Whitepaper

EnGenius EnSky Solution

Versatile On-Premises Network Management Solution

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Introduction

Since the first release of the 802.11 standard in 1997, Wi-Fi has been developed more than two decades and evolved to reach gigabit speeds by advancement of multiplexing and modulation techniques. Nowadays, Wi-Fi becomes a must-have utility for all kinds of properties from corporate buildings, public facilities, campuses, hospitality, to MDU/MTU. To address a diversity of requests in different WLAN deployments, it requires a complete solution for managed Wi-Fi that will be supporting a variety of Access Points (APs), with easy adaptation to on-site environments and simple-to-use user interfaces for device configuration and network management. According to the ResearchAndMarkets.com report, it forecasts the global managed Wi-Fi solutions market size to grow from USD 3.07 Billion in 2017 to USD 6.11 Billion by 2022, at a CAGR of 14.8% during the forecast period. To fulfill the future Wi-Fi demands, EnGenius offers EnSky Solution, which is an innovative Total Solution for managed Wi-Fi with a rich product portfolio comprising Indoor and Outdoor Wireless devices, Managed Ethernet Switches, and versatile On-Premises Management Platforms such as ezMaster and SkyKey. These management platforms provide powerful management and monitoring services with ease for all types of deployments from SMB to Large-Scale distributed networks.

On-Premises vs. Cloud

EnGenius has provided an on-premises network management solution, ezMaster for many years to locally or remotely manage EnGenius Ethernet Switches and Access Points. EnGenius customers can install ezMaster on their onsite server or remotely on AWS for management of EnGenius devices. Now an integrated ezMaster-embedded SkyKey appliance is available for users to simply plug in the SkyKey to one of the switch ports in the network for easy device management. In recent years, EnGenius invested more in the latest cloud-computing technology and serverless infrastructure to provide our customers with the most advanced plug-and-play, easy-to-use EnGenius Cloud solution. Thus, IT users simply need to focus on

how they want to manage their networks, without worrying about server capacity, performance, and scalability.

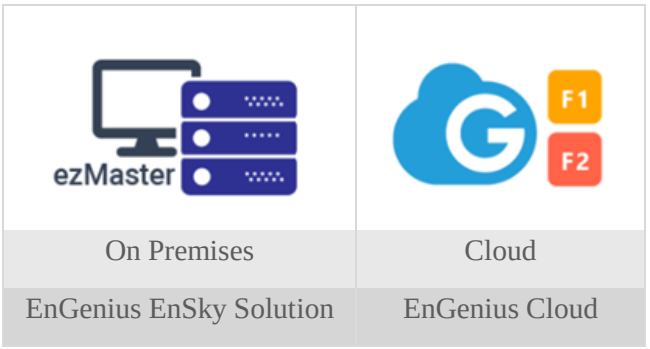


Figure 1 - EnGenius On-Premise and Cloud Solution

Streamline WLAN Deployment for Managed Wi-Fi

The process to streamline WLAN deployment for Managed Wi-Fi includes the pre-deployment planning and post-deployment management, which will be deciding overall effectiveness of deployed WLAN and its performance. Based on the ideas for ease of planning and management, EnSky Solution is developed to accommodate the full cycle of WLAN deployment. For example, System Integrators (SI) can use ezWiFi Planner for coverage planning and select a management platform from EnGenius EnSky Solution for on-site WLAN management and monitoring. Once EnSky Solution is deployed in a network, auto AP discovery will facilitate users to add Indoor or Outdoor Wireless devices for management without One-by-One search. Upon AP selected from the discovery basket or inventory list, AP provisioning will then establish the connection for management to each AP automatically. When the managed Access Point goes online, this turn-key management system will unleash all proceeding WLAN management and configuration by its intuitive GUI pages.

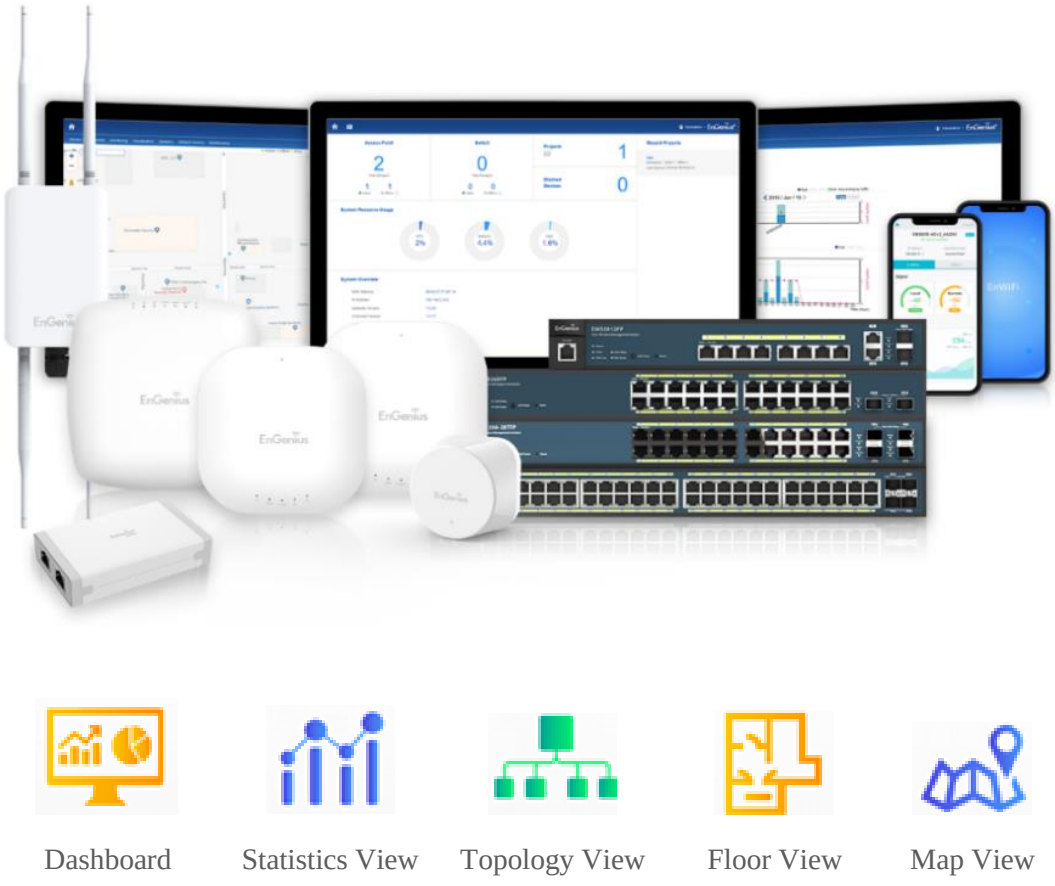


Figure 2 – EnSky Solution Portfolio

Flexible Deployment Scenarios

To address cross-network management and remote access capability regardless of managed devices' placement and management staffs' locations, EnSky Solution utilizes ezMaster's system design to provide different forms of Management Platforms including ezMaster, SkyKey with built-in ezMaster, and ezMaster AMI deployment via customer's own AWS account. Users can choose a variety of AP devices in EnSky Solution from Indoor to Outdoor Wireless AP products to meet their on-site WLAN requirements and leverage EnSky Solution's Management Platforms to transform deployed networks to managed Wi-Fi in different scenarios:

A. Local Network Deployment

Using SMB network deployment as an example, when AP and Switch devices from EnSky Solution are deployed in the same network as management platforms such as SkyKey, users can deploy their devices and then find the devices shown in the SkyKey web interface's pending approval list, which will be eligible for selection to a user-created project for further management.

