

Virtualization of Wireless Lan Controllers



Executive Summary

There are three main functions typically outsourced by a Wireless AP to a Wireless Controller:

- › Management and Provisioning
- › Control functions such as Client Authentication and RF management
- › Data forwarding



Typical Use Cases of WLAN Controllers

Centralized-Control and Centralized Forwarding

This model typically consists of two main use-cases as follows:

Enterprise-WLAN:

In this case, WLAN controller acts as a central switch, performing the function of all data forwarding on behalf of the WLAN APs. The APs just operate as radio devices (or ports), performing only the wireless reception and transmission. They act as a conduit between the wireless and the wired controller. Once received, all WLAN frames are sent to the controller over a secure channel/tunnel. The WLAN controller or switch operates within the enterprise executing the function of an Internet Gateway. The traffic can be monitored, filtered, shaped and forwarded to appropriate ports on the WLAN switch.

Hotspot:

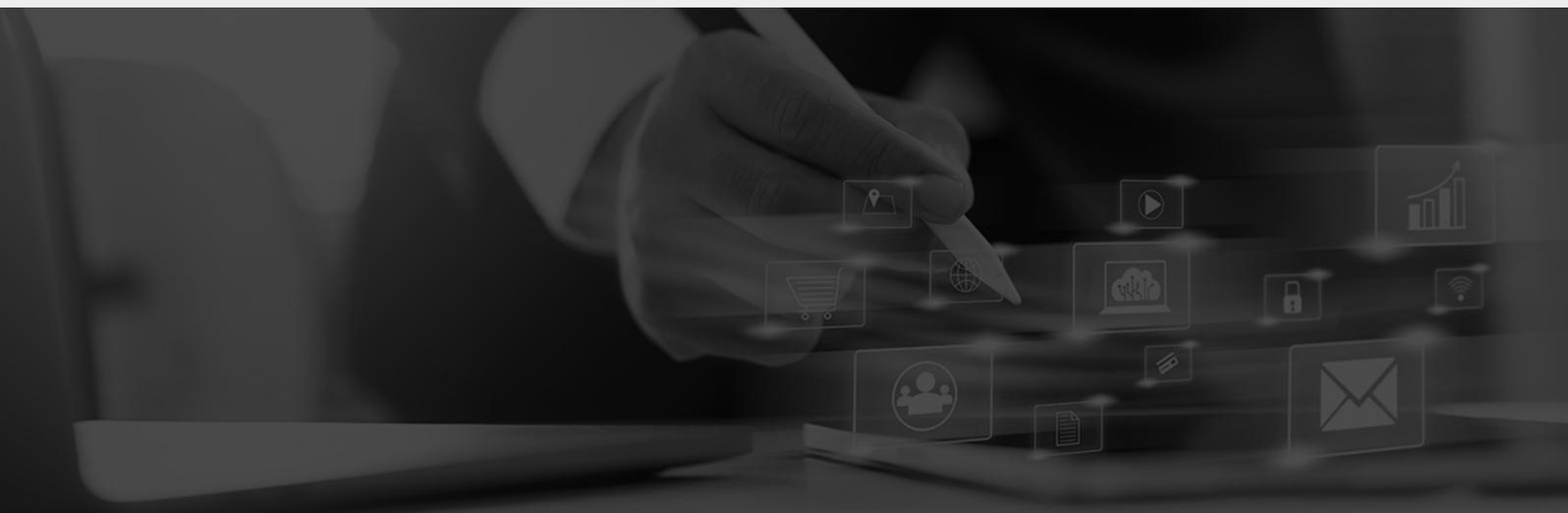
A typical deployment scenario is internet service providers using WLAN to extend the reach of their access networks. The WLAN or hotspots provide internet service to the subscribers and forward all subscriber data traffic to the WLAN Controller sitting at the edge of the packet core network.

Centralized-Control, Distributed Forwarding

Also known as direct forwarding, here APs are directly involved in making the forwarding decision for all wireless traffic. The WLAN controller carries out configuration of the APs and Client Authentication. When the Authenticator function is moved from the AP to the Controller, the AP forwards all station authentication/association related traffic to the Controller. This includes all WLAN management frames and EAPOL frames received from the client. Since there is just one central authenticator, the client need not authenticate every time it switches APs as it roams.

Centralized Management Only

The WLAN controller supports only remote AP provisioning and monitoring. It can only push wireless configuration to the APs being managed. The control functions—client authentication and RF management, and Data forwarding are still performed at the individual APs.



WLAN Function Virtualization

Virtualization technology has made massive strides in the past one decade. It has become one of the key points in any IT planning—be it compute, storage or network. It can dramatically reduce the need for any new, function-specific hardware and enable IT functional components to be deployed on generic, but powerful server hardware along with many other instances of same or different virtualized functional components.

This way both the CAPEX and OPEX costs can be drastically reduced. Virtualization brings with it the benefits of automation which in turn enables more agility and flexibility in deployment.

A new and powerful emerging virtualization paradigm is Network Functions Virtualization (NFV). NFV aims to consolidate many network functions running on diverse network equipment types onto industry standard high volume servers, switches and storage, which could be located in a variety of NFVI-PoPs, including datacenters, network nodes and end user premises.

Enterprise Wireless LAN network planners are also looking to reap the benefits of Virtualization—but therein lies the challenge. Most of the existing cloud-based virtual controller solutions available in the market offer only the cloud-based WLAN management feature.

This although brings the convenience of centralized management, it lacks support for some of the core enterprise WLAN control functions. This is because most of the control and client authentication functions still occur at the Access Point.

