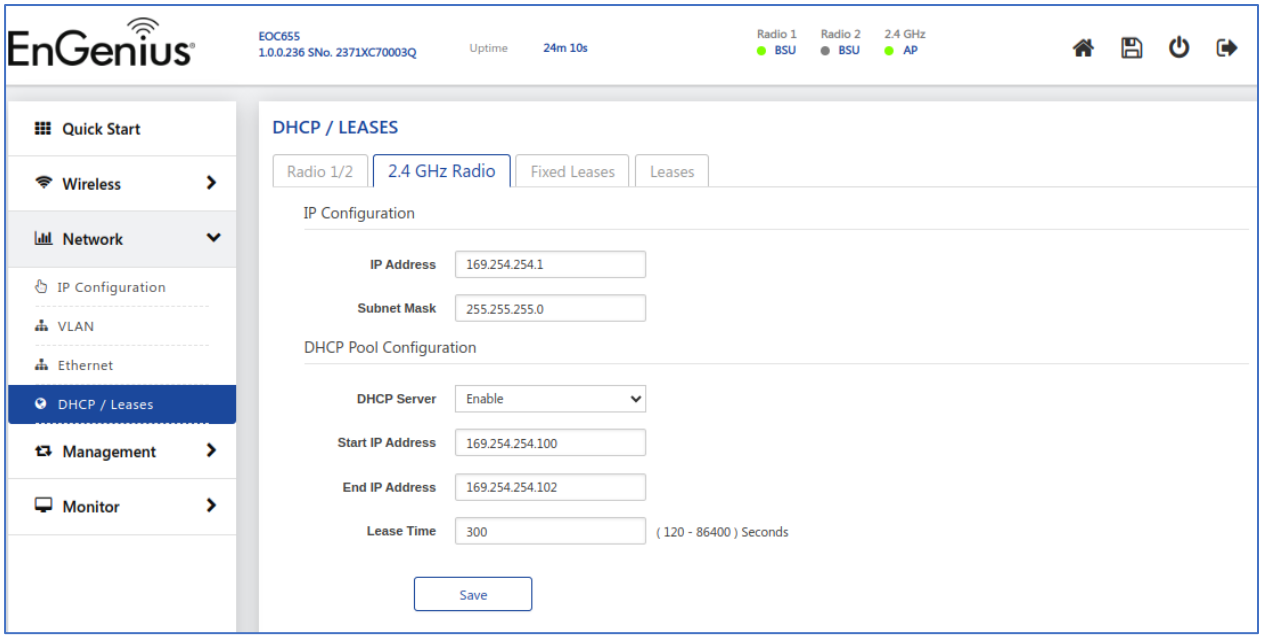
Range of IP address to be used by DHCP server to assign.

Lease Time

DHCP Lease Time is the amount of time in minutes or seconds a network device can use an IP Address in a network.

2.4 GHz Radio

*To configure the 2.4GHz parameters, **Click Network > DHCP Server> 2.4 GHz Radio***



IP Address

An IP address (internet protocol address) is a numerical representation that uniquely identifies a specific interface on the network.

Subnet Mask

The subnet mask number helps to define the relationship between the host (computers, routers, switches, etc.) and the rest of the network.

DHCP Server

A DHCP server is configured with a pool of available IP addresses and assigns one of them to the DHCP client.

Start and End IP Address

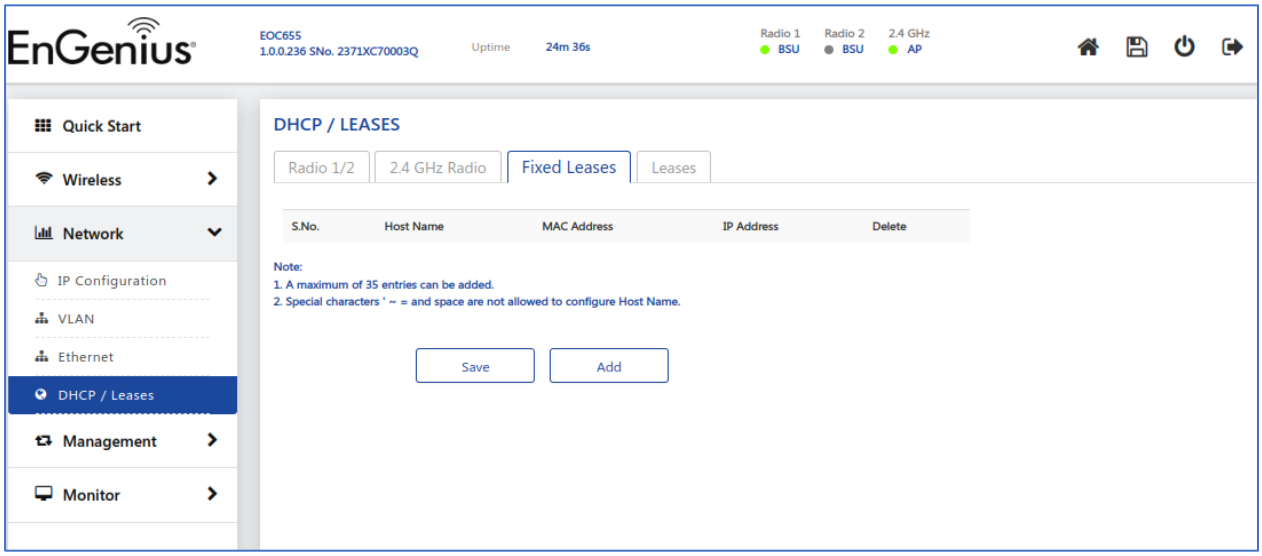
Range of IP address to be used by DHCP server to assign.

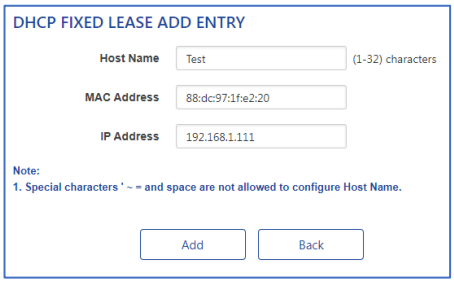
Lease Time

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

DHCP Fixed Leases

To configure the DHCP Fixed Leases parameters, ***Click Network > DHCP Server> DHCP Fixed Leases***

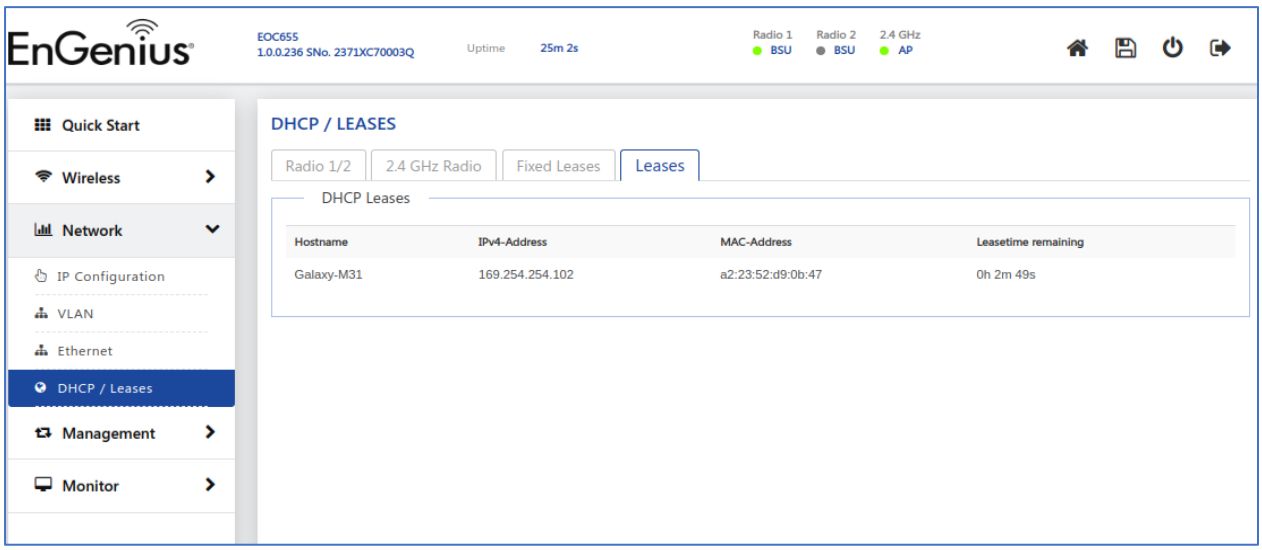




By clicking the ADD user redirected to new window to add the entry of hostname Mac Address, IP Address. Here the MAC address and IP address are banded and listed down.

Leases

To configure the Leases parameters, ***Click Network > DHCP Server> Leases***



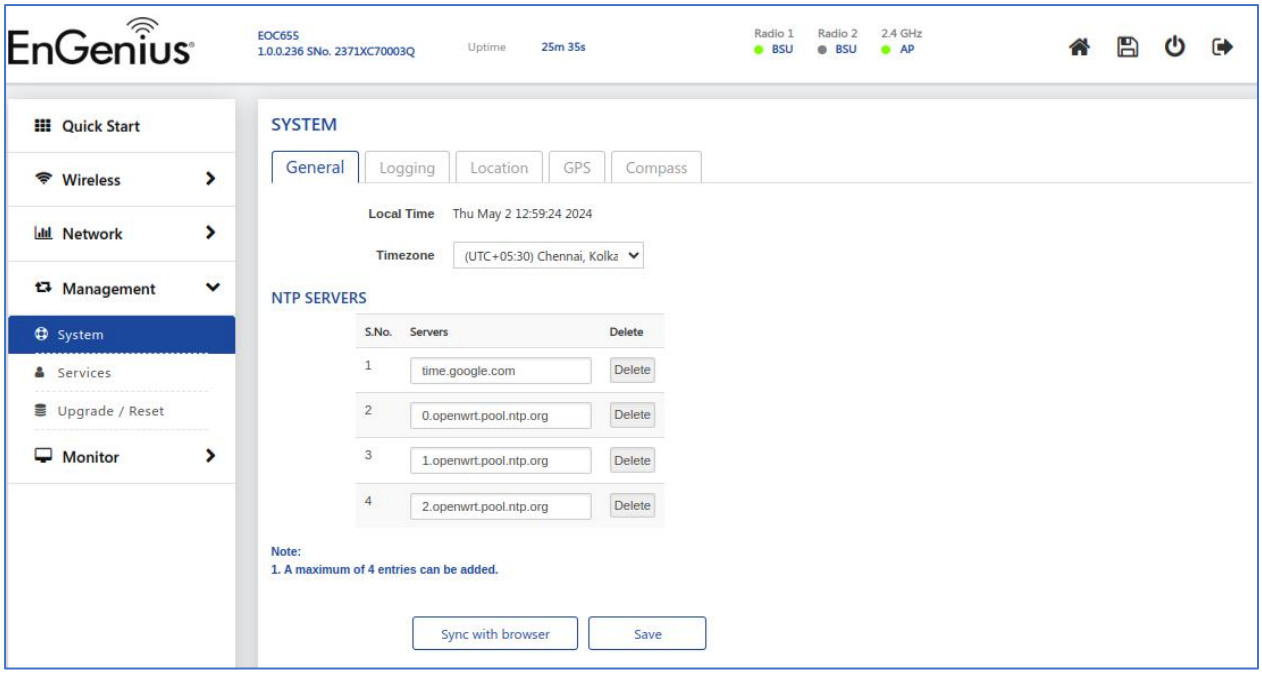
DHCP Leases

DHCP Leases displays the list of IP addresses assigned by a DHCP server.