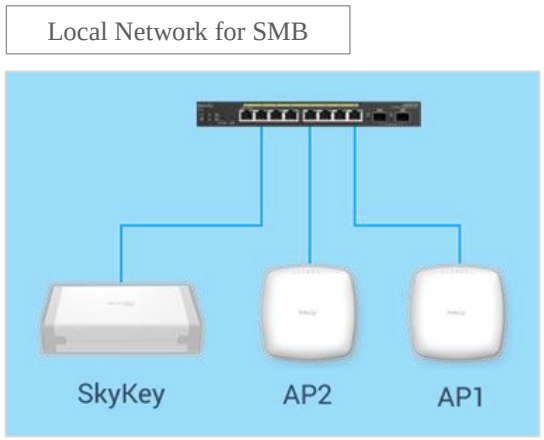


Figure 3 – Local Network Deployment

B. Mixed Network Deployment with Remote Devices

When network deployments involve a major network with multiple small networks, such as corporate WLAN deployments where the company has a headquarters and several remote branch offices, ezMaster can be set up in headquarters to manage local and remote devices. Remote devices can be deployed at the remote site (deployed at locations other than ezMaster) and added to the inventory list for registration with the ezRegister server.

Mixed Network Deployment with Remote Devices

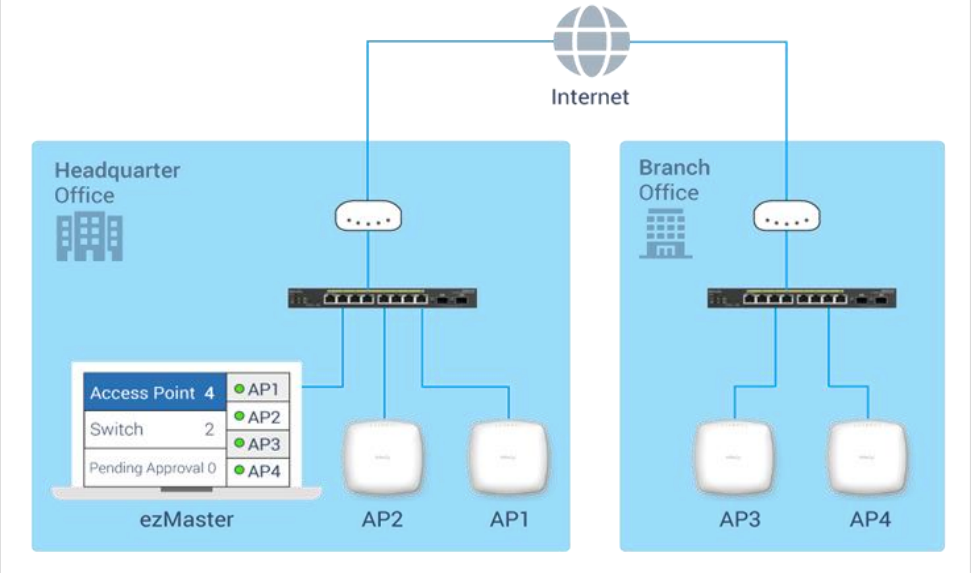


Figure 4 – Mixed Network Deployment

C. AWS-based Network Deployment

For Large-Scale deployments where devices intended for management are geographically placed far apart, the EnSky Solution offers ezMaster AMI for deployment via customer's own AWS account as a Centralized Management Platform where all devices can be added to the inventory list on this AWS instance to register with an ezRegister server for management.

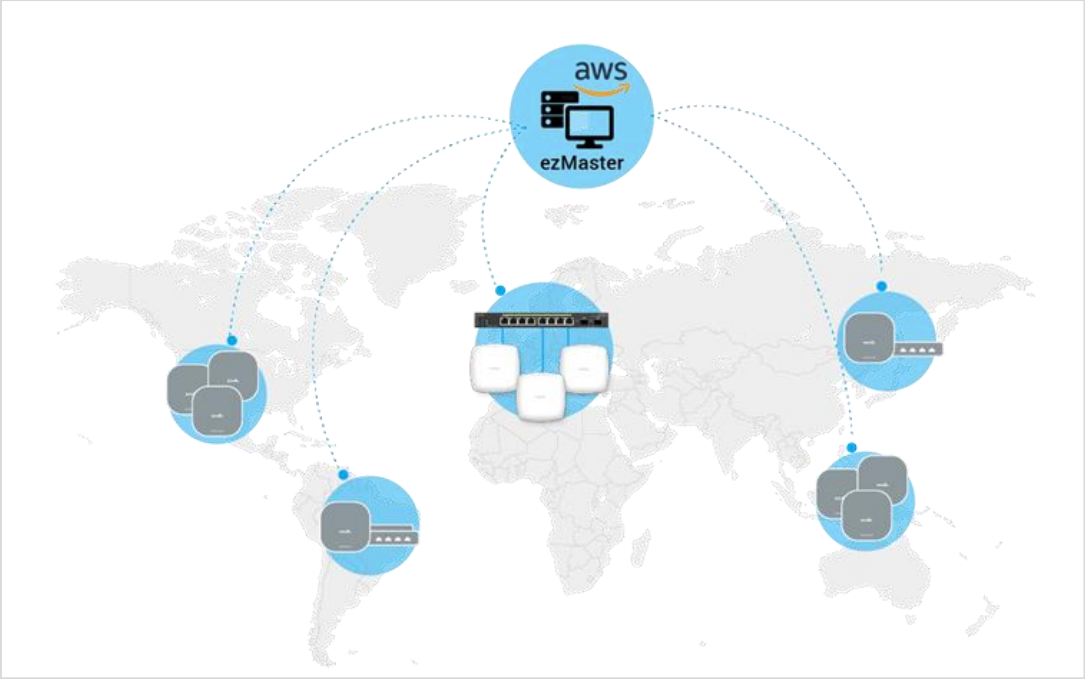
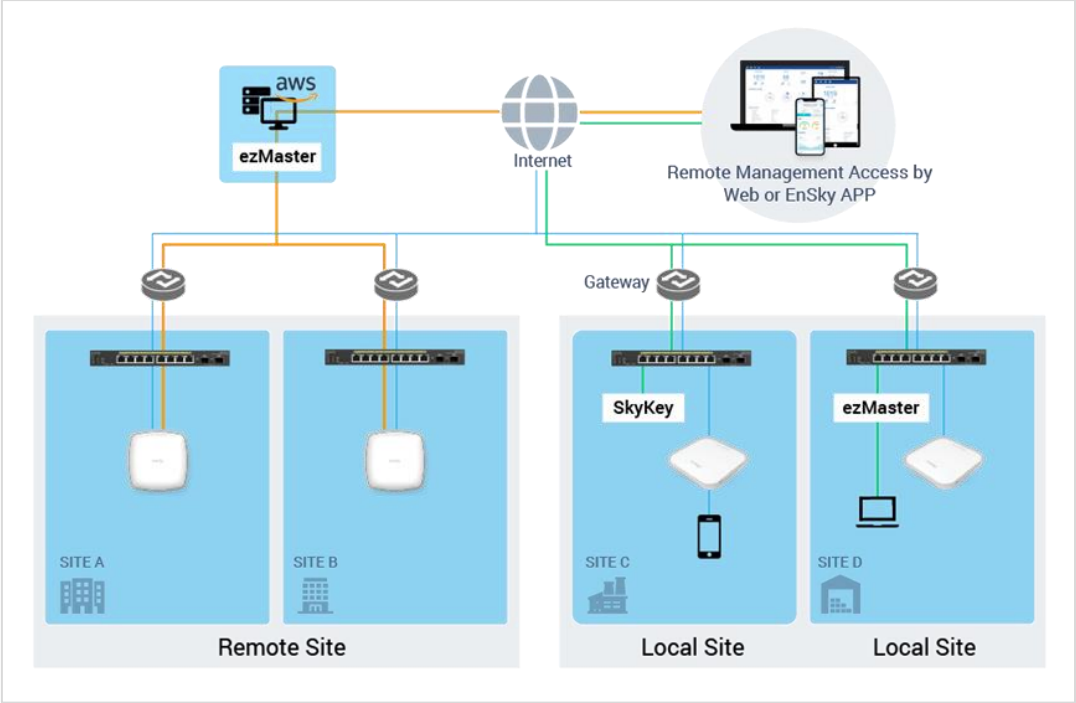


