Solution Overview

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Overview

This document introduces the RUCKUS WAN Gateway (RWG). We will describe the benefits and strengths of RWG, its main features and use cases.

How Are Networks Today

Today's networks are composed of many disjointed pieces, often purchased from different vendors.

The minimum requirements for a typical deployment might include switches, wireless controllers, access points, SD-WAN, firewall, NAC, RADIUS servers, NAT, DHCP servers and management.

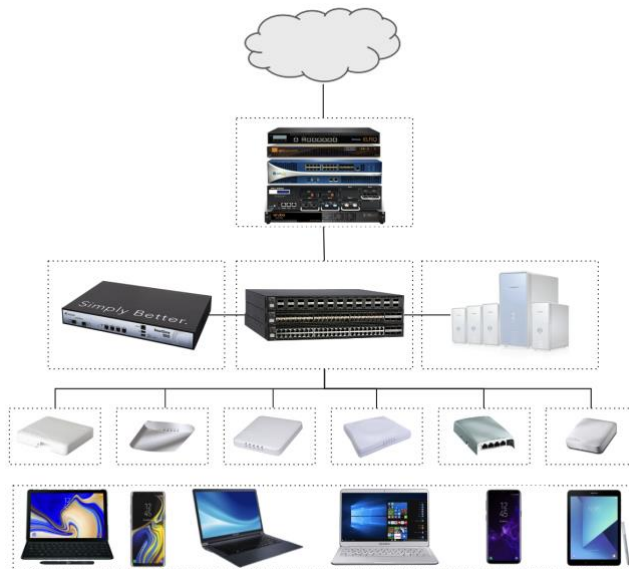Those networks are difficult to configure and to scale.

FIGURE 1 – NETWORK BUILT WITH DEVICES AND SOFTWARE FROM MANY VENDORS

Enterprise Network Requirements

These are some of the common requirements for enterprise networks:

- NAT/cgNAT
- DHCP
- Traffic Shaping
- IDS/IPS/NAC/DPI/UTM
- Static and dynamic routing
- SD-WAN and Uplink control
- DNS, dynamic DNS, DNS overrides
- Event-driven policies
- Site-to-site and client-to-site VPNs
- RADIUS AAA integration
- LLDP/NMS/EMS

And some special requirements might include:

- Microsegmentation/BiNAT pooling
- Forced browser redirect/captive portal.
- Property Management System (PMS) integration
- CC billing/payment gateway integration
- ISP/WAN/LTE-4G OSS integration
- MS AD/LDAP integration
- HTML payload rewriting
- Interstitial redirection
- Content filtering/HTTPS intercept
- Advertising
- End-user analytics

Service Provide Requirements

In addition, service providers might require the following functions:

- Zero touch deployment
- Certificate management
- RadSec
- Configuration templates
- CALEA compliance
- Strong API support
- Roaming
- Database federation
- Subscriber self-service provisioning
- Simplified network management portal

If we combine all the requirements, there might be over 30 features required to run a network!

An MSO (Multiple Systems Operators) has requirements like service providers. In many cases, the appliances are virtualized and chained together. That involves installing containers and running piles of VMs, then add cloud services and a cloud manager. It is also a hard environment to manage and to scale.

Try to answer the following questions:

- What is this MAC address experiencing? What policies are applied to it?

- How much utilization is incurred by this PMS guest?

Try to configure the following:

- Send Corp X's booth traffic to the Internet via uplink Y.

All that functionality, especially some vertical-specific requirements, may lead to a giant, impenetrable mess.

Here are simple things a HSP property owner might want to do:

- See the guest's physical location on a property, tied to a timestamp.
- Check which APs are down, so they can plug them back in.
- Push a button to reconfigure the network for a conference.
- Collect data about the subscribers to build ad profiles.

Engineering's response: That's too hard... That's too costly... That won't scale.

The Solution

All the required network services are tightly integrated in RWG.

SmartZone controllers and ICX switches can be adopted by RWG, greatly increasing the deployment speed for large and complex networks.