Management

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

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



General

Local Time

Display the current time of the radio.

NTP

This option allows the user to Enable or Disable NTP feature. If enabled, the user must configure the NTP server. The device will synchronize its local time with NTP server.

Enable NTP

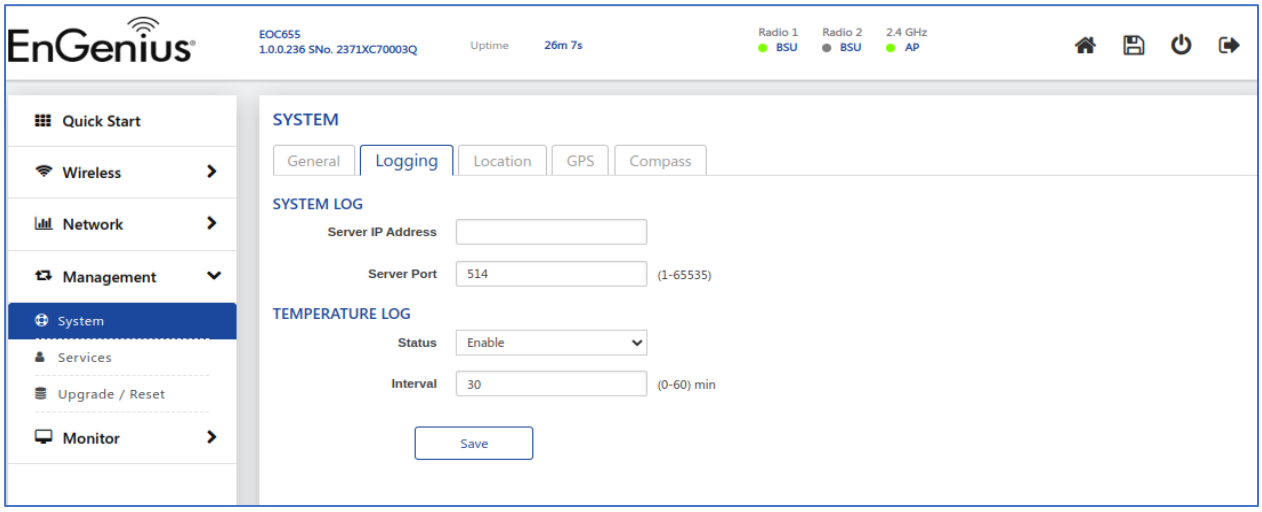
Enable NTP, will sync the radio time with the NTP server time.

NTP Server

A server to provide the reference time to radio for sync up.

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.

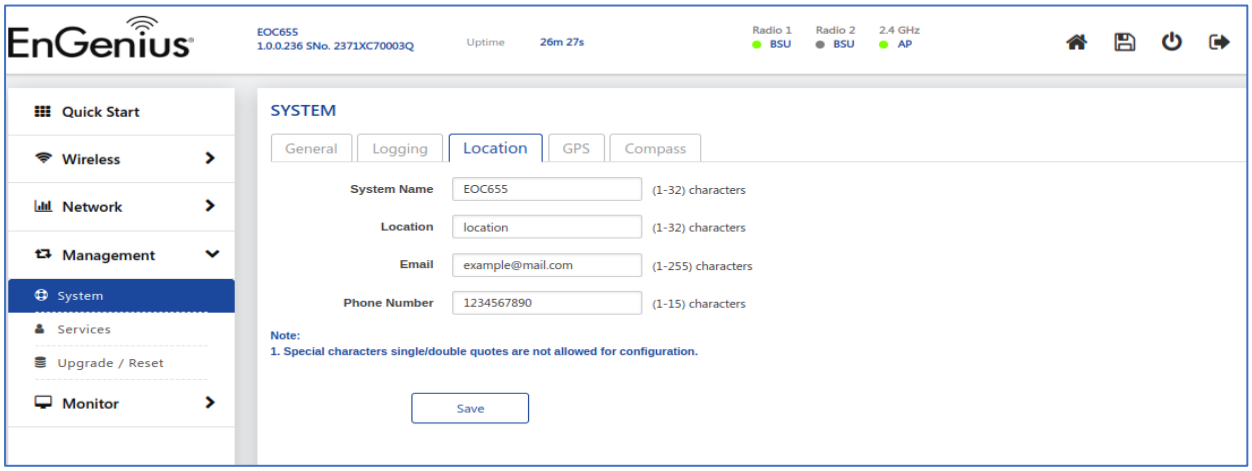
Temperature log

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, a new log is generated with temperature in °C.

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

Location

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



System Name

This will help in identifying the SU name.

Location

This will help in identifying the location of the SU.

Email

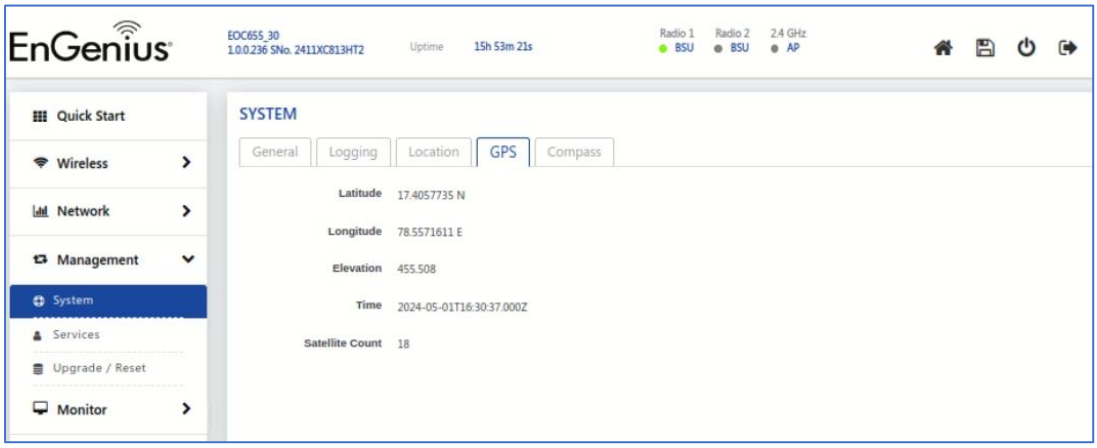
This will help in identifying and contacting the customer through email.

Phone Number

This will help in identifying and contacting the customer through phone.

GPS

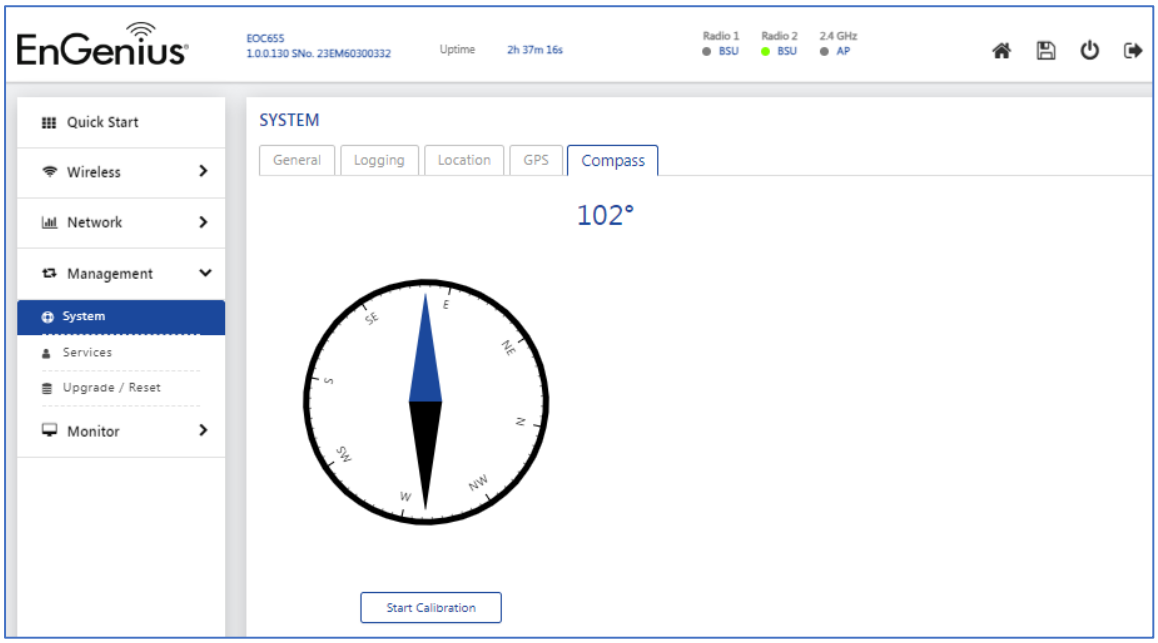
To see GPS Data, ***Click Management > System > System Configuration> GPS.*** This section shows details like Latitude, Longitude, Elevation, Time and Satellite Count.



