

Smart AP

Cloud-based AP Controller with OSS/BSS



Technical Overview

Smart AP Controller + OSS/BSS

Overview

Traditional networks consisting of switches, routers, access points and other active network elements are generally managed by a network controller. The controller is responsible for being the single interface for managing and monitoring the health of the network. The controller interfaces with various network elements through the vendor specific protocol and functions as a central NMS for the network.

Recently, the paradigm for network managing and monitoring has changed. Instead of installing a hardware appliance in the network, the controller is installed in the cloud and is designed to manage multiple networks through a single interface. This greatly reduces the cost of network controllers since administrator don't need to install a hardware appliance and can avail the services through the cloud.

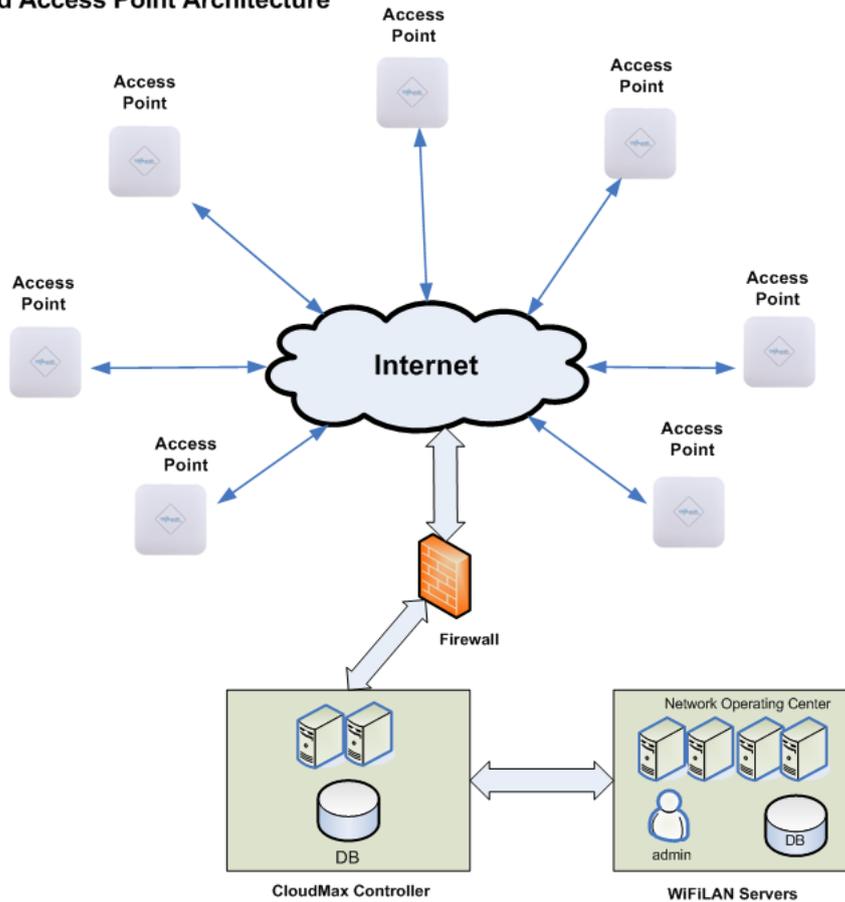
WiFi network controllers are also built on the same principle. Traditionally vendors offer physical controllers along with their access points and swithes. Lately, many vendors have started offering cloud-based controller that offers much more flexibility and scalability compared to the physical controllers.

Wifisoft also offers cloud-based controllers that can be either hosted in public or private cloud. This offers customer with unmatched flexibility to scale their networks and also much cheaper pricing options for managing their networks.

Cloud Controller Architecture

The diagram below depict how the cloud controller architecture works.

Cloud Access Point Architecture



This is a central controller architecture where only access points are installed in remote venues and managed centrally using a controller. The controller communicates with the WIFILAN OSS/BSS within the data center and is responsible for managing and monitoring the remote access points. Each access point is programmed to periodically checkin with the controller and update its configuration. The cloud controller communicates directly with WIFILAN OSS/BSS for captive portal and AAA.

UniMax Access Points

Wifi-soft's range of access points are marketed under the brand UniMax. We offer both indoor and outdoor access points that are reliable, long-range and affordable. The access points come in different models for in-wall, ceiling, wall, pole-mount and outdoor installations.

Each access points functions in three modes – stand-alone, controller-managed and cloud-managed. In case of standalone configuration, the access point can be deployed individually and can be configured separately. The intuitive web interface allows the administrator to configure the wireless, security and other settings on the AP.