Figure 5 – AWS-based Network Deployment

Enable On-Premises Cross-Network Management

Local management access can be simply done by typing SkyKey or ezMaster's IP address in web browser to proceed; for Remote Access, network administrators can set up port forwarding on gateway devices (at the same LAN with ezMaster or SkyKey) which will assign a specific external port to point to ezMaster or SkyKey at internal network so the management system's web interface can still be accessed over the Internet by providing gateway's WAN IP address along with assigned port in a web browser's address field.

In addition, to facilitate management for a Large-Scale deployment across multiple networks, another alternative is by EnSky App or EnSky remote cloud access through web portal (integrated in myEnGenius online service center) which will redirect users' access to remote deployed network through EnGenius Cloud Service.



*Blue lines denote user data path; green and orange lines denote management access path

Figure 6 – On-premises Cross-Network Management Access

EnGenius EnSky Solution

EnSky Solution, including ezMaster, SkyKey with built-in ezMaster, ezMaster AMI (for deployment from customers' own AWS account), Indoor Wireless products, Outdoor Wireless products, Ethernet Switch products, and EnGenius management APPs. It is a Total Solution, which will be able to help our customers plan their Network Infrastructure, deploying Managed Wi-Fi to integrate with an existing on-site network infrastructure or build customized networks from scratch, and then Manage and Monitor the Network.

EnGenius will be presenting an aggregated online service platform, named myEnGenius Center to facilitate such WLAN plan-deploy-manage flow upon user login to their registered account where users will find respective links to Wi-Fi planning tool and the remote access portal to management systems in a centralized location.

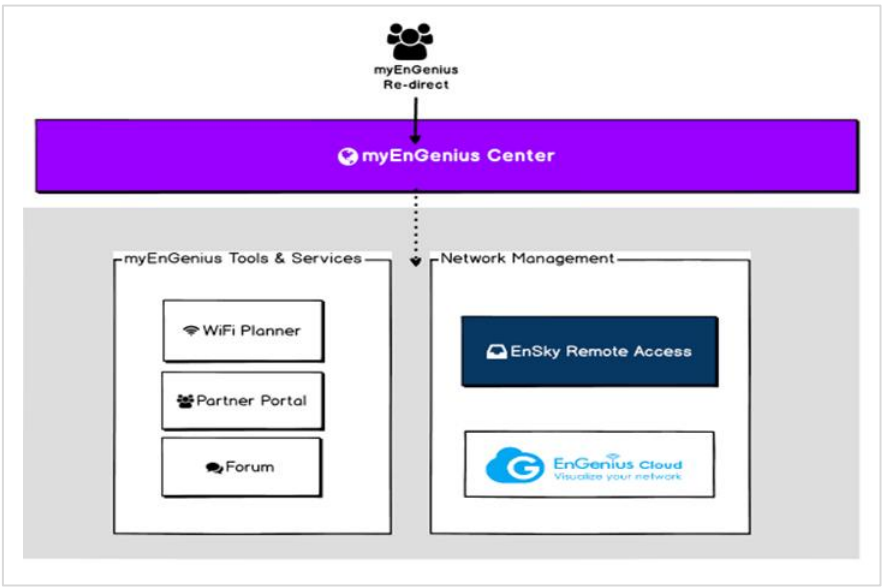


Figure 7 – myEnGenius Center Portal

WLAN Planning by ezWiFi Planner

EnGenius customers have enjoyed the benefits of the subscription-free ezWiFi planner, a Wi-Fi planning tool, to map out Wi-Fi coverage and Access Point (AP) placement in their latest deployment.

This planning tool will be integrated into the myEnGenius online service center. Users can login to their own accounts and import floor plans or area maps to scale, where a scale can be set to match the real dimension or distance; once scale is confirmed, the ezWiFi Planner offers a collection of tools to place AP models and simulate potential obstacles with variation of attenuation in order to create heat map visualizations and aid in determining optimal coverage. Once completed, users can generate a planning report for deployment with suggested AP models and device placement for an optimized coverage scenario that closely mirrors reality.

Figure 8 – ezWiFi Planner Console

Management Architecture for WLAN Deployment

After using ezWiFi Planner to estimate the types and the placements of APs that best meet on-site Wireless coverage requirements, for ease of management and maintenance, users will then consider how their deployed WLAN are managed; this usually involves several factors such as the number of managed APs and the location of management system.

Depending on users' preferred management architecture, they can leverage different types of management platforms from EnSky Solution that best meet their usage requirements.

a. Centralized Management

For medium to large-scale deployment, users may adopt ezMaster or deploy ezMaster AMI from their own AWS account as they can manage more than thousands of APs from a single system.