Compass

To see Compass Data, ***Click Management > System > System Configuration> Compass***

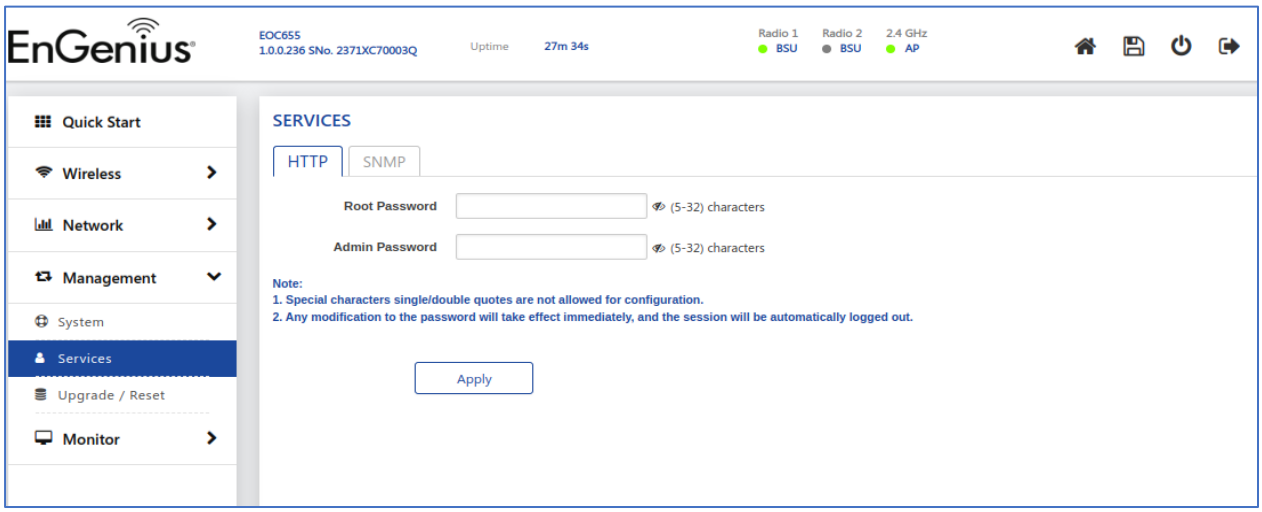
It shows the compass readings to help in alignment of the device w.r.t to the poles.



Services

The device can be managed using different management protocols. The supported protocols are HTTP, SSH, SNMP.

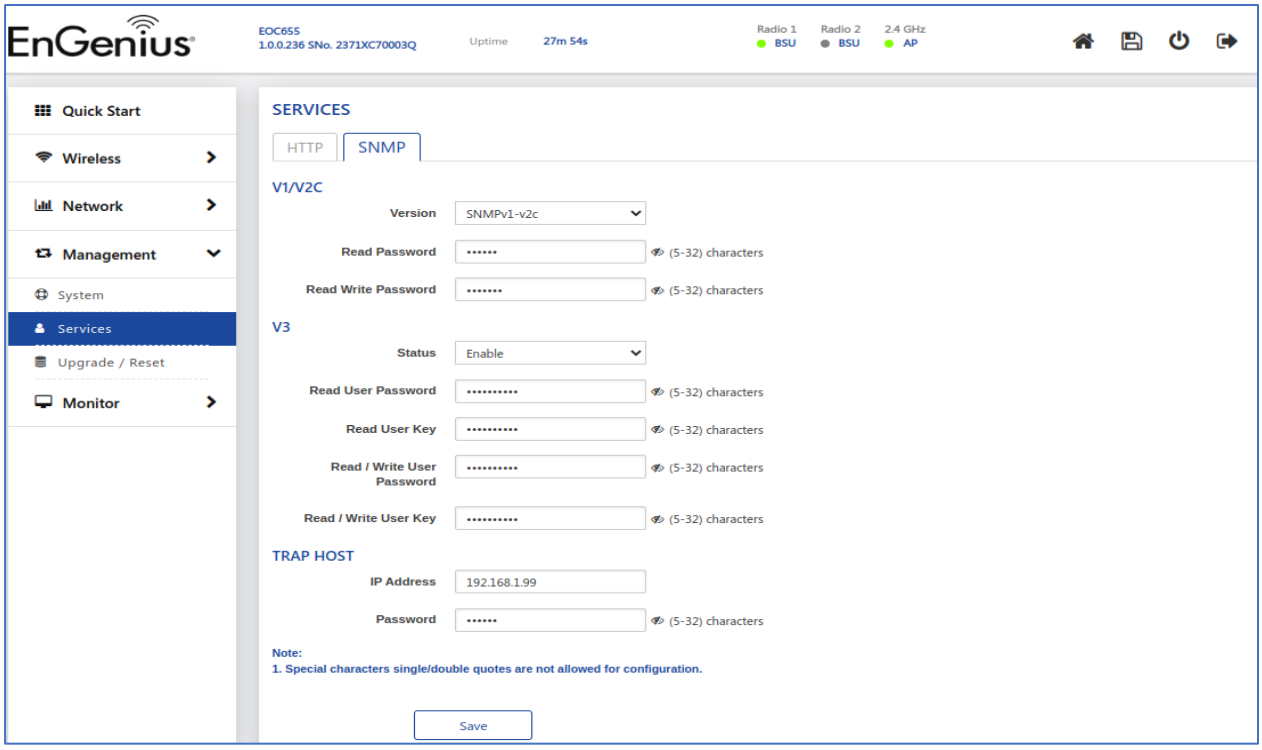
HTTP



To configure the HTTP, ***Click Management > Services*** >>**HTTP**

Passwords setting, or modification can be done in this section.

SNMP



To configure the SNMP, ***Click Management > Services*** >>**SNMP**

Enable SNMP

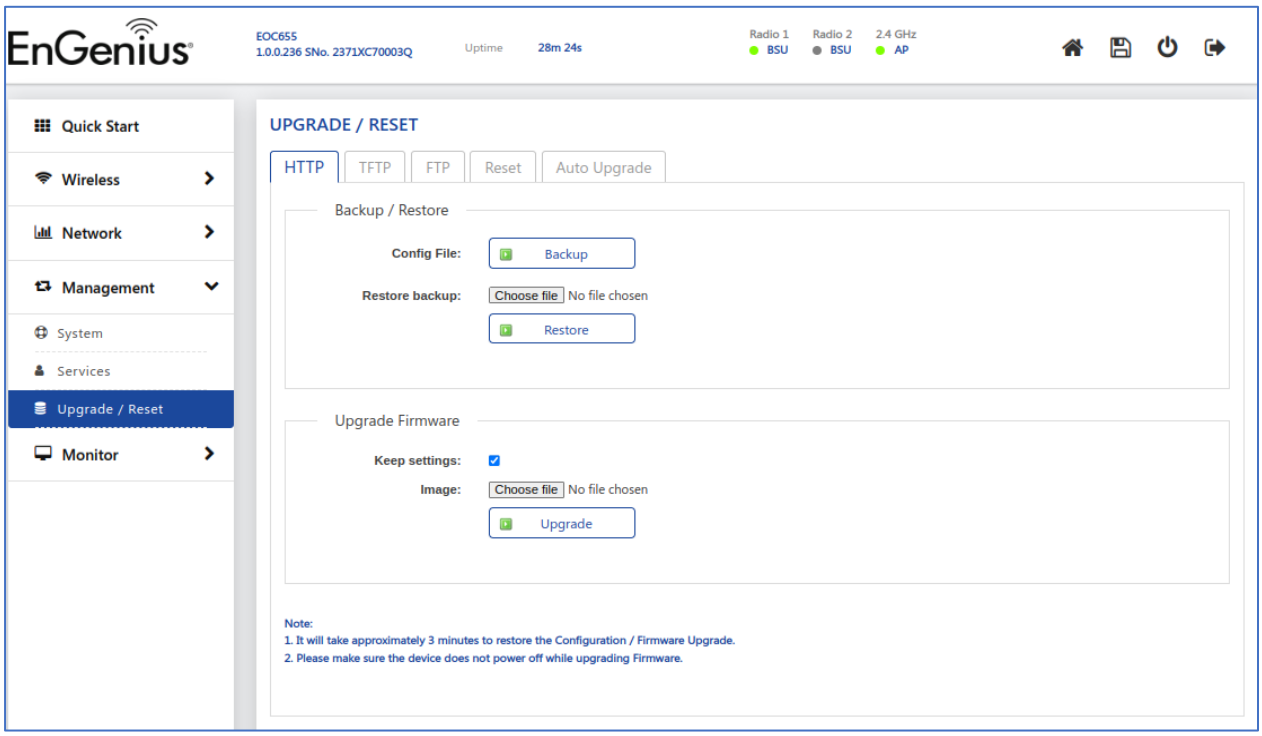
- ***SNMP version:*** SNMP v1, SNMPv1-v2, SNMP v3
- ***SNMP Read /Read-Write Password:*** Here Read and Read Write password are available to read the configuration from the SNMP.
- ***SNMP Trap Host IP Address:*** Here the IP address of a Trap Server is specified.
- ***SNMP Trap Host Password:*** The password is set to secure the Trap sent.

Upgrade/Reset

HTTP

Backup & Restore

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



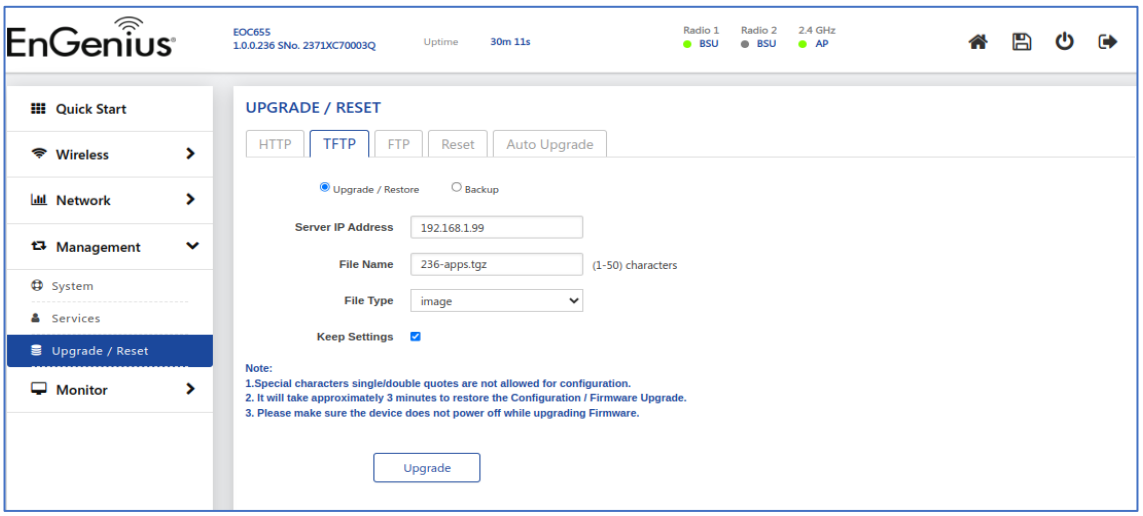
- This back-up option allows the user to download the device configuration locally.
- The restore option allows the user to restore the device configuration to the uploaded configuration file.
- Restoring the config file to the device will take 30 sec approx.
- After uploading the configuration file,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