In controller managed configuration, the access points work seamlessly with our UniBox controllers. The controller provides an interface to auto-discover, provision and manage the access points. Multiple access points can be managed centrally using the controller.

Lastly, the cloud-managed access points are designed to work seamlessly with the controller in the cloud. The access points can be installed anywhere on the Internet. Each AP is designed to checkin on the dashboard and can be fully controlled from the central cloud interface.

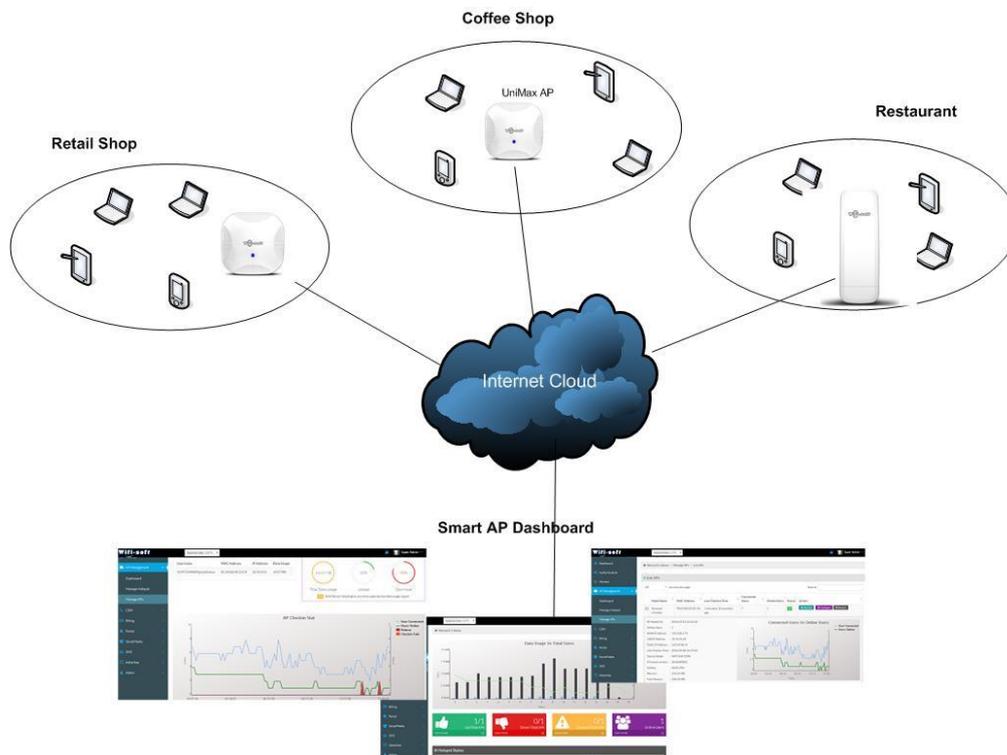
Each AP can be mesh enabled to design a self-healing and self-organizing mesh network. All APs have a hotspot mode that provides captive portal and AAA integration.

