



KEY FEATURES/BENEFITS

Scalability for Service Providers and Enterprises

The vSCG is a virtualized WLAN Controller that runs in the cloud and can easily support networks with tens of thousands of APs and hundreds of thousands of users for Carriers; and one thousand of APs and tens of thousands of users for Enterprises, along with a rich set of features.

Flexibility

Hot-swappable The vSCG can run in a public cloud where it can provide a managed WLAN service offering for an almost unlimited number of customers or a private cloud where it could be for the benefit of a single network deployment.

Multi-Tenancy and Single Tenancy Support

The multi-tenant capabilities of the vSCG enable many customers to share a single instance of the vSCG, or each managed services customer can have their own virtual instance of the vSCG.

High Availability

The vSCG supports Active/Active clustering across multiple data centers for very high availability.

Cost Effective Centralized Licensing Framework

As part of Ruckus Smart Licensing, customers only purchase licenses for the number of APs that need to be supported and additional licenses can be added for a pay-as-you-grow model. Licenses purchases under Smart Licensing can also be easily transferred to other devices using the cloud licensing portal.

Location Capabilities

The vSCG can enable location-based services. These services require the addition of Ruckus Smart Positioning Technology (SPoT), which is available as a cloud based solution or as a virtual appliance for running in your own datacenter

Big Data Analytics and Reporting

Large-scale Wi-Fi networks generate an enormous amount of data on network performance. The vSCG can upload network statistics to the SmartCell Insight (SCI) platform.

Smart Meshing Support

Integrated Ruckus Smart Mesh Networking technology automates deployment and eliminates the need to run Ethernet cable to every Smart Wi-Fi access point.

Virtual SmartCell™ Gateway

SERVICE PROVIDER AND ENTERPRISE CLASS WLAN CONTROLLER DESIGNED TO RUN IN THE CLOUD

The virtual SmartCell Gateway (vSCG) is a scalable and versatile WLAN Controller designed to run in the cloud. It eliminates the difficulties operators are experiencing with building and managing very large-scale WLAN networks, and it is especially well suited to enabling a managed services offering. The vSCG implements a whole host of new features that optimize the Wi-Fi deployment either in a carrier class with multi-tenant configuration or in an enterprise with single tenant configuration.

By moving the SCG functionality into the cloud, it becomes possible to offer a platform with enormous scalability. This includes support for tens of thousands of Ruckus access points and hundreds of thousands of subscribers per virtual instance. The vSCG provides all control plane functions, with data plane traffic being routed directly from the APs to a separate WLAN gateway. This approach is consistent with the industry trend toward Software Defined Networks (SDN) that split out the control plane from the data plane.

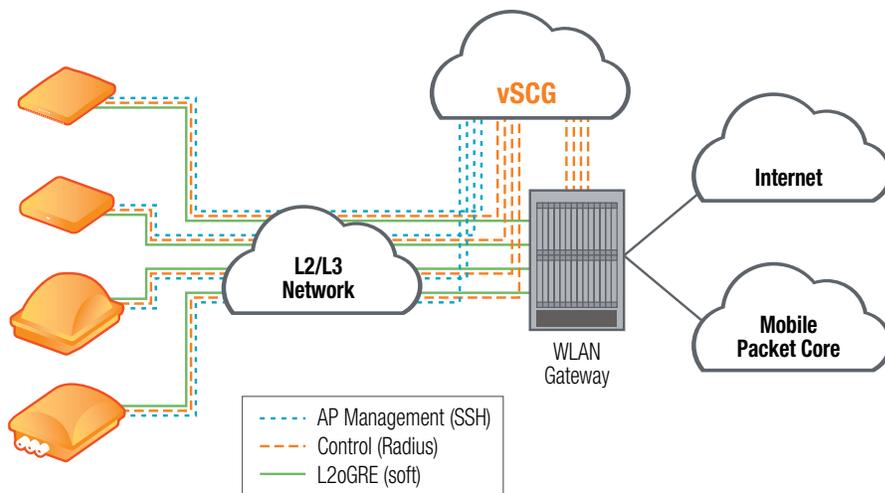
The vSCG can be deployed as a private cloud to support one specific network deployment, or in a public cloud that can support hundreds or even thousands of managed WLAN networks. The vSCG can run on either an open-source KVM hypervisor or the VMware vSphere hypervisor. The hypervisor function creates the virtual machines (VMs) that the vSCG application can run on. As traffic and load increases, the hypervisor can obtain additional resources from the underlying hardware layer to meet the demand. These resources can later be released as circumstances dictate.