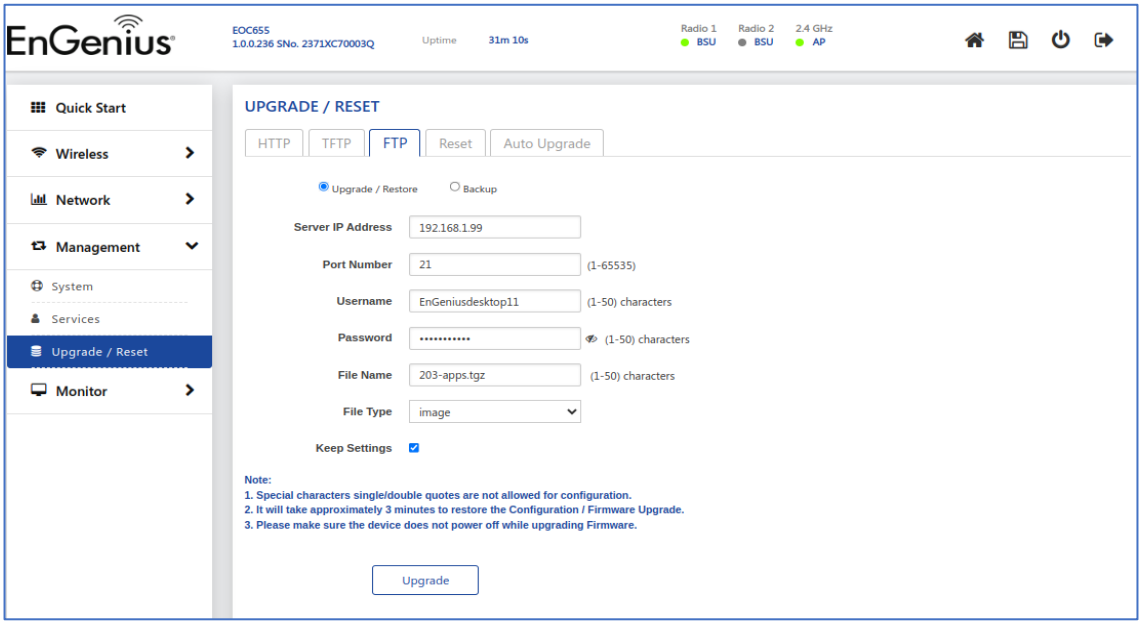
Upgrade Firmware

*To configure Upgrade Firmware, **Click Management > Upgrade/ Reset > HTTP > Upgrade Firmware***

The firmware upgrade process happens in four phases:

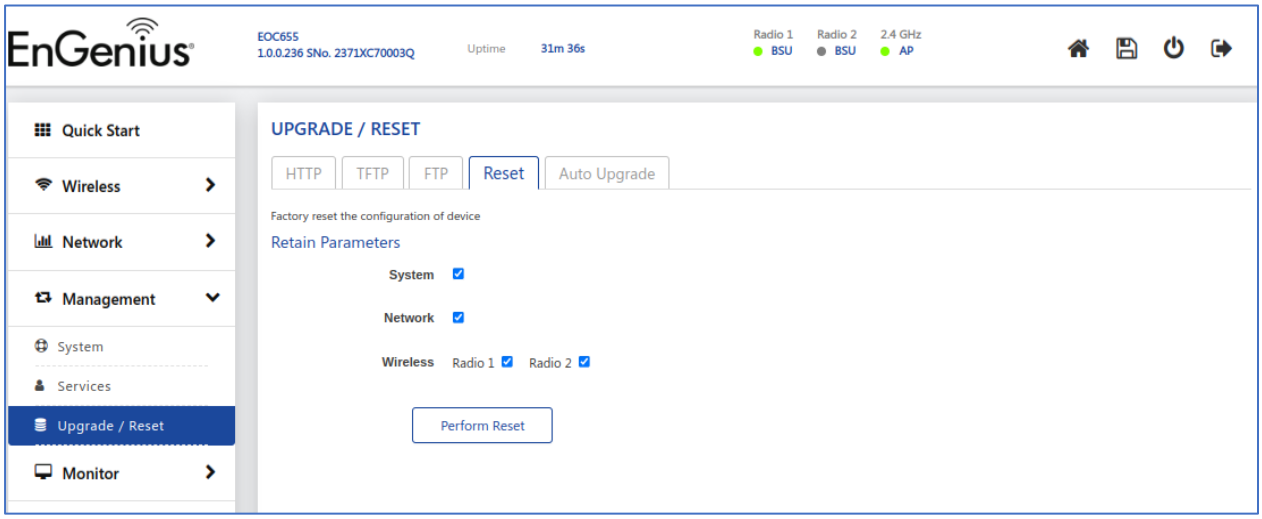
- Upload: Select firmware to be uploaded
- Verification: Verify the firmware to validate the checksum
- Upgrade: Write the new firmware into flash memory
- Reboot: Once the flash write process is completed, then automatically reboot the device.
- The whole firmware upgrade process takes around 6.30 minutes to complete.
- When the 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 device.


EnGenius
EOC655
1.0.0.236 SNo. 2371XC70003Q
Uptime
30m 11s
Radio 1
BSU
Radio 2
BSU
2.4 GHz
AP
Quick Start
Wireless
Network
Management
System
Services
Upgrade / Reset
Monitor
UPGRADE / RESET
HTTP
TFTP
FTP
Reset
Auto Upgrade
Upgrade / Restore
Backup
Server IP Address
192.168.1.99
File Name
236-apps.tgz
(1-50) characters
File Type
image
Keep Settings
Note:
1.Special characters single/double quotes are not allowed for configuration.
2. It will take approximately 3 minutes to restore the Configuration / Firmware Upgrade.
3. Please make sure the device does not power off while upgrading Firmware.
Upgrade


EnGenius
EOC655
1.0.0.236 SNo. 2371XC70003Q
Uptime
31m 10s
Radio 1
BSU
Radio 2
BSU
2.4 GHz
AP
Quick Start
Wireless
Network
Management
System
Services
Upgrade / Reset
Monitor
UPGRADE / RESET
HTTP
TFTP
FTP
Reset
Auto Upgrade
Upgrade / Restore
Backup
Server IP Address
192.168.1.99
Port Number
21
(1-65535)
Username
EnGeniusdesktop11
(1-50) characters
Password
(1-50) characters
File Name
203-apps.tgz
(1-50) characters
File Type
image
Keep Settings
Note:
1. Special characters single/double quotes are not allowed for configuration.
2. It will take approximately 3 minutes to restore the Configuration / Firmware Upgrade.
3. Please make sure the device does not power off while upgrading Firmware.
Upgrade

Reset

To Reset, ***Click Management > Upgrade/ Reset> Reset***



This option allows the user to reset all device configuration to factory defaults.
After reset, the device must be accessed using the LAN interface locally and must be re-configured to allow the device to join into the network again.

Retain Parameters:

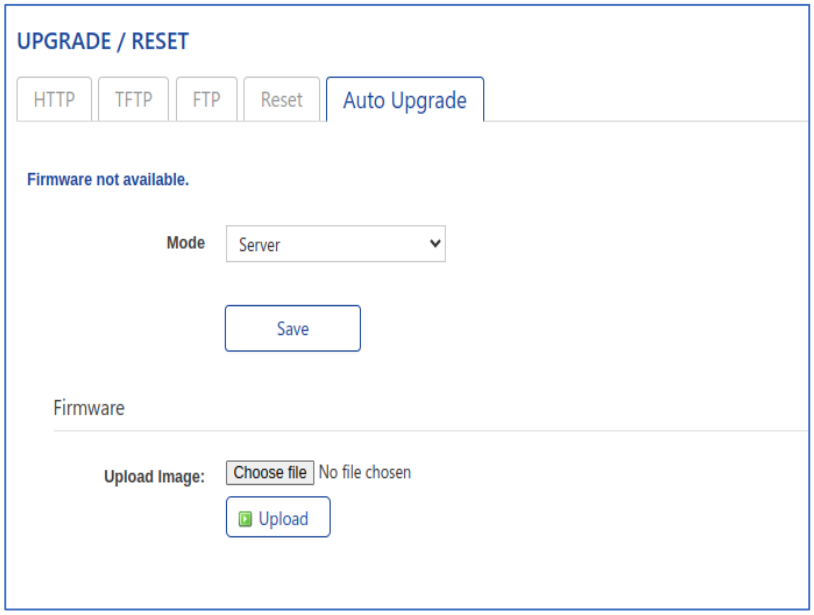
System – Retains the System Configuration (System Name, Location, Email, Phone Number).

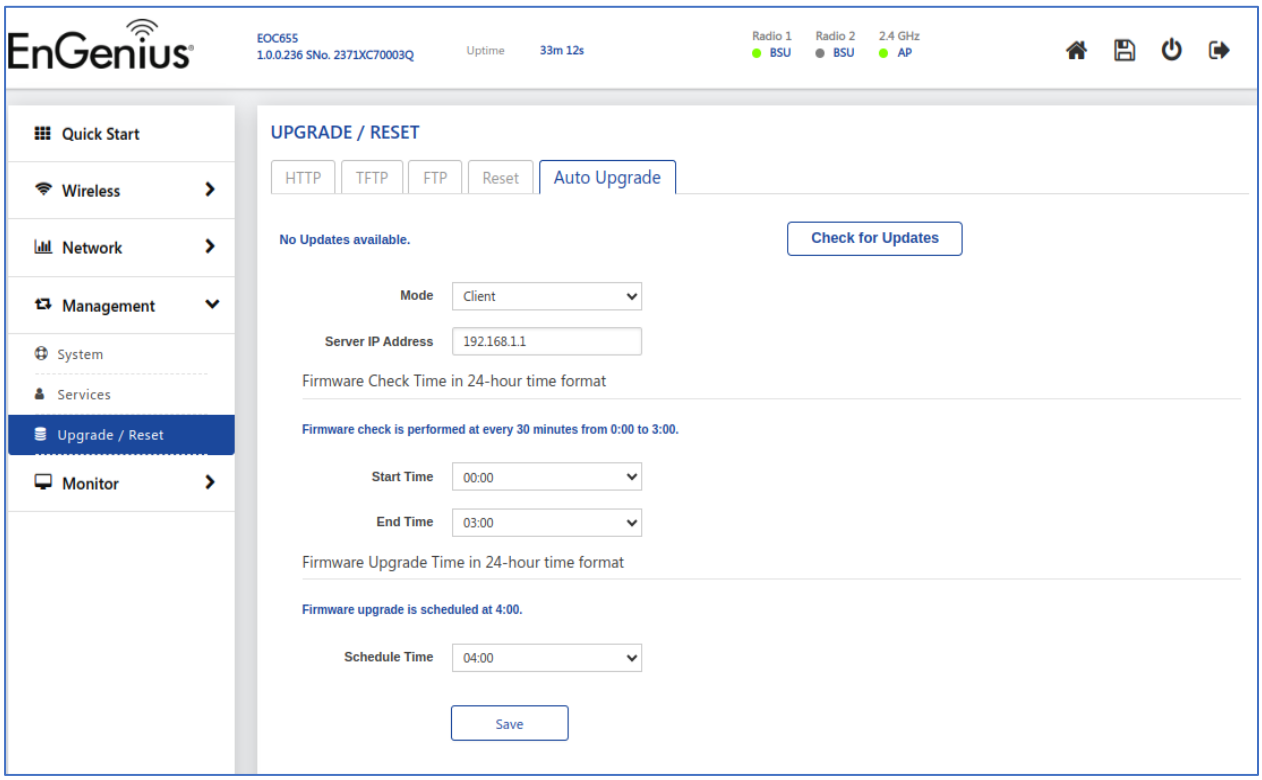
Network – Retains the IP Configuration (IP Address, Mask, Gateway).