Models

The various access point models available from Wifisoft are as follows –

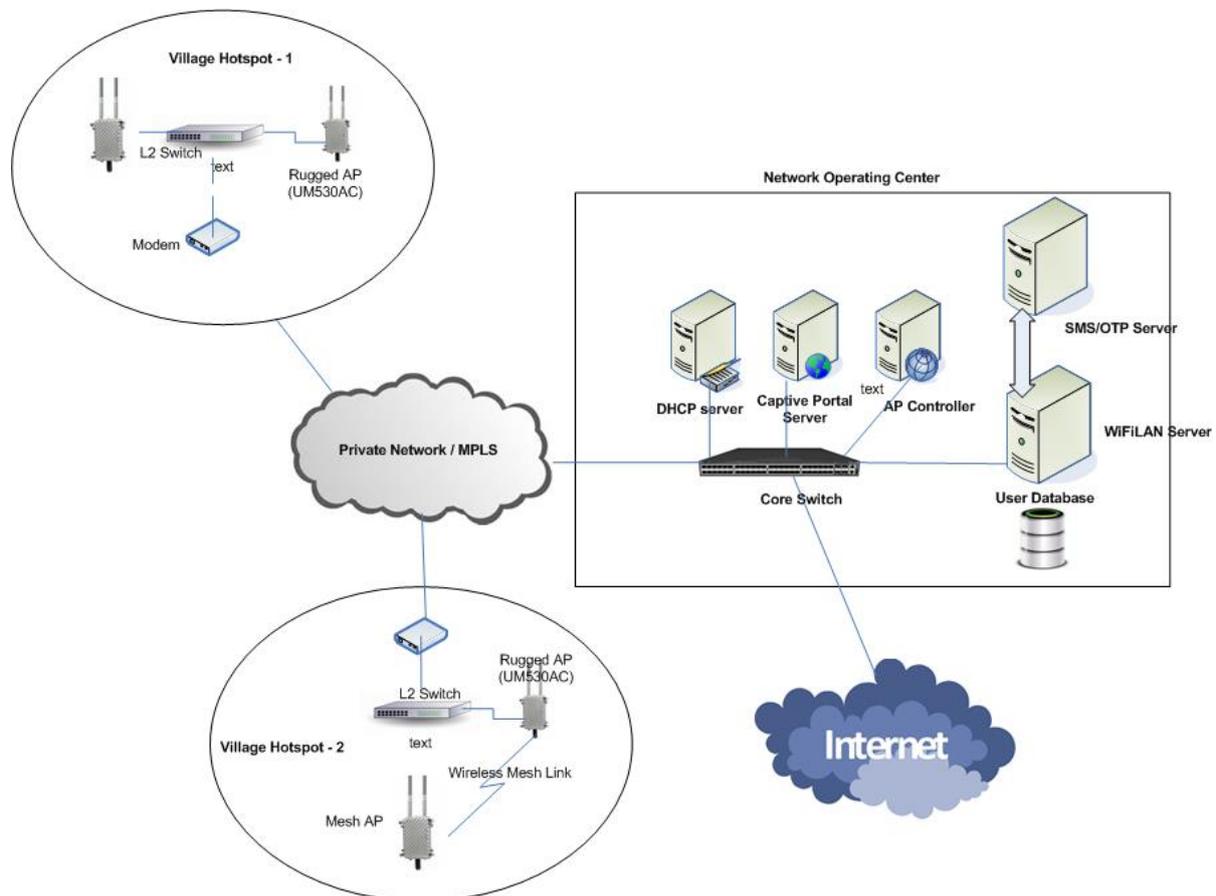
Model Number	Description	Picture
UM-310N	Type: Indoor, Ceiling-mount Band: Single (802.11n) Mgmt: Cloud, Controller, Standalone Antenna: 5 Dbi internal Transmit Power: 500mW RF: 2x2 MIMO 300 Mbps Power: POE	
UM-310AC	Type: Indoor, Ceiling mount Band: Dual (2.4 & 5 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 5 DBi internal (2.4 & 5 GHz) Transmit Power: 1000mW RF: 2x2 MIMO 1200 Mbps Power: POE	
UM-320N	Type: Indoor, Ceiling mount Band: Dual (2.4 & 5 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 5 DBi internal (2.4 & 5 GHz) RF: 2x2 MIMO 750 Mbps	

	Power: POE	
UM-350AC	Type: Indoor, Ceiling mount Band: Dual (2.4 & 5 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 5 DBi internal (2.4 & 5 GHz) Transmit Power: 1000mW RF: 3x3 MIMO 2100 Mbps Power: POE	
510N	Type: Outdoor, Pole/Wall mount Band: Single (2.4 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 5 DBi internal (2.4 GHz) Transmit Power: 500mW RF: 2x2 MIMO 300 Mbps Power: POE	
510AC	Type: Outdoor, Pole/Wall mount Band: Dual (2.4 & 5 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 5 DBi internal (2.4 & 5 GHz) Transmit Power: 1000mW RF: 2x2 MIMO 1200 Mbps Power: POE	
UM530N	Type: Outdoor, Rugged, Pole mount Band: Single (2.4 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 8 DBi (external) Transmit Power: 500 mW RF: 2x2 MIMO 300 Mbps Power : POE	
UM530AC	Type: Outdoor, Rugged, Pole mount Band: Dual (2.4 & 5 GHz) Mgmt: Cloud, Controller, Standalone Antenna: 8 DBi (external) Transmit Power: 1000 mW RF: 2x2 MIMO 1200 Mbps Power : POE	



Network Design

The diagram below shows how the solution will be deployed at multiple hotspots and how it will be operated from the central NOC. The architecture is designed to be scalable, flexible and easily manageable and deploys the cloud managed controller along with the OSS/BSS solution.



Each access point is capable of working as a hotspot router/gateway. It issues IP addresses to the clients and is responsible for captive portal redirection. The captive portal is served from the central web server. All APs are controlled, managed and configured centrally.

APs can use any form of Internet backhaul (Fiber, aDSL, Coaxial, Radio, Satellite, etc). The architecture is designed to work smoothly using any connection from any ISP.

The network operating center will have the OSS/BSS and NMS servers that will be responsible for wide range of functions ranging from AAA services, captive portal, online billing, vouchers, bandwidth and policy management, URL logging, Subscriber management, Accounting, analytics and reporting and more. In addition, it will also host access controllers that will be responsible for handling the traffic and management of remote hotspots.