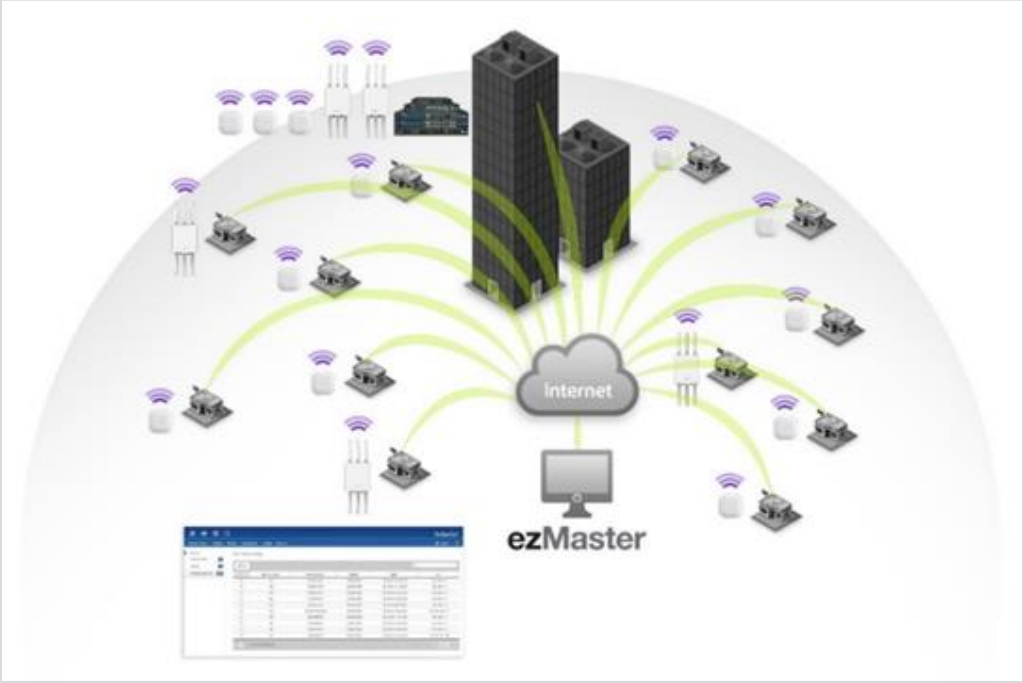


Figure 9 – Centralized Management Architecture

b. Distributed Management

Taking deployments for building complex as an example, when the properties are owned by different owners for certain floors or part of building complex, SkyKey can be simply connected to an Ethernet port at each property to manage up to 50 APs; when the scope of WLAN deployment needs more than 50 AP, it simply needs extra SkyKey for fulfillment. For distributed WLAN deployments with multi-cluster of APs, multiple SkyKey can be deployed in such kind of networks for on-site and cross-network management where each SkyKey can have its own settings for managed APs/WLAN.

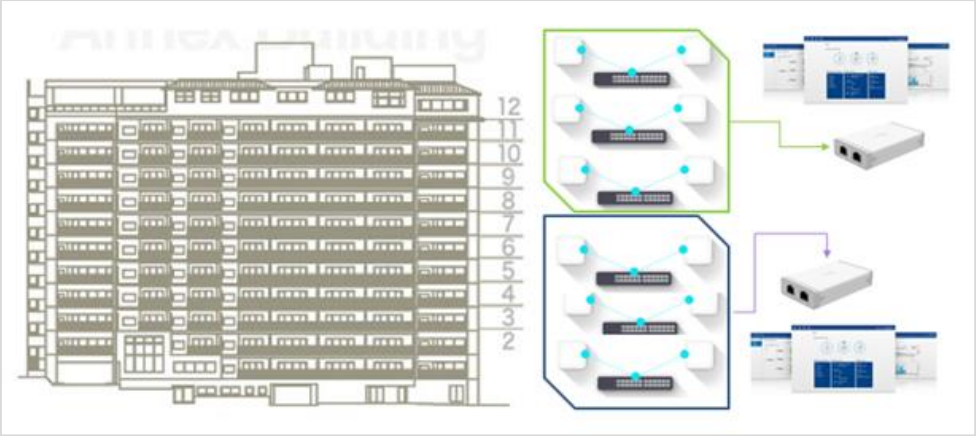


Figure 10 – Distributed Managed Architecture

No matter which architecture is chosen, EnGenius customers can then register each of their On-Premise Management Systems to their own accounts in myEnGenius Center online that will facilitate remote management access. (For such Remote Cloud Access for Management, there would be little charge applied to ezMaster but free of charge for SkyKey.)

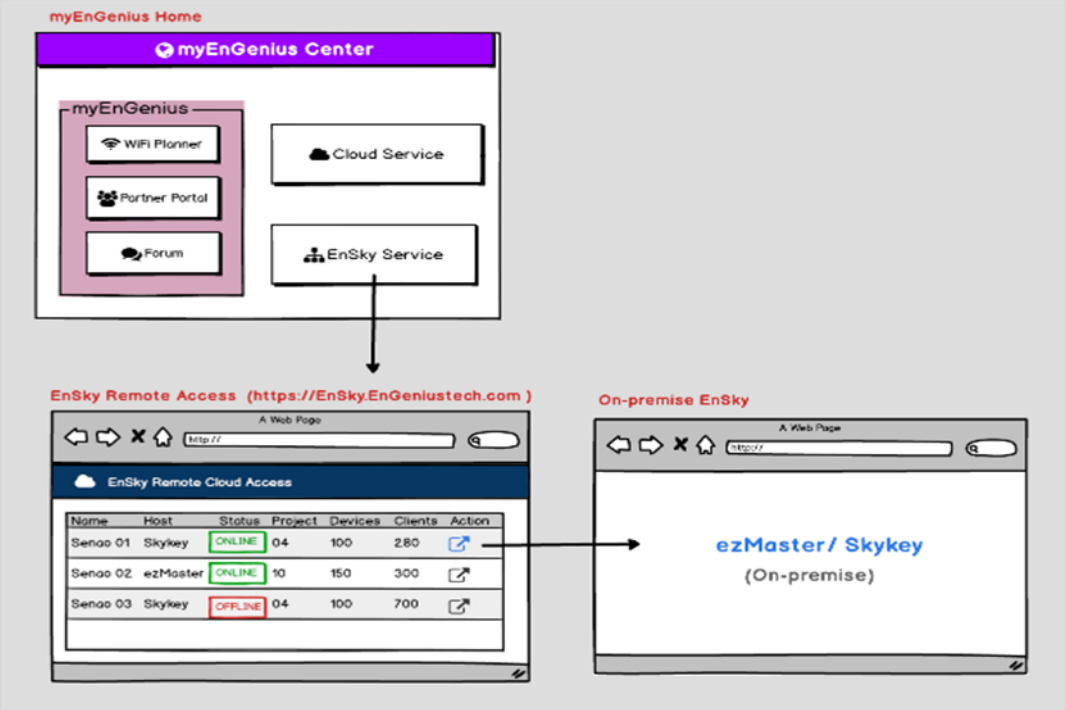


Figure 11 – Remote Cloud Access for Management

On-premise Management for WLAN Deployment

a. Create Projects for Deployed WLAN

A project is the workplace on management platforms for a WLAN deployment where users can add auto-discovered APs on-site and from the inventory for further configuration; it also facilitates Group management for AP sharing common settings and allow overwrite to fine-tune individual settings such as channel or transmit power to meet suggested guidelines from ezWiFiPlanner.