The vSCG is especially effective at addressing the enormous opportunity in managed WLAN services for enterprises, small and medium business, and public venues. These organizations see WLAN service as business critical, but often do not have the IT infrastructure to support a truly robust deployment. They are looking to service providers to fill the void here, and the vSCG is a critical tool in enabling a very scalable and cost effective service.

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Figure 1 shows how the vSCG would be deployed in an actual network. All control plane traffic flows between the Ruckus access points and the vSCG in the cloud. All data plane traffic is routed directly from the Ruckus access points to a WLAN gateway, without passing through the vSCG. This greatly simplifies network design as it allows the WLAN Controller function to be consolidated in a national data center, while the WLAN gateway function can reside in regional data center. This approach allows user data to be quickly routed via the most expeditious path to the Internet. Ruckus supports L2oGRE (aka Soft GRE) for this data tunneling function. Soft GRE is supported by most WLAN gateways. The RADIUS Proxy function on the vSCG can greatly reduce the RADIUS traffic load on the WLAN gateways.



Highly Scalable and Fully Featured WLAN Controller

The vSCG has the scale and the feature set for the most demanding service provider applications. It has been designed with Network Function Virtualization (NFV) in mind, a central tenant of which is the decoupling of the application from the underlying hardware. By splitting out the WLAN control plane from the data plane, and then virtualizing the WLAN Controller application, the stage is set for an extremely versatile network deployment that is consistent with emerging industry trends . (See Figure 1.)

The vSCG WLAN Controller function provides feature-rich access point management, including control over their self-organizing smart networking behaviors such as RF management, load balancing, adaptive meshing, and backhaul optimization.

The following are some of the capabilities that are enabled by the vSCG WLAN Controller function.

Wi-Fi Radio Resource Management

The vSCG supports a variety of radio resource management techniques of which the most important is ChannelFly™. This algorithm allows APs to automatically select the optimum 2.4 and 5 GHz channels so as to maximize performance and minimize interference. When properly deployed, ChannelFly can double the capacity of a WLAN network in a high-density environment. The vSCG also manages dynamic mesh deployments that make use of the 5 GHz band to backhaul AP traffic to a point where wireline facilities are available. Mesh backhaul configurations can be dynamically reconfigured to reroute traffic over different paths as conditions change.

Seamless Low-Latency Wi-Fi Handoffs

The vSCG supports seamless handoff for subscribers as they move from one Wi-Fi AP to another in the coverage area. It is not necessary for the user to re-authenticate as they move about. Their credentials are passed from access point to access point. Handoffs are performed rapidly, and there is no impact on the application. The vSCG also supports Wi-Fi RAN load balancing.

Hotspot 2.0 based roaming

Hotspot 2.0 enables seamless network discovery and selection along with seamless authentication using 802.1x/EAP. It represents the future of Wi-Fi roaming and has picked up a tremendous amount of support throughout the wireless industry. The vSCG supports Hotspot 2.0 by enabling Ruckus APs to exchange information with Wi-Fi devices pre-association. The information that is exchanged includes details on roaming consortiums that are supported by that AP as well as information on backhaul capacity and loading. The Wi-Fi device then selects the best available AP and begins the authentication process. Hotspot 2.0 is automatic and requires no user intervention.

New Features

A whole host of new enterprise and service provider class features have been added to the platform including: Ruckus SPoT Location Support, Ruckus SWIPE 2.0 Support, Capacity Based Client Admission Control, Band Balancing, SmartWay Bonjour Gateway, Zero-IT™ Onboarding with User Roles for BYOD (Supports 802.1x with external RADIUS server), JSON/RESTful based APIs for configuration and much more.

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Figure 2: The Ruckus Smart Positioning Technology (SPoT) enables a host of different location based services.

