Juniper Networks Cloud CPE with Ruckus Wireless SmartZone Virtual WLAN Solution

Juniper Cloud CPE and Ruckus Wireless deliver end-to-end managed WLAN services

Challenge

The ability to rapidly deploy managed WLAN services is inhibited by closed, proprietary platforms that restrict scalability and require large up-front investments. Deployment is a time-consuming manual process that does not align with the geographically dispersed branches required by enterprises.

Solution

Juniper Networks automates end-to-end service delivery with a scalable, carrier-grade Cloud CPE solution. When combined with Ruckus Wireless SmartZone virtual WLAN, the solution helps service providers and enterprises simplify, automate, and accelerate the deployment of large-scale geographically distributed WLAN networks.

Benefits

- Uses automation to replace time-consuming truck rolls with a simple mouse roll
- Accelerates multi-location, multitenant managed WLAN deployments
- Provides open standards, APIs, and third-party VNFs
- Delivers optimal WLAN performance with Ruckus BeamFlex+ and SmartCast technologies

Faced with rigid service delivery infrastructures and mounting operating costs, enterprise customers and service providers are constrained in their ability to quickly design and deploy managed wireless LAN (WLAN) services. At the same time, network operations are becoming increasingly complex, driving up the cost of maintaining the service delivery infrastructure. The problem only promises to get worse; with the rapid proliferation of Internet of Things (IoT) devices, smartphones, and tablets, the number of devices accessing the Internet via WLAN and Wi-Fi connections is expected to reach 24 billion by 2020.

Juniper Networks® Cloud CPE solution automates flexible, end-to-end service creation and delivery with a scalable, carrier-grade, multi-location deployment model and an open framework for third-party virtualized network functions (VNFs). Working together, Juniper and Ruckus Wireless have collaborated to deliver a managed WLAN solution that significantly reduces the complexities of network deployment by offering end-to-end automation, provisioning, and orchestration.

The Challenge

Deploying managed WLANs presents a series of multidimensional challenges that need to be addressed, ranging from radio frequency (RF) capacity and roaming to overall coverage and security. These typically lead to very long deployment cycles that require multiple site visits and truck rolls. Each access point and customer premises (CPE) device needs to be configured and provisioned, a complex and costly process that requires highly specialized skills. Meanwhile, ongoing maintenance and operations contribute their own unique challenges. In short, the order and fulfillment process is not compatible with the speed at which businesses must operate.

Juniper Networks and Ruckus Wireless Automate Wi-Fi Deployments

Network Functions Virtualization (NFV) technologies have overcome many of the barriers to network deployment, revolutionizing managed service delivery and life cycle operation. Enterprise customers can now choose from a wide variety of innovative and customized services, available on demand. Thanks to NFV, enterprise and service providers alike are less dependent on rigid physical network infrastructure, manual workflows, and service silos, making them more relevant to their customers. NFV empowers service providers with a more software-centric approach, accelerating service innovation that ultimately increases their competitiveness, revenue, and profitability.

The combination of Juniper's Cloud CPE solution and Ruckus wireless technologies accelerates the deployment of large, multi-location and multitenant managed WLAN services. By leveraging a highly scalable and versatile Ruckus Wireless SmartZone (vSZ) virtual WLAN controller, this joint solution eliminates the difficulties of building and managing very large-scale WLAN networks, making it well suited for managed WLAN offerings.

Juniper Networks Contrail Service Orchestration automates the provisioning, operations, and management of the Ruckus vSZ controller, enabling rapid instantiation of managed WLANs with the Juniper Networks vMX advanced virtual routing solution, as well as the vSRX virtual security and firewall capabilities. The Juniper Cloud CPE solution with Ruckus vSZ WLAN technology can be deployed in both centralized and distributed deployment models.

Centralized Deployment Model

A centralized Cloud CPE deployment model is not only simple and agile; it offers substantial CapEx and OpEx efficiencies for large-scale network deployments. Complex branch routers and appliances at the branch sites are replaced by a simple network interface device (NID) for customer site demarcation and cloud access. Juniper's Contrail Service Orchestration solution centralizes Ruckus vSZ virtual WLAN controller management, provisioning, and orchestration, dramatically simplifying WLAN deployments at remote, geographically dispersed branch sites.