Having a localized or distributed control plane implies that enterprise WLAN features such as fast-roaming, load balancing with RF optimization optimal channel selection and dynamic TxPower adjustment cannot be supported on such solutions.

ACL Digital's Virtual WLAN Controller vWLC

ACL Digital's Wireless LAN Controller (WLC) is based on the "central control, distributed forwarding" model. The Controller only indulges in the lightweight management, control and authentication functions, and is not overloaded with the data forwarding decisions.

ACL Digital's virtual Wireless LAN Controller (vWLC) is a virtual WLC Appliance that can be deployed either within the enterprise or on the ACL Digital's OpenStack based cloud framework – CloudNOC. vWLC offers fully virtualized management and control WLAN network functions for enterprise wireless LANs.

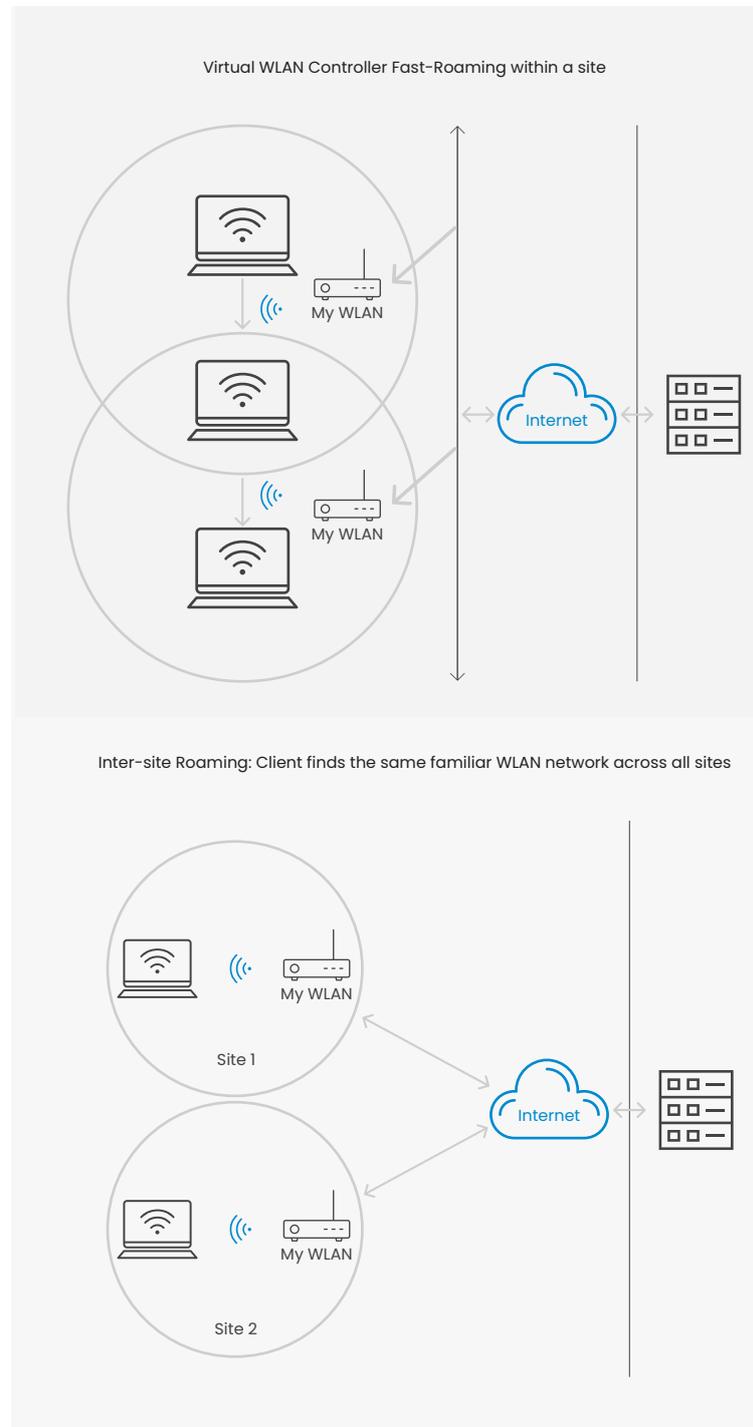
CloudNOCTM is ACL Digital's Cloud Network Functions Virtualization Operations Center (CloudNOC). It helps service providers to virtualize network functions and enables the network operator to add new services faster thereby creating virtual appliances of network services. Virtual appliances (VA) are containers of network functions and services. The hardware infrastructure used here is the standard x 86 platforms optimized for virtualization.

ACL Digital's vWLC Appliance, built on CloudNOC, offers scale elasticity, management and control of Access Points (APs) across globally deployable sites. It offers centralized management dashboard that allows easy interface for scaling up or down as per WLAN network requirements. Each vWLC appliance can support up to 250 APs across multiple sites.

The Enterprise WLAN network can be controlled and monitored from the CloudNOCTM dashboard—a simple management interface which allows you to define your WLAN characteristics and map them to your WLAN networks. Since, the authentication of clients happens at the vWLC appliance, the clients can skip entering passwords to access the same WLAN network as they move across the sites/branches.

This ensures that the client always connects to the familiar WLAN network they are used to on their home site, providing consistent network policies and WLAN features such as RF management, optimal channel selection and Tx power adjustments.

The cloud-based vWLC still supports WLAN fast-roaming within a site, which is made possible by having the vWLC do the entire client authentication. The ACL Digital' cloud based vWLC is a perfect solution for SMB enterprises such as educational institutions, hospitality, and healthcare providers.



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