The following section describes some of these new vSCG features:

Smart Positioning Technology (SPoT) Support

This release introduces support for Ruckus' Smart Positioning Technology (SPoT) location-based services. Ruckus SPoT™ is the industry's first cloud-based location technology suite that enables service providers and enterprise customers to deliver a wide range of location-based services. The solution works with ZoneFlex Access Points that track wireless device location by triangulating in on Wi-Fi probe requests. SPoT also includes a set of APIs that power a new generation of mobile applications that can enable a host of compelling location specific applications like mobile advertising, footfall analytics, and indoor navigation. See Figure 2.

Ruckus SWIPE 2.0 Support

The vSCG supports Ruckus Smart Wireless Installation & Provisioning Engine (SWIPE) version 2.0, a mobile application running on Apple iOS and Android mobile devices. SWIPE makes deploying a new AP as simple as scanning the barcode of the AP (serial number and MAC address), entering the AP name, taking a picture of the AP once installed, using a default WLAN to automatically download the IP address of the vSCG to the AP,

and uploading the correct zone for that AP to the chosen vSCG via a standard cellular modem. The AP will then automatically connect to that vSCG using that IP address and get its configuration downloaded.

This makes it possible for the technician to go to the designated location, take an AP out of the truck and mount it, have that AP automatically connect to the correct vSCG, and get itself automatically configured. All of which greatly simplifies the installation procedure. Nothing needs to be pre-configured, APs can be shipped from the factory directly to the site for install by semi-skilled workers.

Call Admission Control

This new feature helps to ensure existing Wi-Fi customers' quality of experience is maintained when the maximum load of the access point is reached. A minimum bandwidth per client can be configured and enforced by monitoring user counts, radio load and average user throughput. When the access point detects thresholds are exceeded that could impact the minimum bandwidth per client it will stop accepting new client connections. This will force the new client to connect to either cellular or another nearby Wi-Fi access point.

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SmartWay Bonjour Gateway Support

The SmartWay Bonjour Gateway allows customers to discover Bonjour services (such as AirPlay, Apple TV and other Apple network services) and other mDNS based products like ChromeCast across VLANs and subnets. Additionally, the SmartWay Bonjour Gateway provides filtering services to limit which Bonjour services are allowed to be shared across network segments. The vSCG is preconfigured with the common Bonjour service types, making configuration of the SmartWay Bonjour Gateway extremely simple. The Bonjour Gateway service can be enabled at the AP to support flexible deployment options supporting larger and more complex networks with Layer 3 isolation between the vSCG and the access point.

AP Survivability for 802.1x, Guest Access and Captive Web-Auth Portal

The vSCG provides a robust architecture designed to be WAN friendly and to provide basic access point functionality when connectivity to the vSCG is lost. In addition to providing continuous service to existing and new clients for open and PSK WLANs, the vSCG introduces AP survivability operation for 802.1x, Guest Access, and Captive Web-Auth Portal WLANs. To enable secure access, credentials are cached for Guest Access operation while a local, onsite AAA server is required for Web-Auth and 802.1x secure access.

WIDS/WIPS Rogue AP Detection and Prevention

The vSCG adds Wireless Intrusion Detection and Prevention System (WIDS/WIPS) functionality for rogue AP detection and prevention. Rogue access points can be automatically detected and flagged as malicious when they pose a significant threat to wireless networks. Malicious rogue access points are identified as being connected to the Ruckus network or those spoofing an SSID or BSSID of any Ruckus connected access point. Once identified as malicious, and if enabled, Ruckus access points can automatically start defending the network.

Guest Access Enhancements

Guest access on the vSCG has been enhanced to provide added functionality and ease of use. Guest credentials can be delivered via SMS using Twilio or email. The guest access authentication page can use a customized logo with welcome text in multiple languages. To support multiple guest WLANs and managed services, multiple guest access templates can be created and used in multiple WLANs. Finally, guest passes can be imported to support events and large groups.

Per WLAN Access Control Lists (L2/L3/L4)

Access control lists can be created and deployed per WLAN to control device access and IP traffic flows. Layer 2 MAC address black lists/white lists can be created to permit or deny individual device access based on MAC addresses of mobile devices. User IP Traffic Profiles allow control over L3 and L4 network traffic flows.