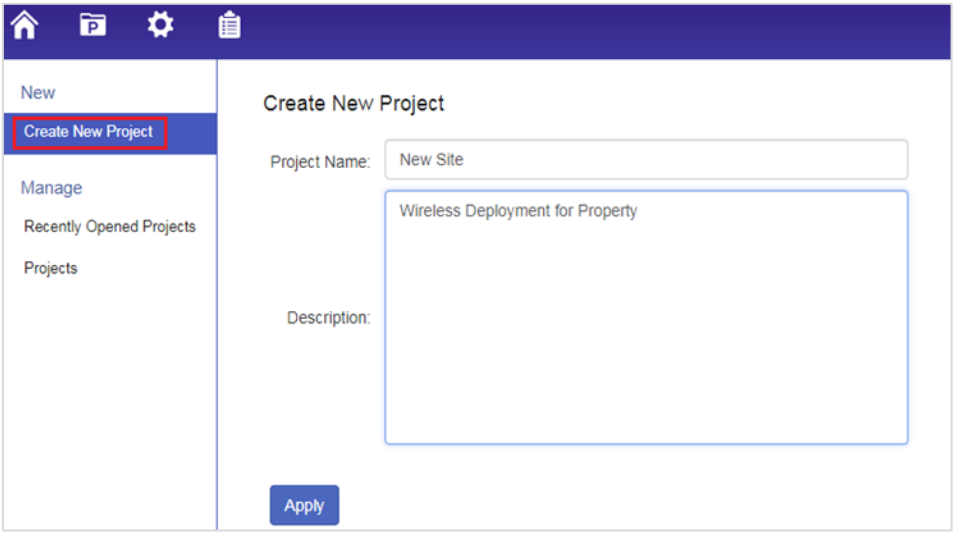


Figure 12 – Project Creation for Deployed WLAN

b. WLAN Configuration and Group Management

When Managed AP becomes online upon provisioning, EnSky Solution's management platforms will facilitate users to do configuration and management for deployed AP in the following regards:

- Wireless Radio Settings (such as Country, Channel/HT Mode, Transmit Power, Data Rate, Client Limits)
- WLAN Settings where 8 SSIDs are supported on both 2.4GHz and 5GHz radios; for each SSID Profile, in addition to wireless security setting, configuration can be further fine-tuned on VLAN Isolation for network segmentation, Captive Portal with profile selection for Hotspot service, Traffic Shaping per SSID or per User for traffic flow control.

ID	SSID	2.4GHz	5GHz	Captive Portal	Security	Hidden SSID	VLAN
1	SSID_1	☑	☑	t1_BR	WPA2-PSK	No	-
2	SSID_2_vlan	☑	☑	-	WPA2-PSK	No	20
3	SSID_guest	☑	☑	t2_NAT	WPA2-PSK	No	-
4	SSID_4	☐	☐	-	-	No	-
5	SSID_5	☐	☐	-	-	No	-
6	SSID_6	☐	☐	-	-	No	-
7	SSID_7	☐	☐	-	-	No	-
8	SSID_8	☐	☐	-	-	No	-

Figure 13 – SSID Configuration for Deployed WLAN'

- AP Group configuration with member selection for RF/WLAN configuration and Mesh Settings where Mesh links can be established among member APs on either 2.4GHz radio or 5GHz radio.

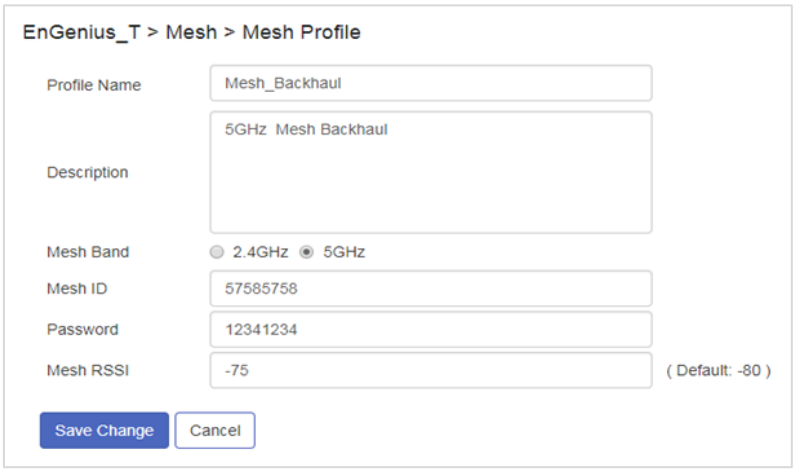


Figure 14 – AP Group Configuration with Mesh Settings

c. Wi-Fi Availability and Scheduling

- For Wi-Fi Access Control, Whitelist and Blocked List are provided to allow or restrict access from separate groups of users.
- For Scheduler settings, AP Auto Reboot can be scheduled by specific day and time respectively every week; to further control WLAN availability in time manner, SSID availability can be set up by specific day and duration respectively every week.

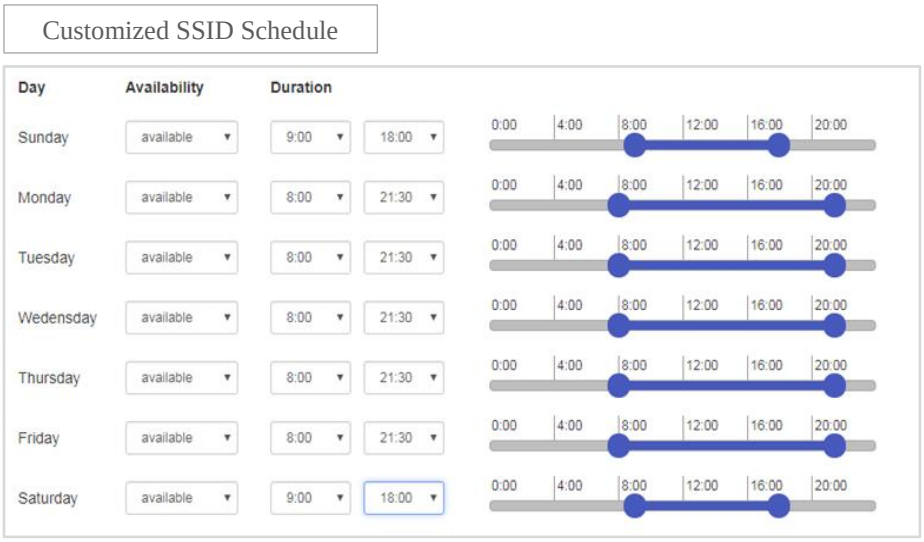


Figure 15 – Schedule Configuration

d. Guest Wi-Fi Customization

EnSky Solution provides hotspot service for guest Wi-Fi access with captive portal page; the management system hosts internal database to store captive portal profiles which facilitate customization for the following configuration items:

- Network Connection Mode by Bridged or NAT for guest Wi-Fi access
- Authentication Types by Splash & Go, ezMaster Authentication, RADIUS, or 3rd Party Authentication such as Cloud4Wi
- Splash Page Customization
- Redirect Behavior Control
- User Session Control (Session Timeout and Idle Timeout)
- Walled Garden

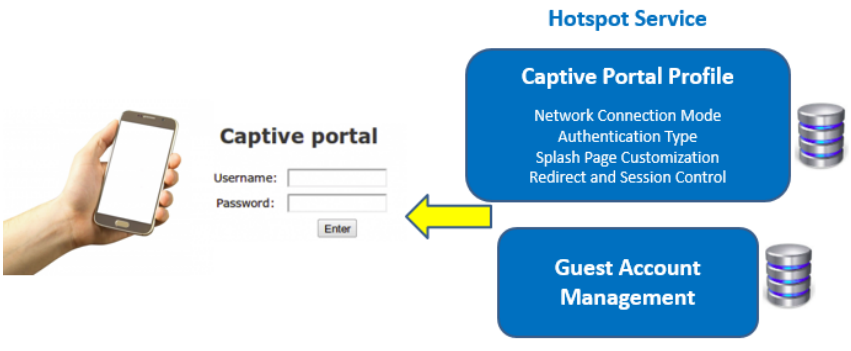


Figure 16 – Guest Wi-Fi with Captive Portal

When authentication is required for Guest Wi-Fi access, other than separate RADIUS server or 3rd Party Authentication option, each management system equips an internal guest account database which can assist network administrator to create and maintain user name and password through its intuitive web GUI page. This authentication option can facilitate fast deployment for guest access without setting separate RADIUS server or 3rd party authentication service.