Wireless – Retains the Wireless Configuration (all link parameters) for both Radio 1 and Radio 2.

Auto Upgrade

To Reset, ***Click Management > Upgrade/ Reset> Auto Upgrade***





Auto Upgrade functionality allows the user to upgrade new firmware automatically to all the available SU.

To use this, the admin needs to configure BSU in Server Mode and Upload the latest firmware package.

In SU side, configure the mode as Client and firmware check time (when the SU will check for new firmware) and Firmware Upgrade Time (At what time exactly the firmware upgrade will happen).

Monitor

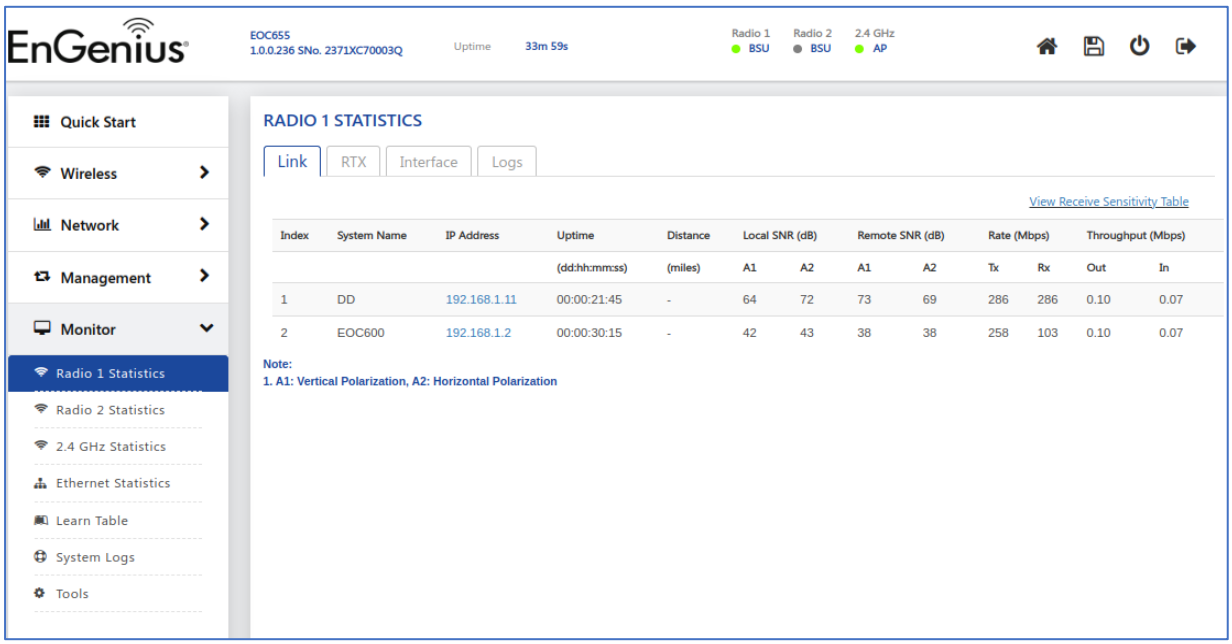
Radio 1 /Radio 2 Statistics

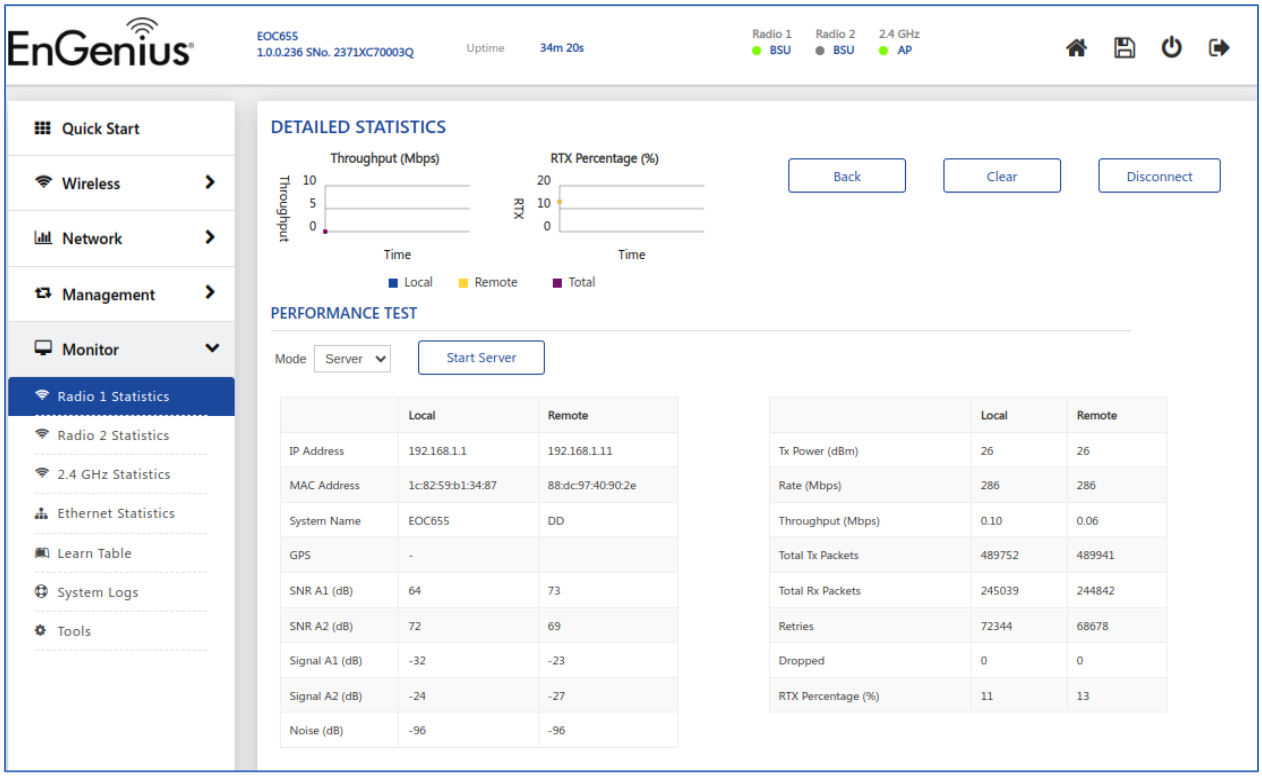
The objective of the statistics page is to allow an administrator to view the state of wired and wireless interfaces. These statistics assist the network administrator to troubleshoot the devices.

You can view the details of associated devices connected to either Radio 1 or Radio 2.

To view the Radio 1 or Radio 2 Statistics,

click Monitor > Radio 1 Statistics/ Radio 2 Statistics > Link





Detailed Statistics

- 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 device.
- Throughput (Mbps): Displays the current Input and Output bandwidth.

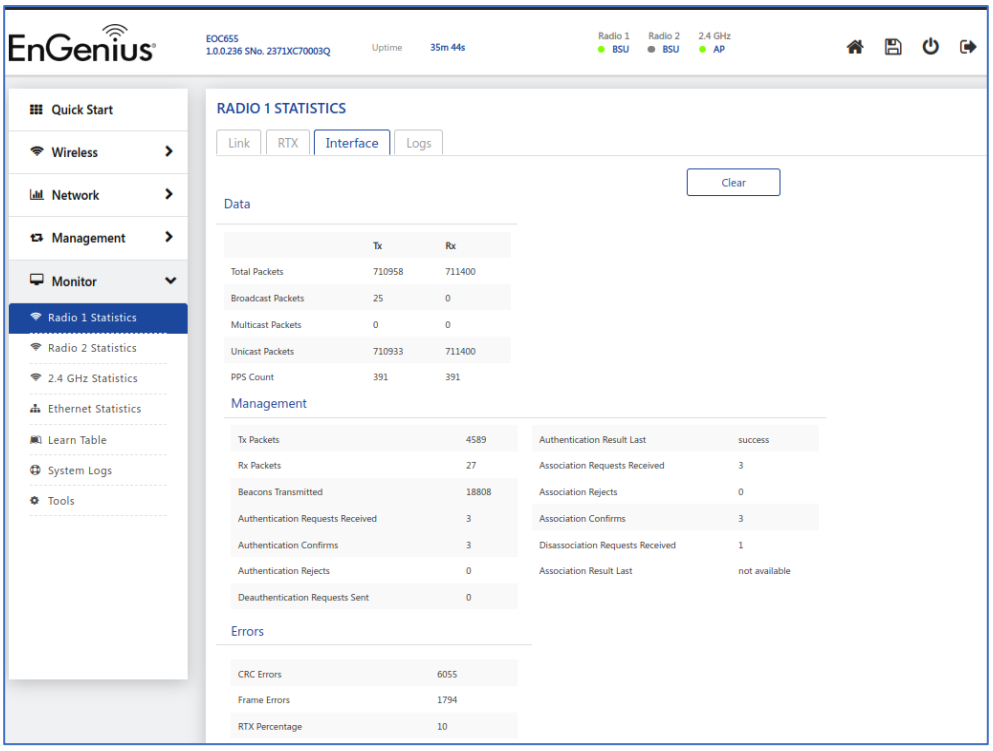
Interface Statistics

To view the Radio 1 or Radio 2 Interface Statistics,
click Monitor > Radio 1 Statistics/ Radio 2 Statistics/ 2.4GHz Statistics > Interface

Interface Statistics will show all the statistics for radio interface.