Device Policy Enforcement

Administrators can now apply rules to allow, deny, rate limit, or assign devices to specific VLANs based on the device operating system. Completely managed by the vSCG, this allows segregating network access on a single SSID without the need to maintain user roles or RADIUS/Active Directory attributes.

Multi-Hop SpeedFlex™ Mesh Traffic Testing

The SpeedFlex™ tool now supports multiple test topologies to provide detailed mesh performance and testing capabilities. SpeedFlex can provide automatic testing of each hop along the mesh tree, reporting each access point to access point hop and edge access point to vSCG hop. This detailed analysis of the mesh topology provides easy determination of performance issues and eliminates the need for a truck roll to evaluate performance issues.

RESTful API for configuraton and data export

The vSCG introduces a RESTful API for access to common configuration and monitoring functions. The API enables the vSCG to integrate into existing automated backend systems and provide a 'headless' interface for WLAN system control and monitoring.

Operations and Administration (OAM)

Element management system

With the built-in EMS, the vSCG supports rapid deployment and eliminates the need for separate and expensive management systems. The built-in EMS provides user-friendly full-fledged FCAPS support and can be easily integrated with existing OSS/BSS systems via a variety of interfaces ranging from traditional SNMP or CLI based interfaces to web programming friendly secure API based methods (RESTful JSON). See Figure 3.

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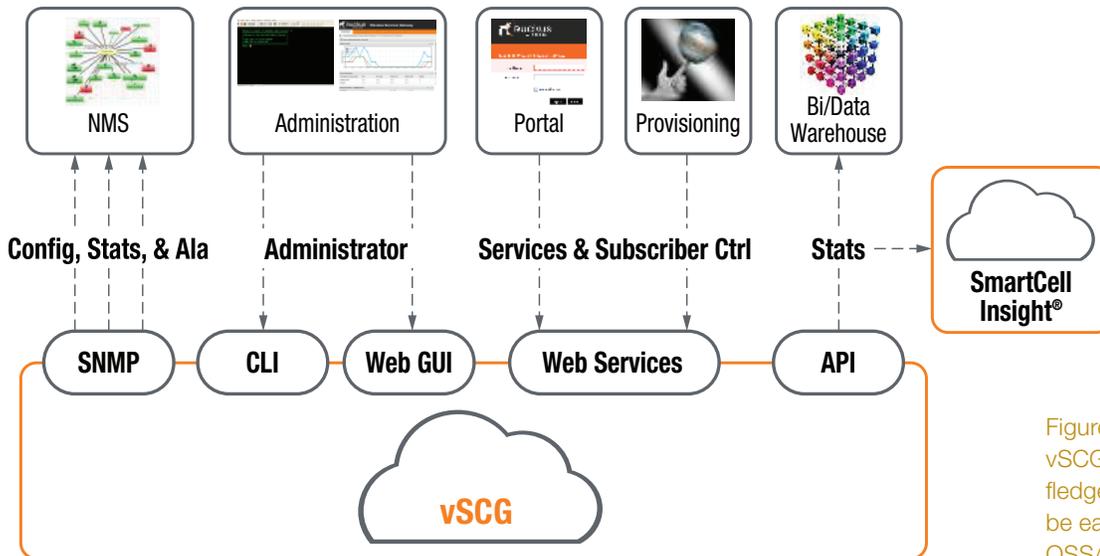


Figure 3: The built-in EMS in the vSCG provides user-friendly full-fledged FCAPS support and can be easily integrated with existing OSS/BSS systems.

Statistics, KPIs and reports

The vSCG's built-in EMS provides rich near real-time statistics on subscribers (including client fingerprinting), APs, SSIDs, mesh backhaul, and the vSCG cluster itself. Reports ranging from hours to years can be generated for a variety of key performance indicators (KPIs) and exported out in multiple formats. For operators seeking richer information reporting, Ruckus also provides the SmartCell Insight (SCI) appliance for long-term storage, sophisticated data mining and analysis, and richer more complex reporting.

Access point configuration and management

Access point configuration is a key function of the vSCG and especially important when rolling out networks with tens of thousands or hundreds of thousands of access points. In a Ruckus network deployment, access points will automatically connect to a pre-determined vSCG instance when they are installed in the field. They will identify themselves via MAC address and serial number, and then their configuration will be automatically downloaded along with their zone number. The configuration information for each AP is downloaded to the vSCG from an external provisioning system via a CSV file or an API (see Figure 4).