Access Points form a separate control plane over secure tunnel to the controller. This connection is used to push configuration changes, firmware updates and retrieve the health of each AP periodically.

The AP controller works along with our OSS/BSS solution. The OSS/BSS solution is deployed in redundant configuration to provide maximum uptime and failover. The failover is automatic without human intervention.

The OSS/BSS server may interface with external systems like payment gateway, SMS gateway using their API.

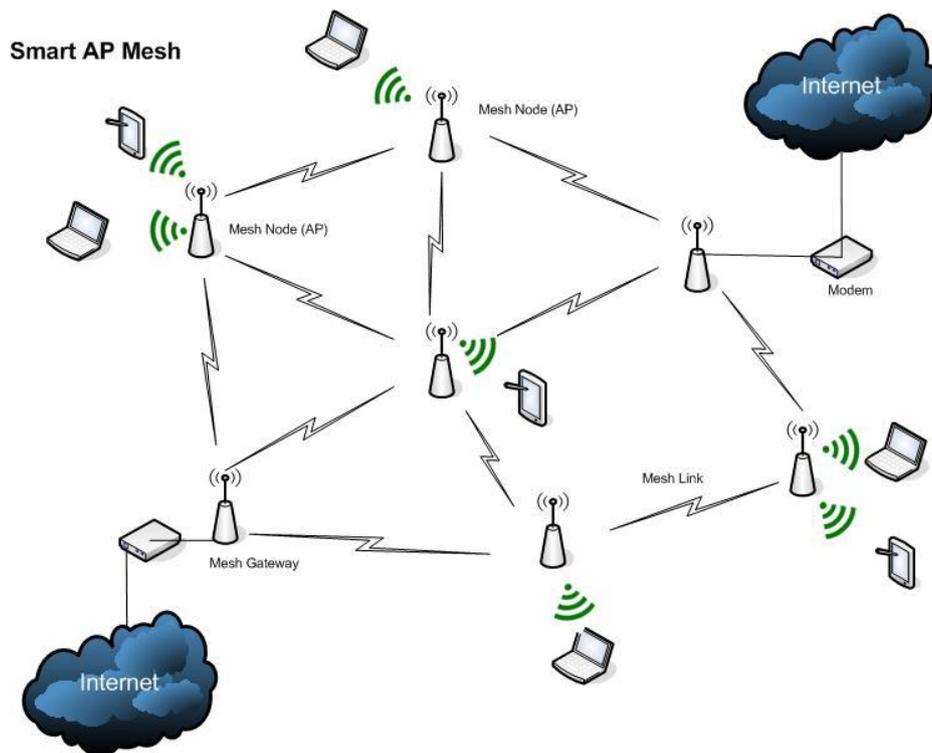
All the customer data is stored in relational databases and automatic backups and archives are maintained by the system.

Meshing

Wireless meshing allows extending the range of the WiFi network by interconnecting the access points with each other using wireless links. Since the mesh needs a dedicated connection, it is generally recommended to use dual-band access points for building wireless mesh.

One of the channels is used to setup connections between the nodes and the other channels can be used for end user access. Wireless mesh need to be dynamic, self organizing and self correcting.

The diagram below shows the mesh capabilities of our Smart APs



Cloud Managed AP Features

1. **Cloud Controller**
2. **AP Discovery & provisioning**
3. **Remote Firmware upgrades**
4. **Multi-tenant administration**
5. **Zero Configuration Setup**
6. **Central Configuration Management**
7. **AP Health Monitoring**
8. **RF Management**
9. **Hotspot Enabled**
10. **Events & Alarms**
11. **Mesh Enabled**
12. **Cloud-based NMS**

Cloud Controller

Smart APs are configured through a cloud-based controller instead of a hardware controller. Each access point is designed to create a secure tunnel back to the cloud server hosting the controller. The tunnel is used as control plane for the access point and all configuration and management traffic is passed between the controller and access point through the tunnel. The cloud controller provides complete management and monitoring functions for the access points

AP Discovery and Provisioning

The controller provides AP provisioning functions that allows admins to configure the access points very quickly. The zero configuration setup makes it really easy to configure and deploy the access points.

Remote Firmware upgrades

The access points need to be upgraded periodically. The cloud controller provides version control and automatic firmware upgrade functions for the access points. Administrator can select the firmware to upgrade on the remote access points. The cloud controller also functions as a repository for the firmware versions.