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

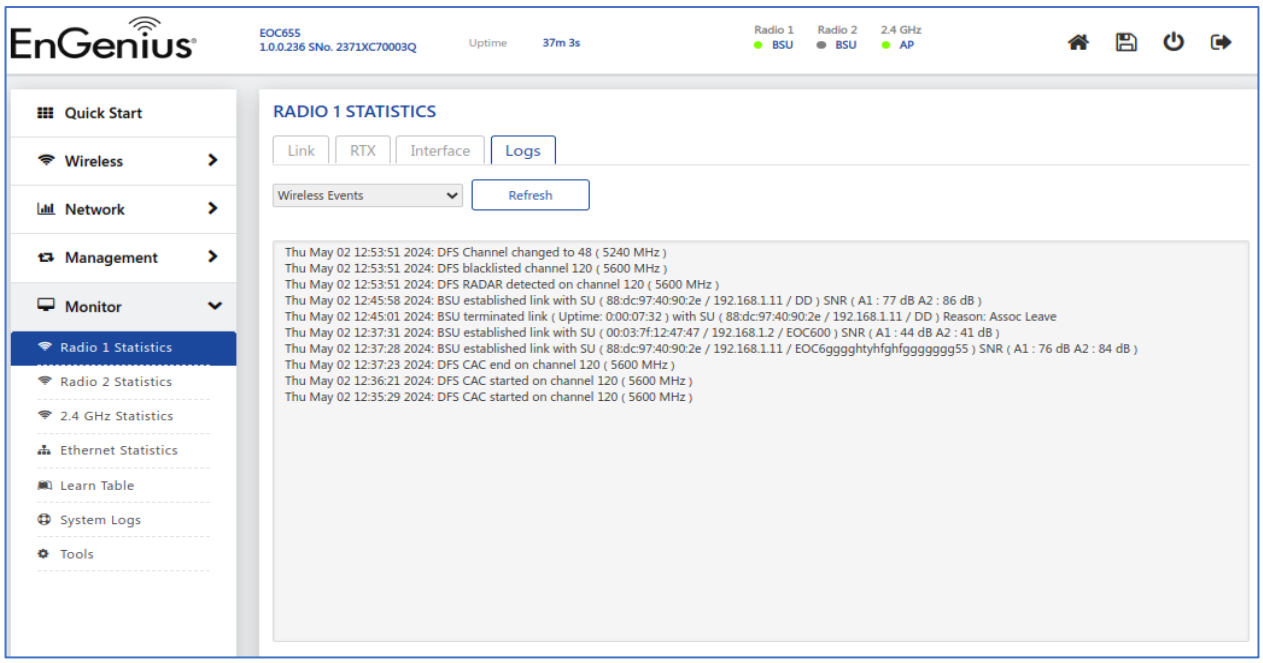


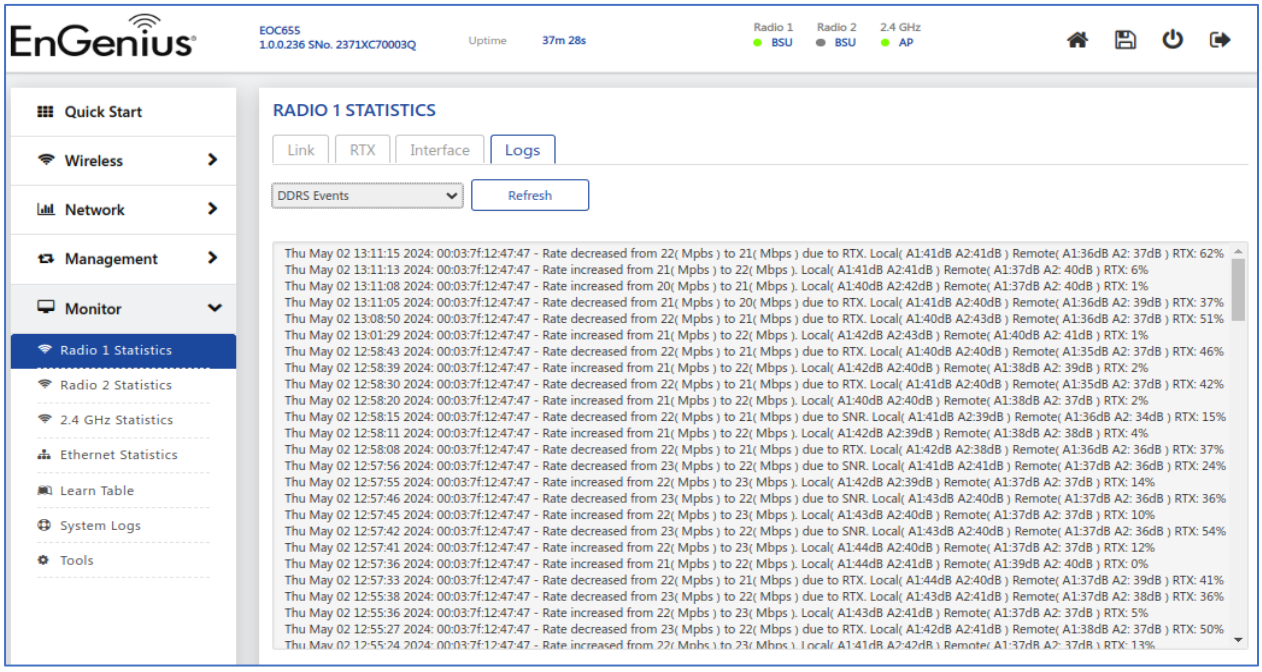
- **CRC Errors:** Specifies the number of received packets with invalid CRC.
- **Frame Errors:** Too many frame errors cause network connection to slow down.

Logs

To view the Radio 1/Radio 2 or 2.4GHz Logs,

click Monitor > Radio 1 Statistics/ Radio 2 Statistics/ 2.4GHz Statistics > Logs





The user can see all the logs related to the respective radio (Connection/Disconnection/DFS, DCS etc.)
Here are some of the wireless event entries 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 Associated log. This log consists of MAC Addresses of the remote device.

> For example:
> Sat Oct 13 07:15:46 2023: BSU established link with SU
> (00:d0:41:e0:1c:1c/192.168.1.2/EOC655) SNR (A1: 50 dB A2: 51 dB)

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 Oct 13 07:15:46 2023: Disassociated (MAC: 00:d0:41:e0:1c:1c) in SU/ Remote Device

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 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 an AP or SU. The termination reason is said to be Power off.

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.
- The default chosen DCS threshold is 20%, when this percentage limit exceeds, then a log is triggered, and the AP activates spectrum analyzer and assigns best channel to the desired SU.

  There are two types of logs generated:
  - DCS Triggered log.
  - DCS best channel selection

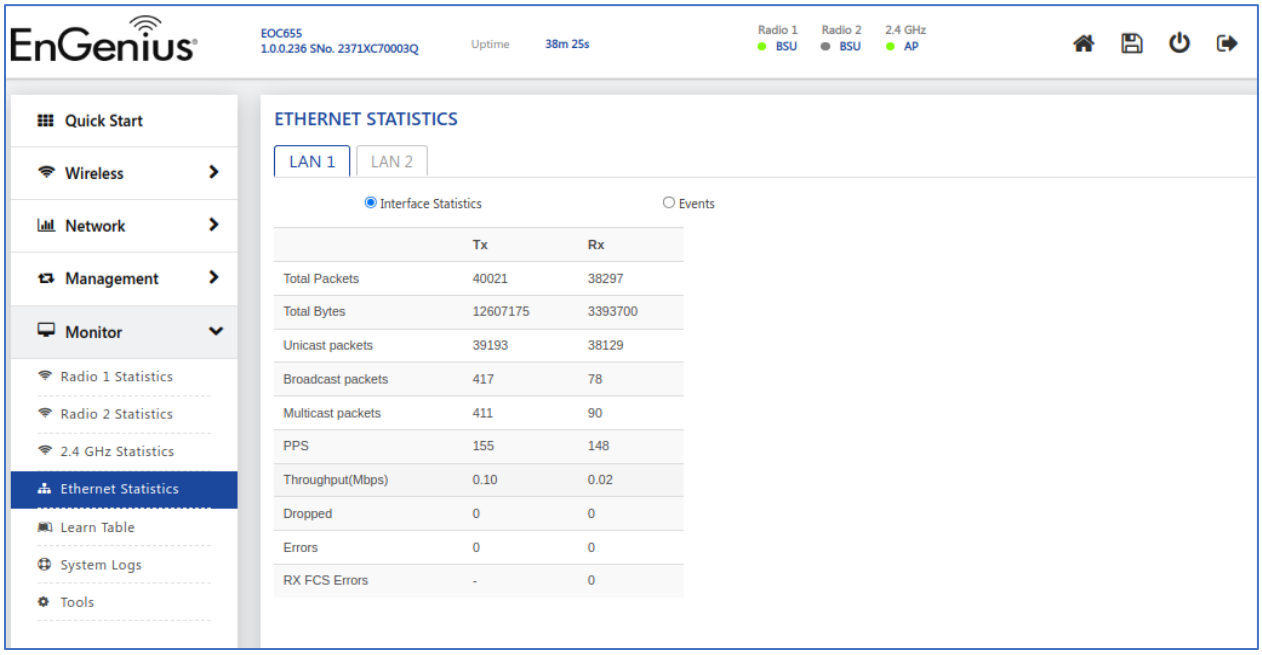
> t for example: <time stamp>: DCS triggered
> <Time stamp>: DCS selected best channel

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

Ethernet Statistics

You can view information about wired Ethernet network traffic.

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



Log Type

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

Learn Table

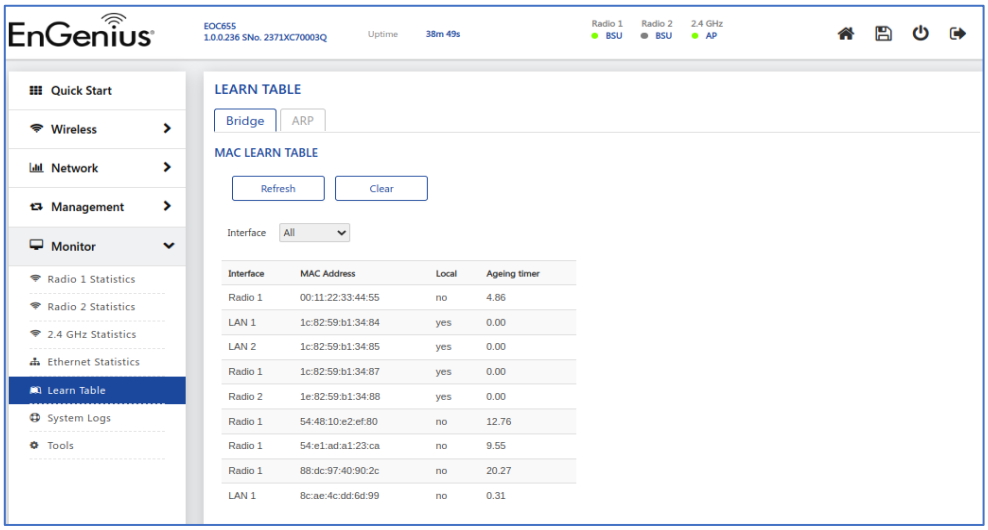
To view the LAN Table Statistics, ***click Monitor > Learn Table***