Managed Services

The vSCG's fully functional GUI provides concurrent role-based access control (RBAC) for viewing the Wi-Fi system resources and performance. With the support of partitioning for access

in a secure manner, the vSCG allows service providers to give their managed services customers the ability to administer and monitor only the SSIDs over which they have control.

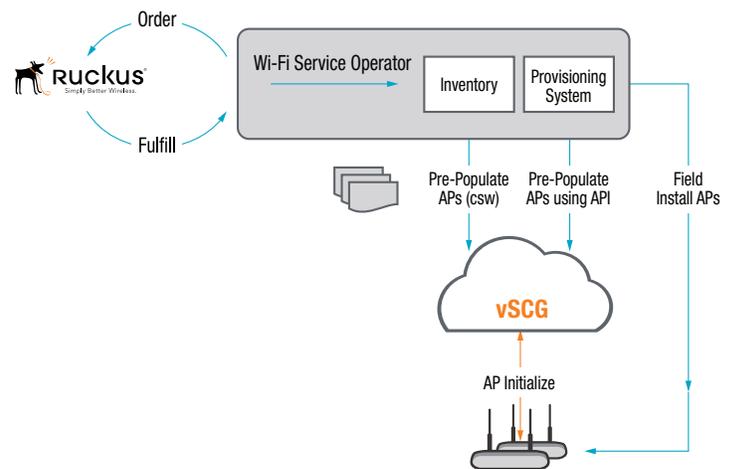
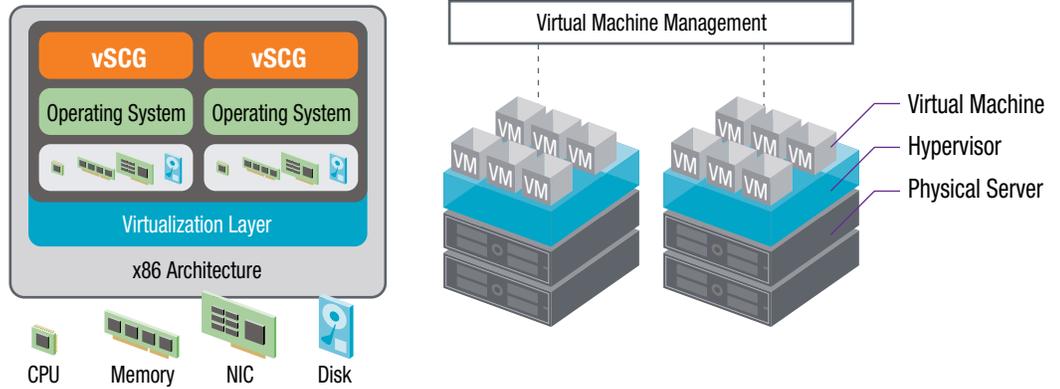


Figure 4: Automatic Access Point Configuration is the process by which APs installed in the field can have their configuration automatically downloaded to them via the vSCG.

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Figure 5: The vSCG runs on a virtual machine established by the hypervisor. It in-turn runs atop the physical x86 blade servers. When deploying the vSCG in a data center, the existing cloud service management and orchestration function can interface with the vSCG through an API. This enables the rapid deployment of large numbers on managed WLAN networks in an extremely cost effective manner.



Virtualizing the SCG

This is a key capability that will accelerate the deployment of managed WLAN services. It involves running the vSCG application and its OS on top of either the KVM or the VMware vSphere hypervisor (see Figure 5). Virtualization enables a whole host of new capabilities including:

- Ability to dynamically add hardware resources as required to support the needs of a specific managed services customer, and those resources can be released just as easily. This enables a much more efficient use of data center resources.
- High availability by enabling the hypervisor to shift applications to different server modules to address failures. The vSCG application can also run in Active/Active mode for extremely high availability.
- The vSCG is well suited to deployment in a service provider's data center and it can support usage-based charging models.
- Managed services customers can be assigned their own VM or they can share a VM in a multi-tenant environment as circumstances dictate. The latter is an extremely cost effective way of virtualizing the SCG function.