Visualized Monitoring and Statistical Information

EnSky Solution's Management Platform will utilize its advanced data processing engine to perform non-stopped monitoring on AP status and active clients, compile WLAN traffic and usage statistics, and provide visualized views on Network topology, Map View, Floor Plan, and Mesh node connection.

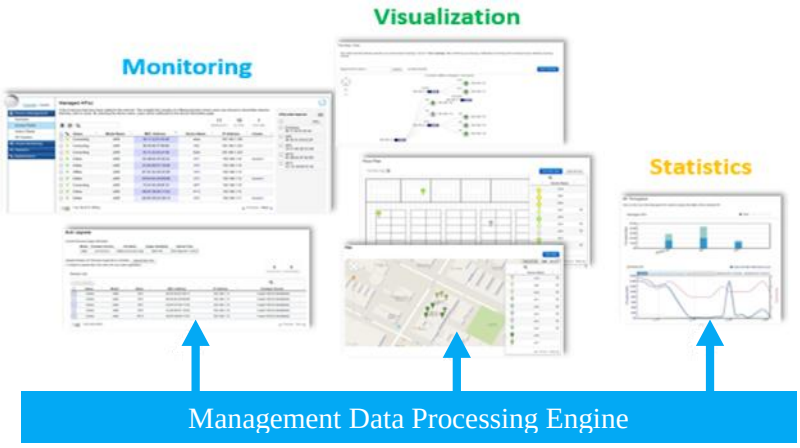


Figure 17 – WLAN Visualization

AP Status Monitoring

AP list provides managed device status and information including model name, device MAC address and name, IP address, firmware version, and operating channels, etc.

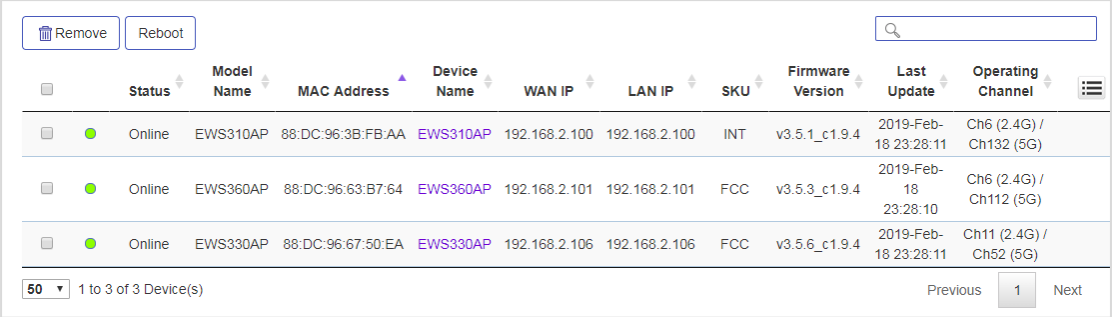


Figure 18 – Managed AP Device Status List

Wireless Client Monitoring

Active client list utilizes fingerprint techniques to identify client name, IP address, operating system type in addition to connected AP, SSID, band, Tx/Rx traffics, and RSSI. WLAN administrator can have a quick browse to identify if there exists a rouge client to kick or ban.

Figure 19 – Wireless Client Fingerprinting

Visualization for Topology View

The management system uses each managed switch as an agent to collect connected devices' information via LLDP (Link Layer Discovery Protocol) which are then further processed to draw the network topology with connected switch port and respective AP device information including device status, connected client number, IP address, and wireless operating channels, etc.

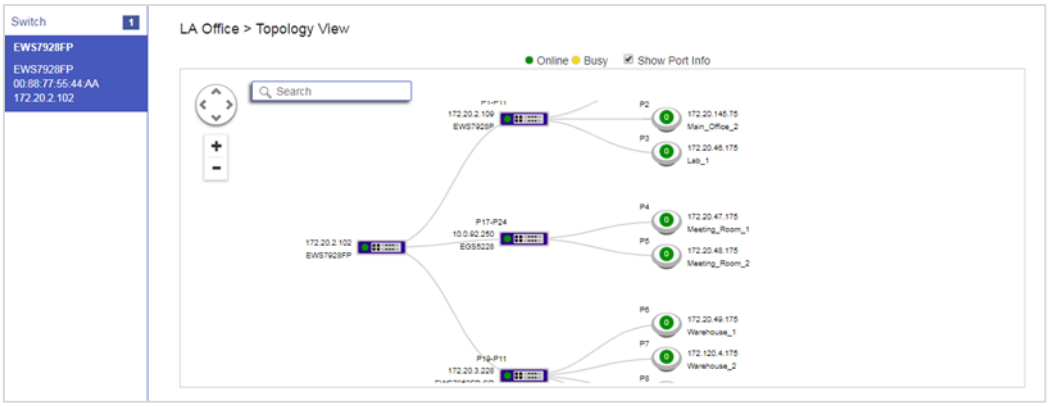


Figure 20 – Topology View for Deployed WLAN

Visualization for Map View

For Outdoor or Large-Scale deployments, the Map View will help users review their deployed AP's status on the map and if there is something for attention, it will be convenient to know its location for quick response.

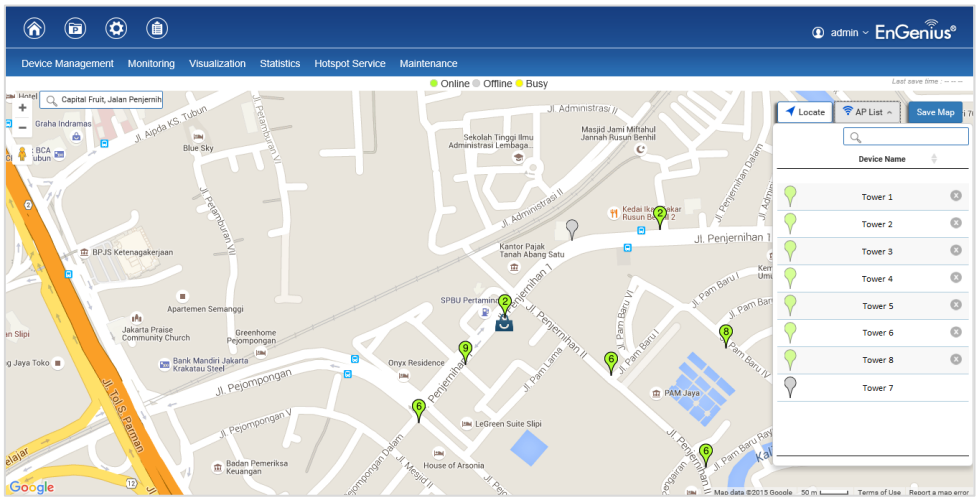


Figure 21 – Map View for Deployed WLAN

Visualization for Floor Plan View

The management system allows users to upload floor plans of deployed networks which will be assisting users for indoor AP monitoring with its respective placement; it also features RSSI simulation tool so users can easily know each AP's heatmap for wireless coverage and reduce blind area.