RWG also offers a northbound REST API for configuration and monitoring.
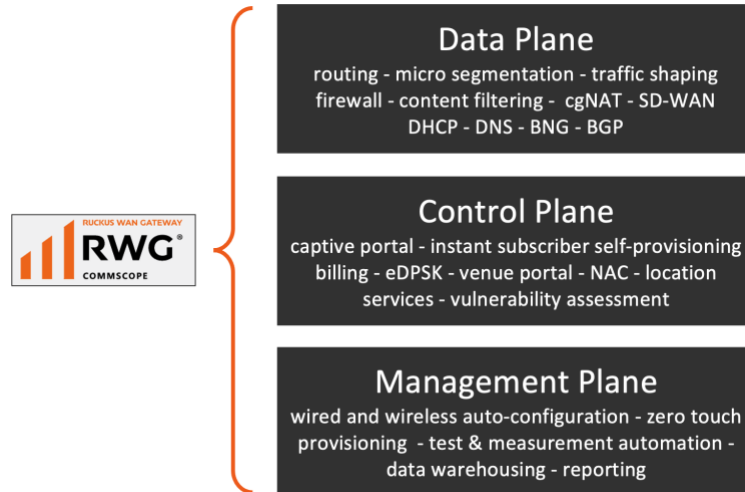

FIGURE 2 – RWG's INTEGRATED SERVICES

Adoption of Devices and Services Integration

RWG adopts ICX switches and SmartZone controllers, then keeps their configurations in sync with its internal repository. When required, RWG can make configuration changes in SmartZone (using REST API calls) and ICX (using SSH). Also, RWG can create a topology map using LLDP.
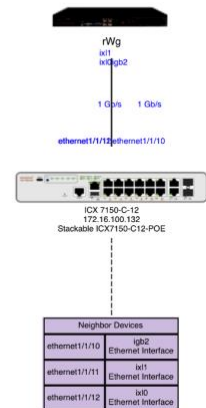

FIGURE 3 – ADOPTION OF DEVICES AND TOPOLOGY MAP

The bottom line is that RWG integrates everything needed in one place, so there is no need to buy dedicated RADIUS servers, captive portal servers, routers, firewalls, NAC software, L7 filtering or SD-WAN devices for your branch office or property. Everything talks to everything. RWG is purpose-built to help enterprise networks and service providers to scale.
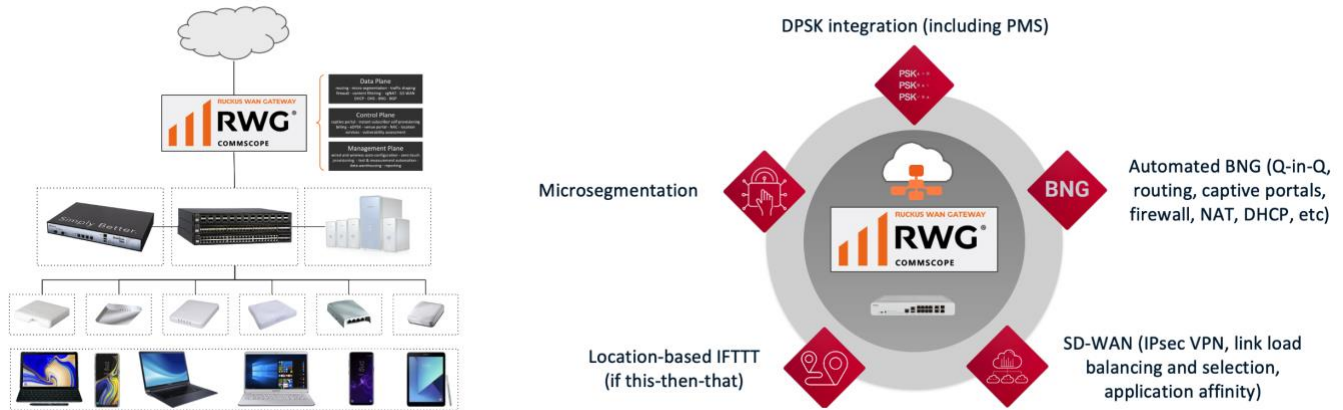

FIGURE 4 – NETWORK BUILT WITH RWG

RWG Scalability

RWG can be installed to run on $400 hardware to bring unmatched functionality to even the smallest networks, and it scales up to run on redundant server clusters to handle ludicrous-size (100,000+ subscribers) large-scale deployments. Dell is a preferred brand to run RWG. Some recommended Dell server models include:

DELL VEP 1425/1445/1485 • 2 GHz, 4 to 16 Core • 3 NICs • 8GB to 64 GB DRAM • 120 GB to 2 TB SSD	
DELL PowerEdge R6515 • 3 GHz, 8 to 16 Core • 4 NICs • 32 GB to 2TB DRAM • RAID with 10 disk bays	
DELL PowerEdge R6525 • 2.8 GHz, 16 to 64 Core • 3 NICs • 32 GB to 4TB DRAM • RAID with 10 disk bays	

FIGURE 5 – SOME OF DELL SERVER OPTIONS

Pack Manager

Pack Manager is a console to manage and monitor multiple RWG instances from a central location. Using Pack Manager, you can monitor the RWG instances health, push config changes to multiple remote devices, or upgrade the RWG instances.

FIGURE 6 – PACK MANAGER

Microsegmentation

Microsegmentation is one of the basic features supported by RWG.

RWG supports L2/L3 microsegmentation in several ways:

- **Per unit:** every device gets its own VLAN and IP subnet.
- **Per room:** personal area networks (PANs) for hospitality, MDUs and MTUs. VLANs and subnets are shared among all devices in the same room. The membership can be defined by DPSKs using the guest's name and room number.
- **Per account:** logical grouping for exhibition halls and conference centers. VLANs and subnets are shared among all devices using the same account. The membership is defined when the user logs into a portal using her/his credentials.

FIGURE 7 – MICROSEGMENTATION

It's very easy to configure microsegmentation using RWG. Hundreds of VLANs and IP subnets can be configured with one click. The required VLANs are configured automatically in RWG and the ICX switch. All IP subnets and DHCP scopes are created in RWG automatically. RWG acts as the NAC and RADIUS server, informing each client which VLAN they will use. Then, the client receives an IP address from the DHCP scope associated with that VLAN.

FIGURE 8 – VLAN INTERFACES AND NETWORK ADDRESSES CONFIGURATION

The WLANs configured for microsegmentation use encryption with physical layer security using 802.1X, PSK or DPSK. There are no "insecure network" messages due to the use of unencrypted WLANs. After authentication, the clients get direct access to their VLAN and IP subnet, as defined by the RADIUS policies configured in RWG.

A splash portal is optional, and it is only required if the authorization process requires the client to enter her or his credentials.

The resulting microsegments support casting, client isolation, customized application policies and it follows the client: wherever they clients are, when the connection is established to the same WLAN, they will be connected to the same microsegment.

PMS Integration

RWG can be integrated with the Property Management System (PMS) guest databases of many large hotel chains, like Marriot, Hilton, and Clarion. It also supports the popular MICROS FIAS specification and comes with a simulated guest database for tests.

RWG uses DPSK mangling. Any valid DPSK will take the wireless client to its dedicated VLAN and IP subnet. For example, a guest in room 328 and last name Smith can use DPSKs like 328smith, smith328, 328Smith, Smith328, etc.

FIGURE 9 – DPSK MANGLING EXAMPLES

RWG uses RADIUS realms to determine the policies used by a WLAN. When PMS integration is configured, RWG pre-generates DPSKs for the guests in the PMS database, and the NAC server consults the PMS guest database to match the DPSK entered by the guests when they access the WLAN.
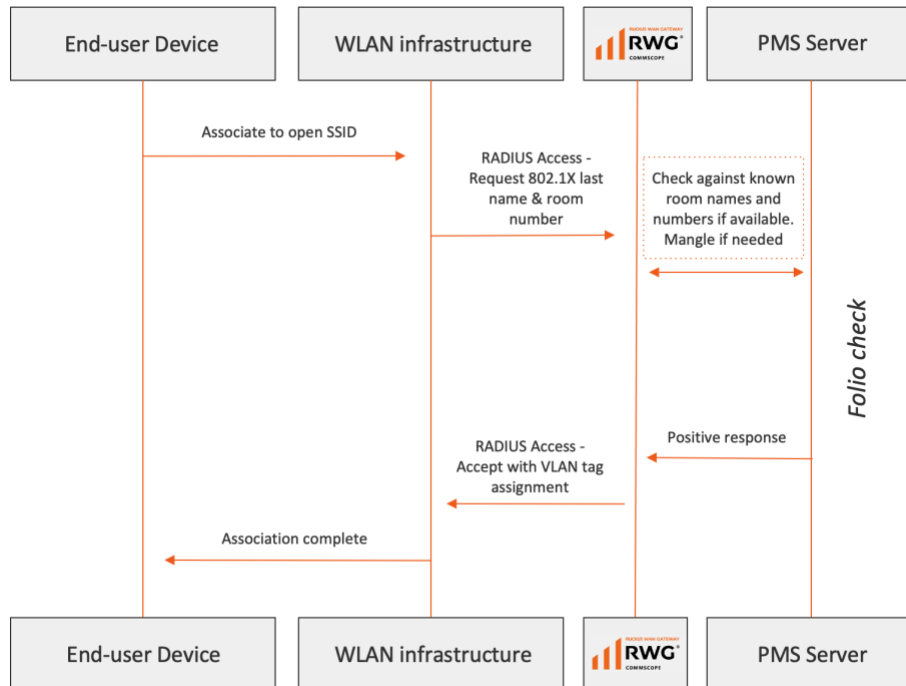