Key vSCG features

Monitoring	<ul style="list-style-type: none"> • Enables quick views of the health of the network, APs, connected devices, and alerts • Provides detailed views of the AP status and client data
Remote troubleshooting	<ul style="list-style-type: none"> • Speeds problem resolution across multiple sites with easy drill-down menus • Enables IT to perform troubleshooting commands from the cloud
Simplified deployment	<ul style="list-style-type: none"> • Accelerates large-scale deployments by configuring APs in groups. • Simplifies configuration by applying consistent configurations and firmware to a group of APs • Offers flexible one-click firmware upgrades for all APs or a group of APs, using a cloud-hosted firmware server • Smart Meshing streamlines costly and complex deployment
Reporting	<ul style="list-style-type: none"> • Creates scheduled or on-demand network and security reports • Delivers PCI-compliance reports for compliance
One-click provisioning	<ul style="list-style-type: none"> • Downloads AP configurations from the cloud automatically • Requires no local IT support; any person onsite can plug in and power up the APs

Specifications

SUPPORTED CONFIGURATIONS		
SUPPORTED CONFIGURATIONS MANAGED APs	Service Providers: <ul style="list-style-type: none"> Up to 10,000 per vSCG Up to 30,000 in a 3+1 cluster 	Enterprises: <ul style="list-style-type: none"> Up to 1,024 per vSCG Supports 1+1 cluster
CONCURRENT MOBILES (UEs) / STATIONS	Service Providers <ul style="list-style-type: none"> Up to 100,000 users per vSCG instance Up to 300,000 users per vSCG cluster 	Enterprises: <ul style="list-style-type: none"> Up to 20,000 users per vSCG instance
WLANS	<ul style="list-style-type: none"> Up to 65,534 per vSCG 	
CONTROLLER EXPANSION	<ul style="list-style-type: none"> Up to 4 controllers in a 3+1 active mode, supporting non-disruptive capacity expansion. Future releases will validate larger clusters. 	
CONTROLLER REDUNDANCY	<ul style="list-style-type: none"> Distributed data preserving with up to 3+1 redundancy 	
KEY FUNCTIONALITY		
DATA OFFLOAD	<ul style="list-style-type: none"> Local offload of traffic from the AP directly to the internet or tunneled to a WLAN gateway 	
AUTHENTICATION PROTOCOLS	<ul style="list-style-type: none"> Open, 802.1x/EAP, PSK, WISPr, WPA, WPA2-AES, WPA-TKIP, WEP Fast EAP-SIM re-authentication EAP-SIM, EAP-AKA, EAP-AKA' over WLAN for 802.1x Wi-Fi Locations with the SCG AAA-Proxy functionality enabled 	
AAA SERVICE	<ul style="list-style-type: none"> RADIUS (AAA) PROXY 	
HOTSPOT 2.0	<ul style="list-style-type: none"> Support for Hotspot 2.0 release 1 	
WISPr SUPPORT	<ul style="list-style-type: none"> WISPr 1.0 authentication 	
ELEMENT MANAGEMENT	<ul style="list-style-type: none"> Secure multi-operator login (RBAC) Large scale (bulk) AP management tools Configuration audit trails Alarm and event notification (SNMP V2 / V3) Extensive statistics and reporting Integrated on-board remote accessible EMS RESTful APIs (JSON) CLI 	

Product Ordering Information

MODEL	DESCRIPTION
Virtual Smart Cell Gateway (vSCG)	
L09-0001-SG00	SZ/(v)SCG AP license for 1 AP
L09-0001-RXGW	SZ/(v)SCG GRE to GW tunnel lic. for 1 AP
S01-0001-1LSG	WD Premium Per AP Support, 1 YR
S01-0001-3LSG	WD Premium Per AP Support, 3 YR
S01-0001-5LSG	WD Premium Per AP Support, 5 YR
L09-VSCG-WW00	Virtual SmartCell Gateway, 1 Instance
S01-VSCG-1L00	WD Premium Support - VSCG-RTU, 1 YR
S01-VSCG-3L00	WD Premium Support - VSCG-RTU, 3 YR
S01-VSCG-5L00	WD Premium Support - VSCG-RTU, 5 YR