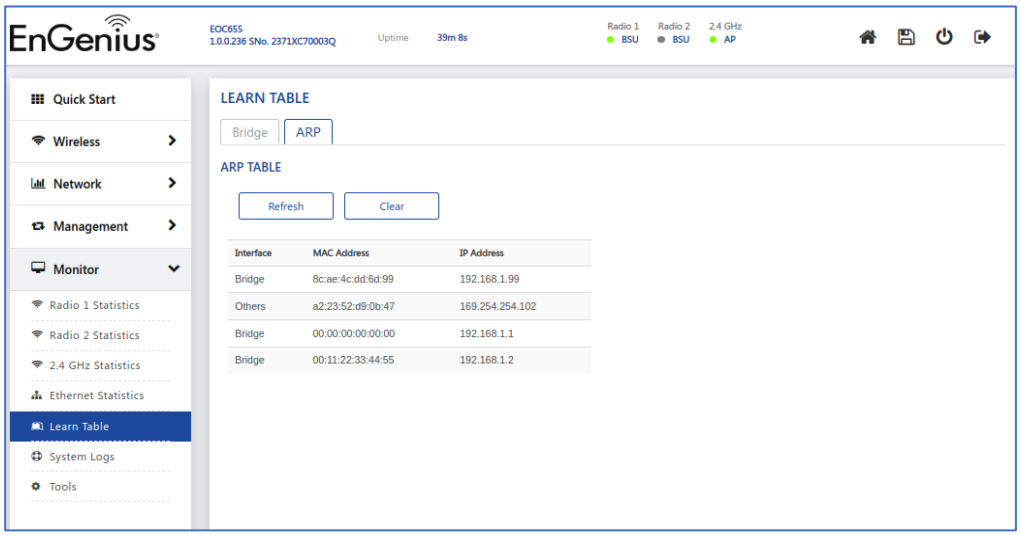
Bridge

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 ageing timer as shown.

- Click Refresh to get the updated or latest Learn Table.
- Click Clear to delete all entries of the Learn Table.





ARP

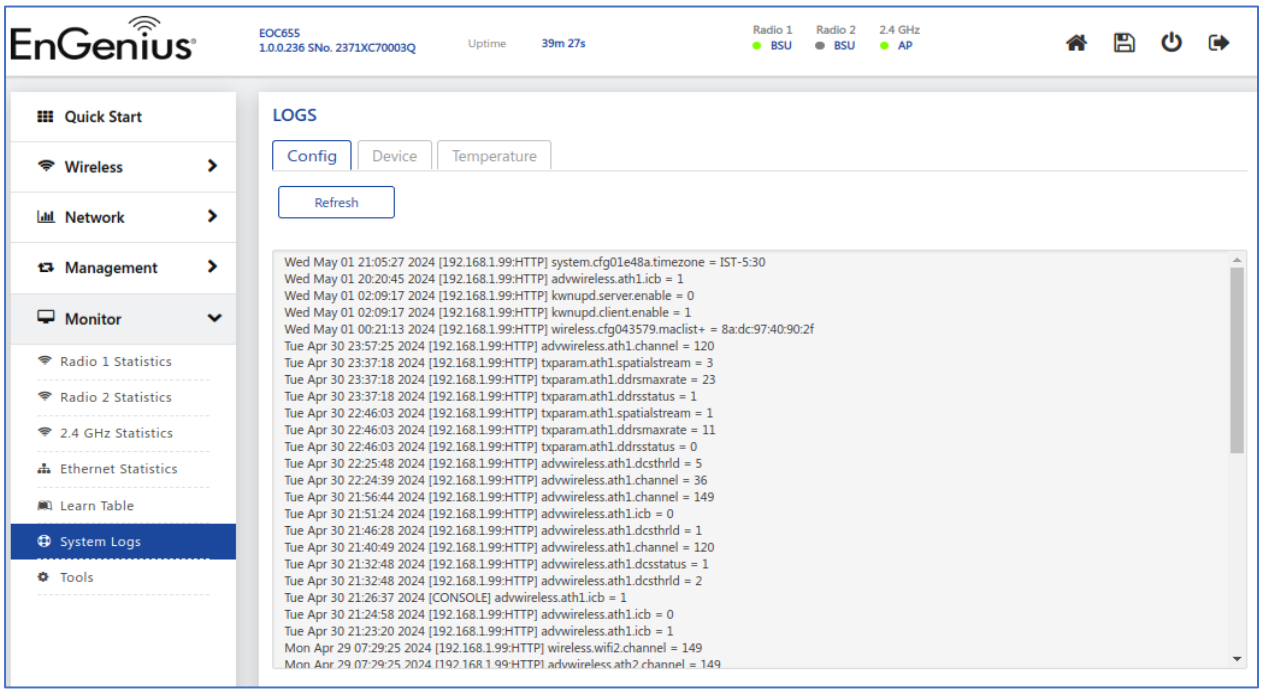
This section displays the mapping of the IP and MAC addresses of all nodes in the network. This information is based upon the Address Resolution Protocol (ARP). ARP is a L2 neighboring protocol which converts the IP address into a physical address on the Ethernet network.

Click Refresh to get the updated or latest ARP Table.

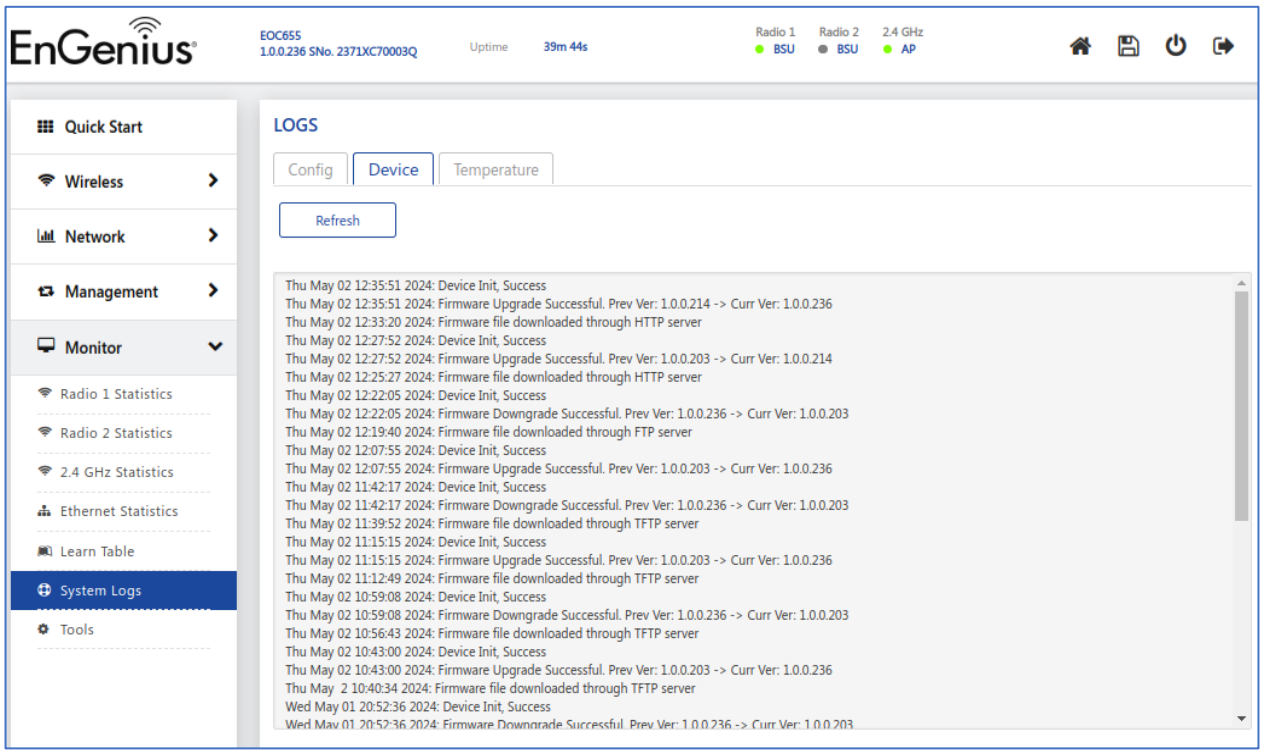
Click Clear to delete all entries of the ARP Table.

System Logs

To view the System, ***click Monitor > System Logs***

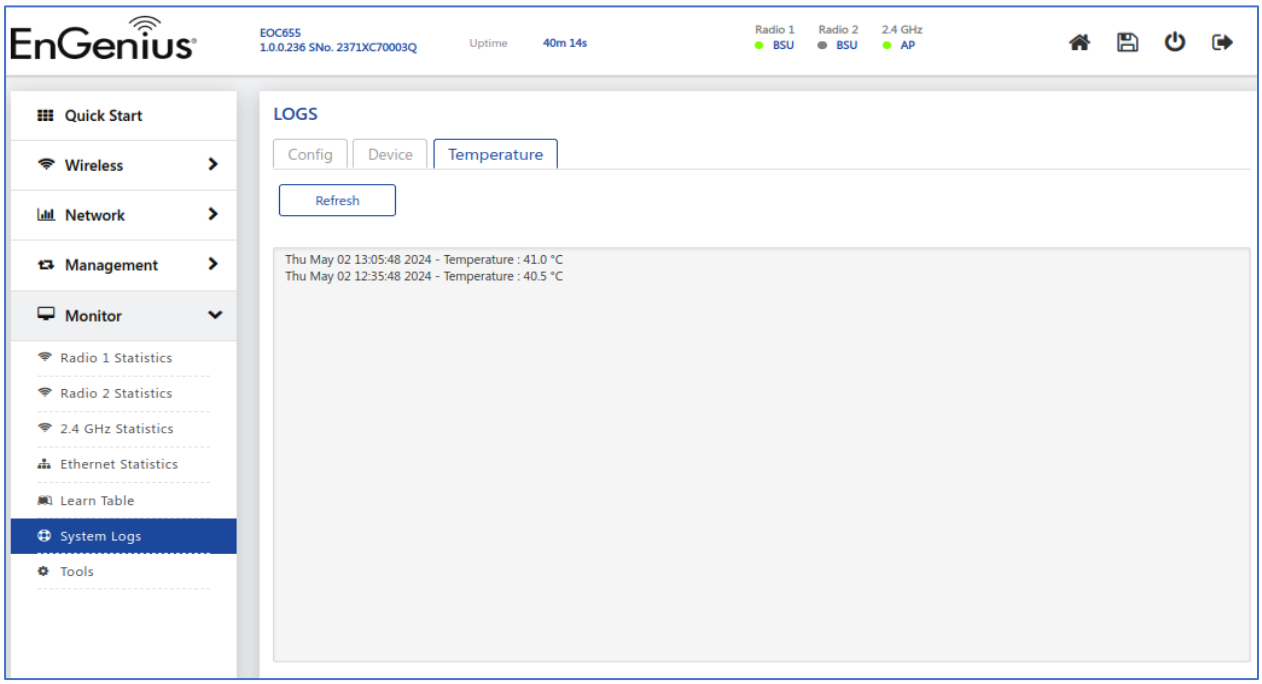


Any recent changes in the device configuration are reflected here.