FIGURE 10 – PMS INTEGRATION FLOW

Location-Aware Services

RWG supports location services by proximity to the access points (for connected wireless clients), without requiring any other software. RUCKUS SPoT integration is also supported.

Using the RWG console, a guest can be instantly located by last name, room number, IP, or MAC address.

Portals can also include tools to locate the guests, or for wayfinding. RWG's location services can also be used to determine the guest's geospatial location patterns, for real-time network changes or notifications due to crowding events, and for SMS marketing based on location.

FIGURE 11 – LOCATING GUESTS IN MAPS AND USING THE RWG SEARCH TOOL

Marketing Campaigns

RWG can use policies to configure marketing campaigns. In the example below, when the guest first connects, he needs to inform his mobile phone number. Then, RWG can send SMS messages to the guest mobile phone based on his location or other criteria.
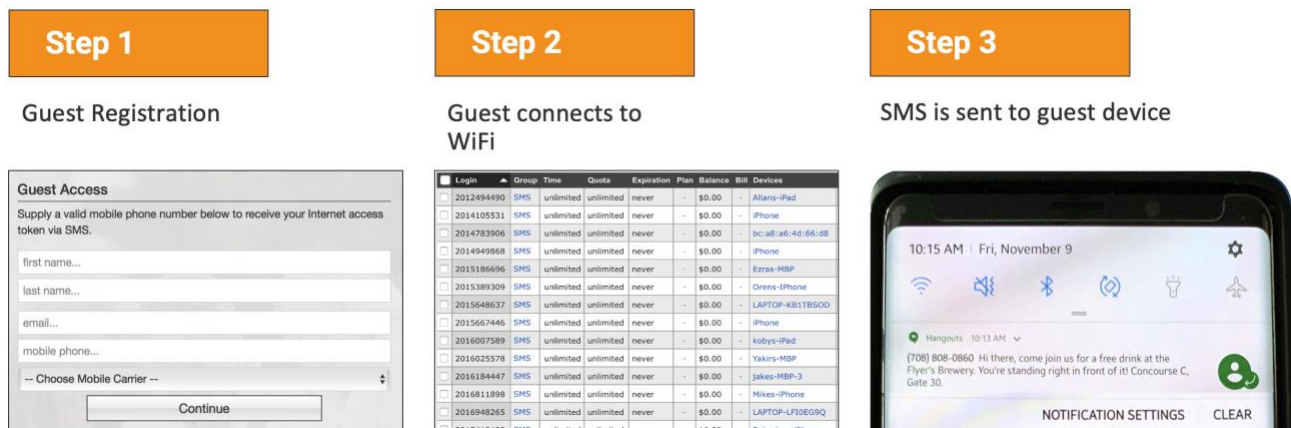