Multi-Tenant Management

Cloud controller provide multi-tenancy setup for managing access points. So, the same controller instance can be used across multiple customers and each customer can manage multiple networks. All the settings are stored for each tenant and administrator gets a consolidated view of complete network.

Zero Configuration Setup

Each access point is designed to automatically download the configuration and firmware from cloud controller. This makes the access points really easy to setup and configure. The access point can be setup by just installing the access point and adding the MAC address of the AP in the dashboard. The AP will get configured within minutes and will be ready to be used.

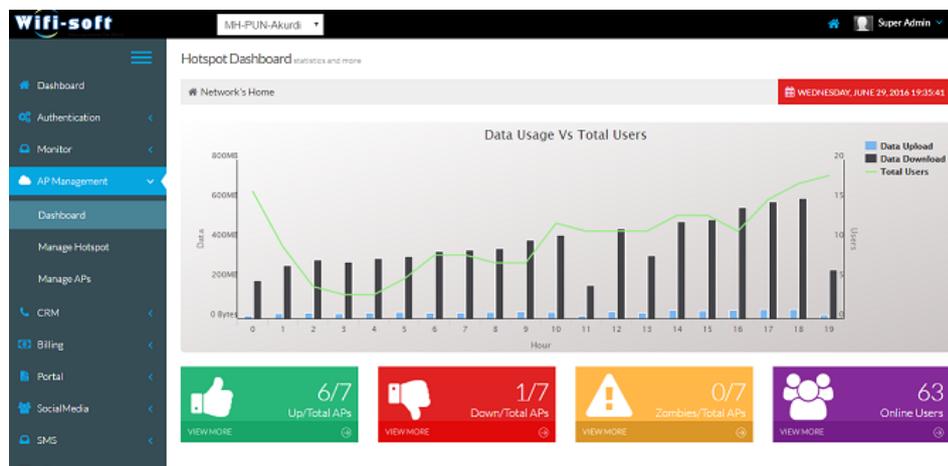
Central Configuration Management

All access point settings are stored centrally on the cloud controller and are pushed to the individual AP when the AP checks into the controller. This allows administrator to

easily update the settings on remote access points. Administrator has an option to update individual settings or settings of all access points in the network or group of networks.

AP Health Monitoring

The cloud controller also functions as a complete NMS and monitoring system for remote access points. The current health of the access point is recorded periodically and displayed on the dashboard. Administrator can also view the complete history of the access point over 24 hours. Statistics like the Tx/Rx rates, bandwidth consumption, connected users, channel utilization are displayed using graphs.



RF Management

The cloud controller provides single console to change the radio settings of the access points. Settings like operating channels, transmit power, SSID, wireless security and more can be configured through the dashboard.

Hotspot Enabled

Each access point is capable of operating hotspot service. The hotspot service consist of a captive portal, RADIUS authentication and user redirection. The access point also functions as a DHCP server for the end clients. When the user enters the login credentials on the login page, the access point is responsible for interfacing with the RADIUS server to authentication the users.

The screenshot shows the 'Hotspot Management' interface. It features a 'Hotspots Summary' table with the following data:

#	Hotspot Name	Status	Access Points	Online Users	Date Created	Action
1	Turnkey	66% UP	Total 3 2 UP 1 DOWN	0	2015-12-10 13:19:22	[Action]
6	Turnkey A13	100% UP	Total 1 1 UP	0	2016-02-15 05:22:15	[Action]
12	Turnkey A4	100% UP	Total 1 1 UP	0	2016-02-15 04:37:46	[Action]
14	Turnkey A6	100% UP	Total 1 1 UP	0	2016-02-15 04:46:27	[Action]
20	Turnkey B11	100% UP	Total 1 1 UP	0	2016-02-15 06:23:49	[Action]
21	Turnkey B12	100% UP	Total 1 1 UP	0	2016-02-15 06:26:13	[Action]
23	Turnkey B14	100% UP	Total 1 1 UP	0	2016-02-15 06:35:34	[Action]
24	Turnkey B15	100% UP	Total 1 1 UP	0	2016-02-15 06:37:14	[Action]
26	Turnkey B2	100% UP	Total 1 1 UP	0	2016-02-15 05:38:34	[Action]
29	Turnkey B5	100% UP	Total 1 1 UP	0	2016-02-15 05:57:36	[Action]

Events & Alarms

The controller is also responsible for showing events and alarms for each access point and network. The events are logged in the controller and administrator can view and search through the events for diagnosing the network problems. The alarms are categorized into different levels and admin can receive alerts for the alarms.

Mesh Enabled

Each dual-band access point is capable of meshing with the neighbouring access points. The mesh is self organizing and self healing. Mesh enables access points to communicate with each other and find the best route to the gateway.