The Ruckus vSZ WLAN controller is a powerful, flexible, easy to use wireless LAN controller that provides a central point for provisioning wireless connectivity across large groups of access points, making new WLAN creation and deployment quick and simple. When deployed in a centralized model, the Ruckus vSZ controller runs in an OpenStack cloud environment hosted by the service provider or enterprise. Lightweight access points are deployed at remote branch sites, which then call home to the cloud-hosted controller for individual provisioning.

Upon discovery of their assigned controller, the access points will initiate an SSH session to the vSZ control plane node, downloading the necessary provisioning and configuration data. Once the provisioning process is complete, the access point will allow the data plane connection for each service.

The data plane method used by each service is dependent upon the deployment scenario. For simple deployments, Ethernet VLANs can be used to tag wireless traffic, while access points can act as simple switches. In more complex topologies with a large number of switches, network requirements can be simplified by tunneling wireless client traffic to a central data plane endpoint. This reduces the number of VLANs to be configured and provides a central point where security policies can be implemented. Tunneling data plane traffic offers the added benefit of providing a seamless handover between access points for VoIP handsets and multimedia devices. Tunneled data plane traffic can be encapsulated in soft generic routing encapsulation (GRE), allowing all client traffic that originates at access points to be terminated on the centralized data plane. The vSRX virtual firewall serves the dual purpose of routing data plane traffic and applying centralized security policies.

In order to add the Ruckus SmartZone Controller to Contrail Service Orchestration, a Kernel-based virtual machine (KVM)-compatible disk image is uploaded to the glance image repository in the OpenStack environment. The VNF package, which consists of a set of JSON-formatted files, is used to define the location of the vSZ image, service configuration templates, and key performance indicators of the VNF. These configuration files can be customized to better fit the needs of each deployed environment. Once added to the platform, the vSZ controller can then be instantiated from within a self-care portal and connected to the tenant network. The vSZ controller can be configured through a secure HTTPS interface, allowing IT administrators to provision secure WLAN services across multiple sites and access points.
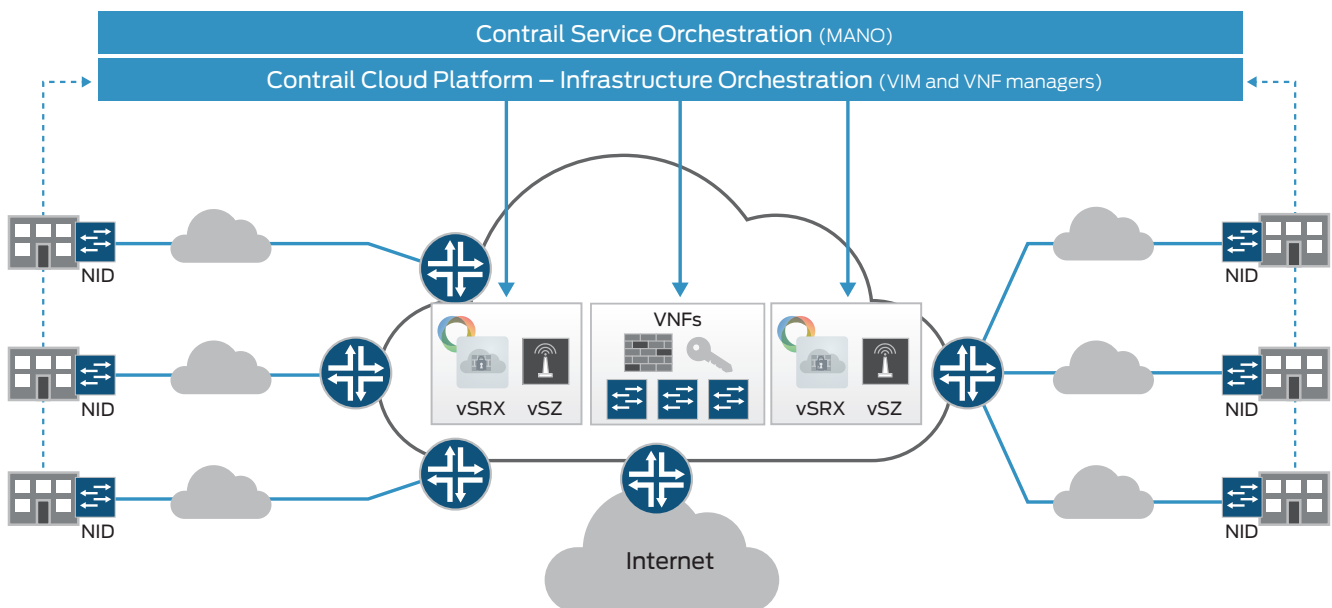