All the device logs like Reboot, Init, Reset are displayed under Device Logs.

Temperature logs are recorded only after a certain temperature login interval.



Tools

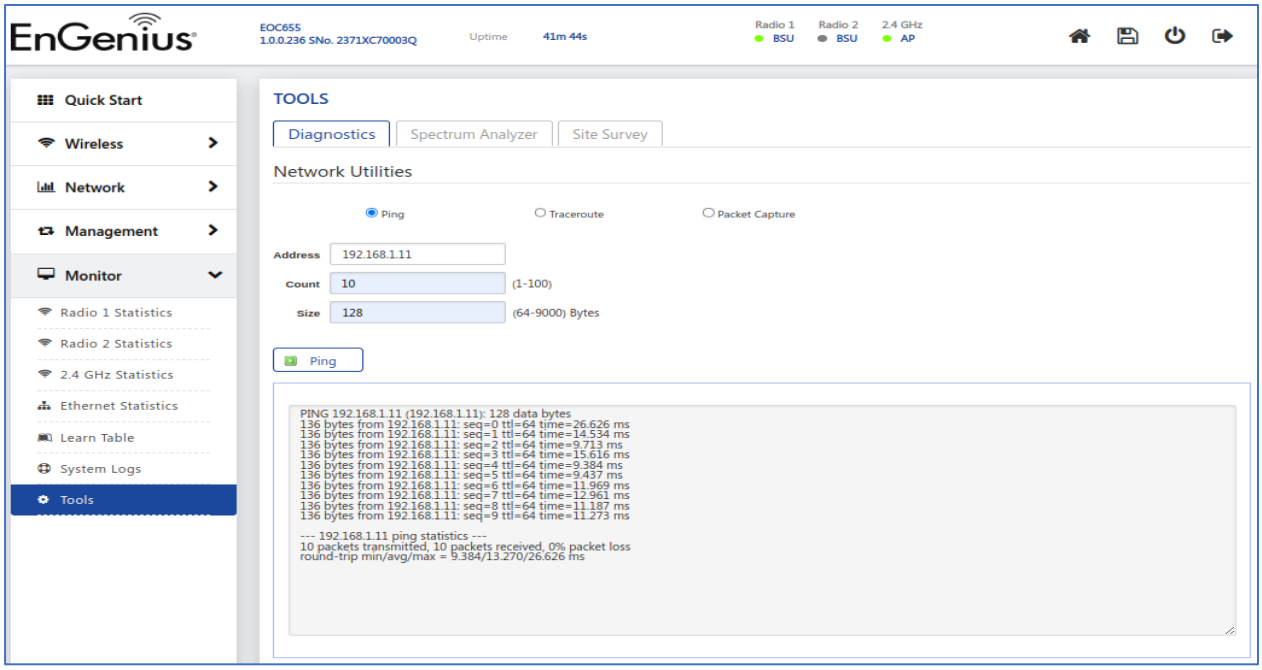
To view the Tools, ***click Monitor> Statistics > Tools***

Diagnostics

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

Ping

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



Traceroute

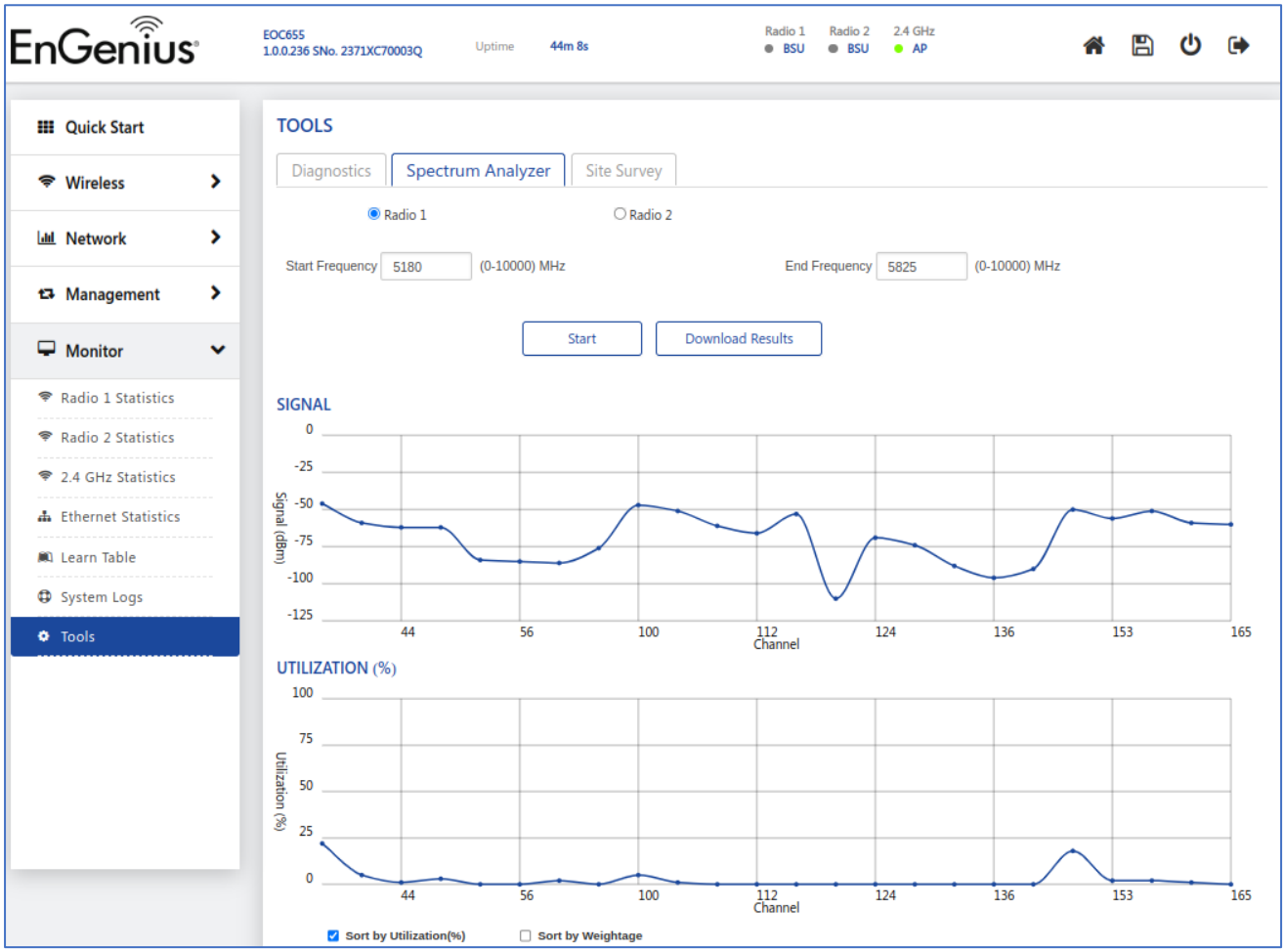
Traceroute determines that the packet has reached the destination by including a port number that is outside the normal range. When it is reached, the Port Unreachable message is sent in return, which defines the time length of the final hop. Trace route provides you with the information hop by hop. 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.

Packet Capture

Packet Capture refers to the action of capturing Internet Protocol (IP) packets for review or analysis. The term can also be used to describe the files that packet capture tools output, which are often saved in the pcap format.

Spectrum Analyzer

*To view the Spectrum Analyzer, **click Monitor> Tools > Spectrum Analyzer***



Same can be started for either of the Radios.

This is available only in AP.

- Scans all the frequencies from the configured start frequency to end frequency for a scan time of 2sec on each frequency.
- Click the Start button and the results will be displayed in a graph.

Signal

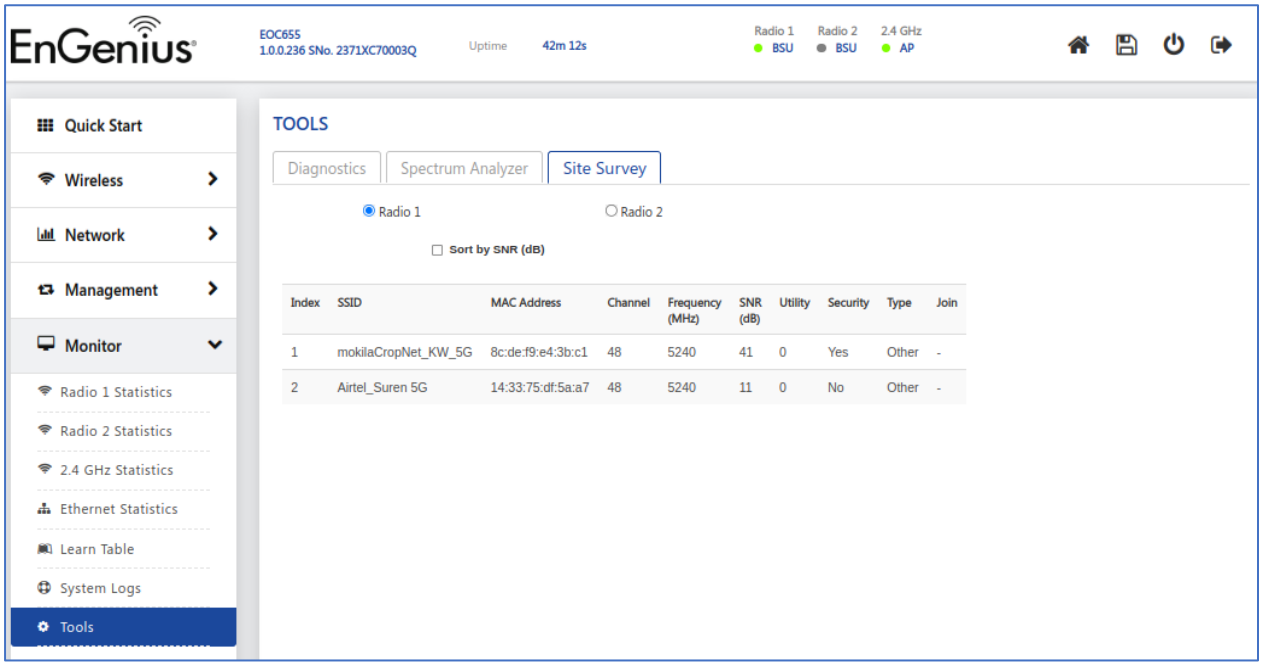
This shows the max Signal of received packets at each frequency in dBm.

Utilization

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

Site Survey

*To view the Site Survey, **click Monitor> Tools > Site Survey***



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

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

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