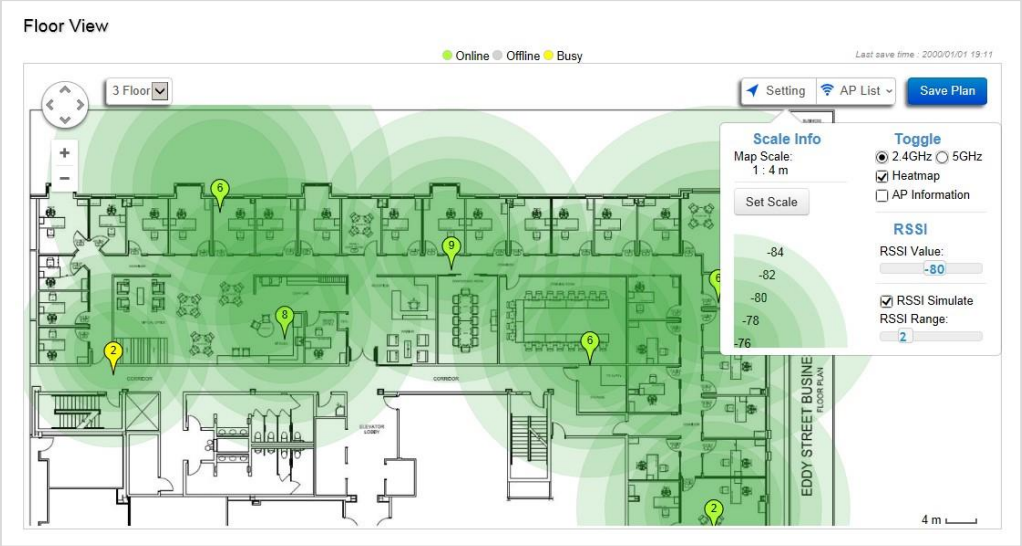


Figure 22 – Floor Plan View for Deployed WLAN

Usage Statistics Monitoring

Networks Usage Statistic enables network administrators quickly identify abnormal network usages and take the immediate actions before the entire networks getting affected.

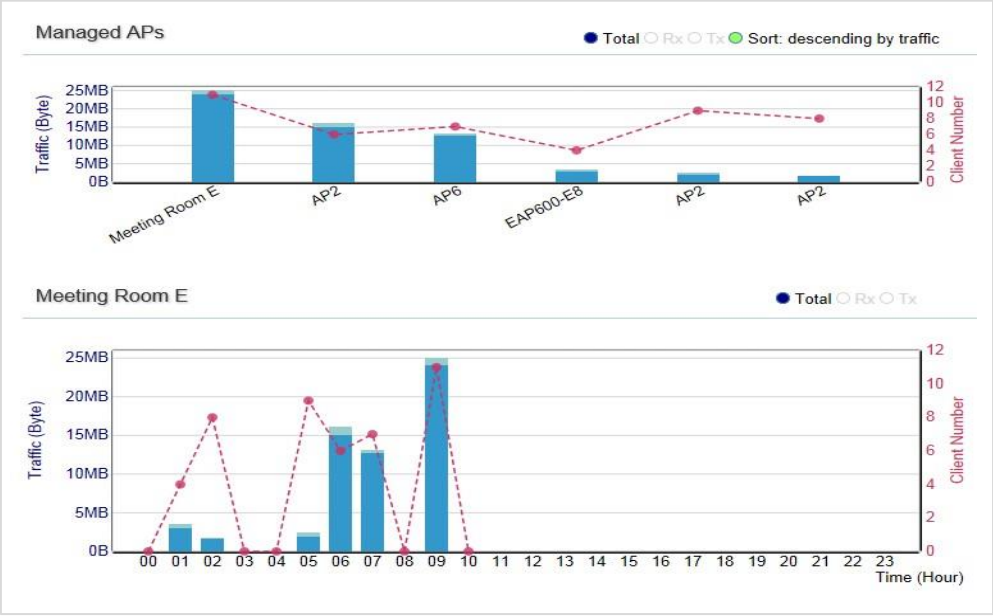


Figure 23 – Statistics Monitoring for Deployed WLAN

Network Maintenance and Notification

Multi-tenant Management

EnSky Solution's Management Platform is a multi-tenant system for ease of system maintenance and management; based on user's privilege, 3 types of user accounts are available:

(1) Admin with full access to system-wise maintenance and all its projects for management of deployed networks

(2) Normal User with management access to assigned projects of corresponding deployed networks

(3) Guest User for monitoring access to assigned projects of corresponding deployed networks

Event Monitoring and Notification

For Event Monitoring, users can apply Event Log Filter by severity (from Emergency to Debug) and by Category (AC, AP, ezMaster, and Switch) to locate the event in interest. Other proactive monitoring tool is via management system's email alert so users can receive timely alert messages for selected types of events.

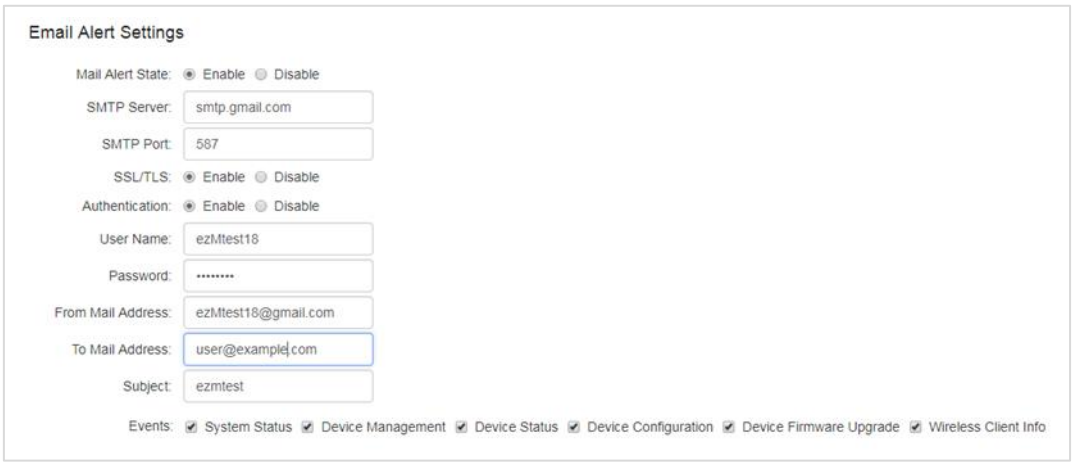


Figure 24 – Email Alert Settings for Deployed WLAN

System Maintenance

For system recovery and rapid deployment, each management system can backup/restore its settings to another management system. Regarding firmware update,

in addition to Bulk Update, it also supports One-Click Update to keep its Managed AP devices to latest firmware versions via EnGenius Cloud.