FIGURE 12 – MARKETING CAMPAIGNS

Integrated SD-WAN and Billing

RWG supports basic SD-WAN functions including site-to-site and host-to-site VPNs using IPsec, link load balancing and link selection. For example, for trade shows RWG can use policies and usage plans to display a portal with several ISP options to connect to the Internet. The booth owner can decide which ISP to use – some may have more speed, while others might be cheaper. RWG also includes integration with popular billing systems.
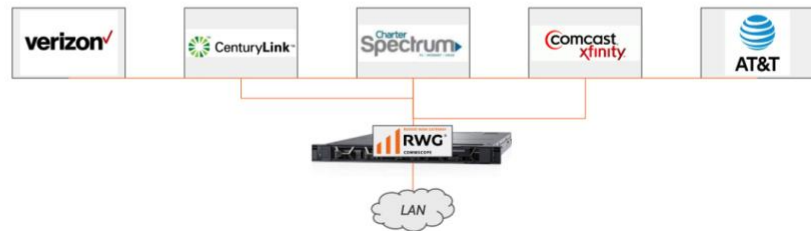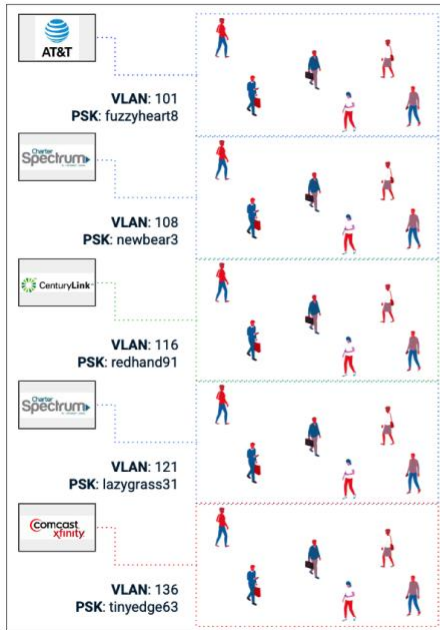
FIGURE 13 – ISP SELECTION

Link load-balancing and link selection can also be used with application affinity. Depending on the application traffic, a different uplink will be used.

Main Verticals

MDU - Apartments, Student Housing, Retirement

- Virtual residential gateway
- Per-person VLAN & configurable router
- Xbox and PS4 works flawlessly.
- Multiple devices integrate flawlessly.
- IoT and Smart Home integration
- Microsoft AD and LDAP integration
- Long-term analytic storage

Reference Site - Arkansas State University dorms – 10K+ living on campus

LPV - Stadiums, Airports, Transit Hubs

- Per-device microsegmentation
- Each device lives on its own L2/L3 network segment.
- What you would expect should be the default in all shared networks!
- Policy driven content filtering (regulatory requirement)
- HTML payload rewriting for advertising.
- SD-WAN optimization
- Optional: PSK used as advertising - force people to type
- Zero touch rotation with digital signage integration

Exhibition Halls

- Wired Integration
- Wireless and wired devices share the same VLAN.
- Automated configuration of switch ports
- Policy driven traffic shaping.
- Guest analytics
- Neutral Host ISP Selection
- Integrated web portal allows exhibitors to purchase a preferred ISP link.

Reference Site - Sydney International Convention Center (360K sq ft)

Hospitality

- Personal Area Network
- Unique VLAN and router for each hotel guest
- Wired integration, in-room set-top-box integration.
- Casting between guest device and in-room equipment
- Property Management System Integration
- Advanced business rule enforcement and orchestration through folio interface
- Write back critical data to the folio (capture email, captured MAC, captured analytics, etc.)
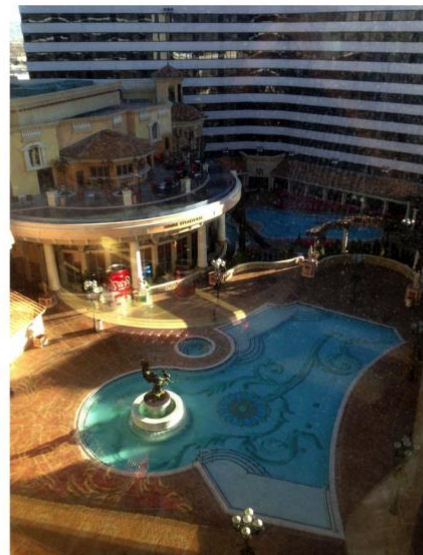
Reference Site - Peppermill Resort Hotel, Reno, 1600 + rooms

RUCKUS solutions are part of CommScope's comprehensive portfolio for Enterprise environments (indoor and outdoor).

We encourage you to visit commscope.com to learn more about:

- RUCKUS Wi-Fi Access Points
- RUCKUS ICX switches
- SYSTIMAX and NETCONNECT: Structured cabling solutions (copper and fiber)
- imVision: Automated Infrastructure Management
- Era and OneCell in-building cellular solutions
- Our extensive experience about supporting PoE and IoT