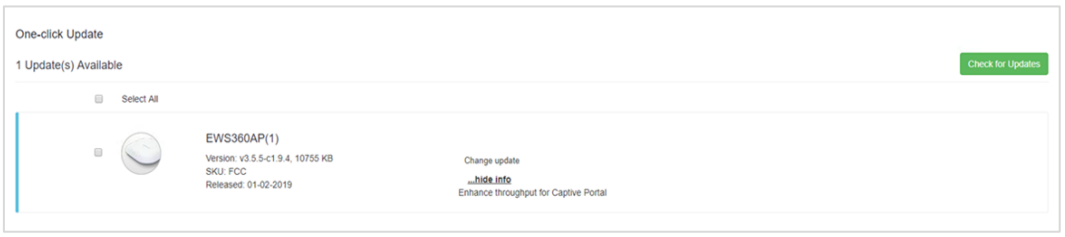


Figure 25 – Firmware by 1-click Update for Deployed WLAN

For Managed AP maintenance, it features Bulk Update that will facilitate multi-device firmware upgrade at a time by uploading AP firmware through Web GUI page.

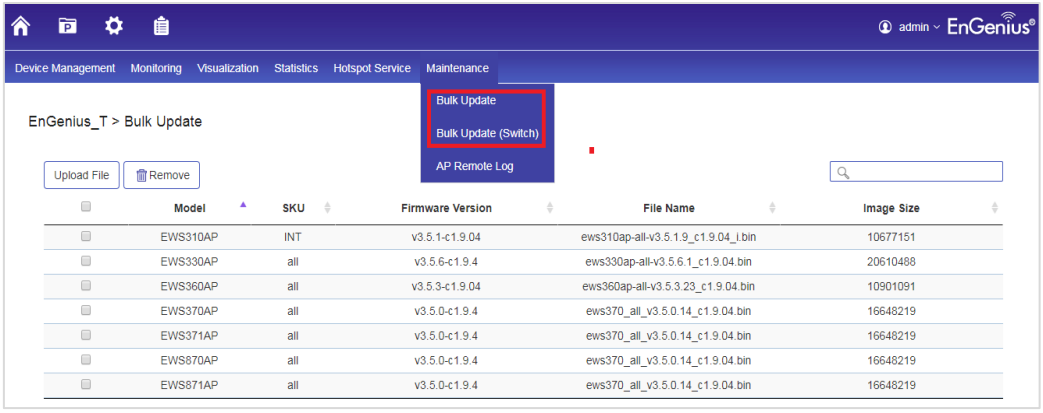


Figure 26 – Firmware Bulk Update for Deployed WLAN

Product Portfolio of EnSky Solution

List of Product Category

Managed APs

1. EnSky Solution encompasses a variety of Indoor AP and Outdoor AP models where all devices can either be deployed as standalone device or managed by EnSky Solution's Management Platforms such as ezMaster, SkyKey, or ezMaster AWS.

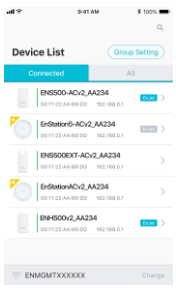
Managed Switch

1. Besides providing PoE power to APs, EWS switch itself is a controller switch.
2. It can also play a role as an intermediate connection coordinator when it is managed by ezMaster or SkyKey.

SkyKey

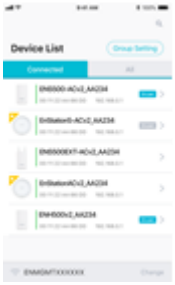
1. With built-in ezMaster, it's capable of transforming plain WLAN into managed Wi-Fi with up to 50 managed APs.
2. It can leverage EnGenius Cloud for remote management access and let user build their own management cloud after device registration to EnGenius Cloud server.

EnSky App



1. This App tool can help management staffs perform network monitoring and collect statistics information from their mobile devices.
2. It also facilitates remote access for on-premise WLAN management.

EnWiFi App



1. It can assist on single device or group configuration.
2. It can facilitate system settings for initial configuration on both Indoor and Outdoor applications.

Quick Set-up and Management Tool On-the-go (EnWiFi App)

EnSky solution is a complete turn-key solution for managed Wi-Fi not only with devices added to the management system but even during the deployment on the go. With EnWiFi App, it will facilitate the initial quick set-up for an AP or group of APs before being added to the management system. This is especially helpful for service providers or operators to do initial deployment on-site with devices just taken out of the box with factory default settings.

For configuration with a single device, upon AP power-up, this unmanaged AP will broadcast a specific management SSID for connection; users can look at the back of AP to match the last 6-digit of MAC address with its corresponding SSID. For ease of group configuration on a bunch of APs sharing common settings, EnWiFi App is also capable of using a selected AP to discover all other APs for further configuration. For WLAN deployment needing coverage extension, besides devices' wireless settings, EnWiFi App will also assist users to set up WDS links to extend the coverage.

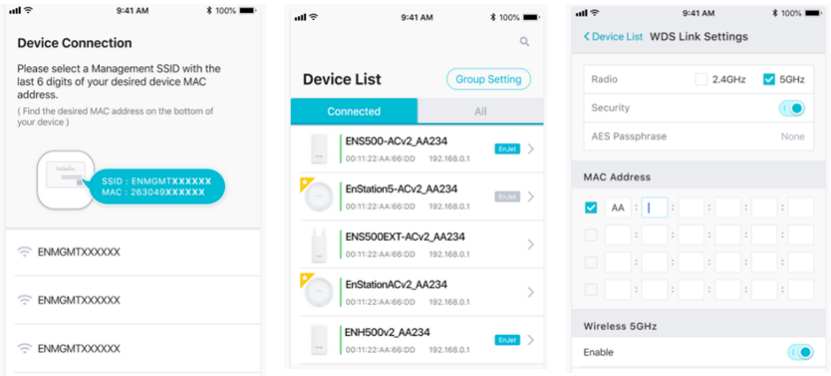


Figure 27 – EnWiFi APP

Summary

EnGenius EnSky Solution is a flexible and robust solution designed to bring Managed Wi-Fi to any size of networks where it can handle multi-requirement to fulfill customers' demands from pro-users to large scope deployment by plug-and-play manner without complicated installation.

A variety of management platforms from EnSky solution such as ezMaster, ezMaster AMI, and SkyKey, offer great flexibility to accommodate on-site and cross-network management; by leveraging EnGenius Cloud, the hybrid design also facilitates remote management through a unified portal access for all deployed networks. The following benefit chart lists its advantages on scalability, mobility, affordability, and reliability:

Scalability

1. Offer networks a variety of management implementations.
2. ezMaster can be installed on VM/AWS platform
3. SkyKey can be worked individually

Mobility

1. Unified Web portal allows users to build their own management cloud for access to deployed networks anywhere.
2. Flexible deployment options accommodate cross-network APs without geographical limits.

Affordability

1. No extra charges for AP licensing and annual subscription fees
2. Modular design for any sized network; no need to spend a fortune to buy costly controllers.

Reliability

1. No extra charges for AP licensing and annual subscription fees
2. Modular design for any sized network; no need to spend a fortune to buy costly controllers.