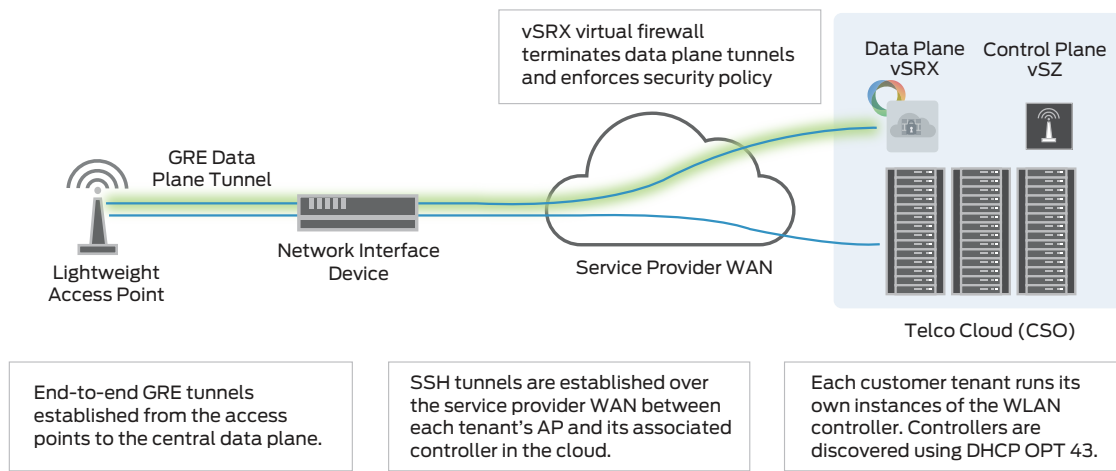Figure 1: Centralized Cloud CPE with Ruckus vSZ WLAN controller

vSRX virtual firewall terminates data plane tunnels and enforces security policy

GRE Data Plane Tunnel

Lightweight Access Point

Network Interface Device

Service Provider WAN

Data Plane vSRX

Control Plane vSZ

Telco Cloud (CSO)

End-to-end GRE tunnels established from the access points to the central data plane.

SSH tunnels are established over the service provider WAN between each tenant's AP and its associated controller in the cloud.

Each customer tenant runs its own instances of the WLAN controller. Controllers are discovered using DHCP OPT 43.

Figure 2: Centralized Cloud CPE with Ruckus vSZ WLAN solution architecture

Distributed Deployment Model

The distributed Cloud CPE deployment model lends itself to medium and large enterprises that want services deployed locally for data confidentiality and control, service agility, and data compliance requirements. The customer site incorporates WLAN access points and Juniper Networks NFX250 Network Services Platform. Customers can also deploy third-party VNFs and SD-WAN on the NFX250, reaping the benefits of an open NFV ecosystem and optimized routing functionality.

The distributed Cloud CPE architecture can be deployed in two modes, each optimized for a specific traffic delivery use case. For deployments requiring optimal traffic delivery with a streamlined set of services deployed across multiple sites in a tenant network, a centralized control plane with local data plane breakout can be deployed. When unique local site-specific services are required with a high degree of per-site multitenancy, a distributed control plane and data plane architecture can be leveraged.

When leveraging a centralized control plane with distributed data plane elements, enterprises can scale their WLAN services across sites while optimizing local traffic delivery. Services are defined and deployed with the Ruckus vSZ controller hosted on data center compute resources, while the data plane for each enterprise site is terminated on a local instance hosted on the NFX250 platform. Access points will discover their data plane elements via the vSZ controller, establish IP tunnels to the data plane endpoint, and simplify the network topology required to deploy large numbers of access points. The data plane element also acts as a central point of security policy enforcement.
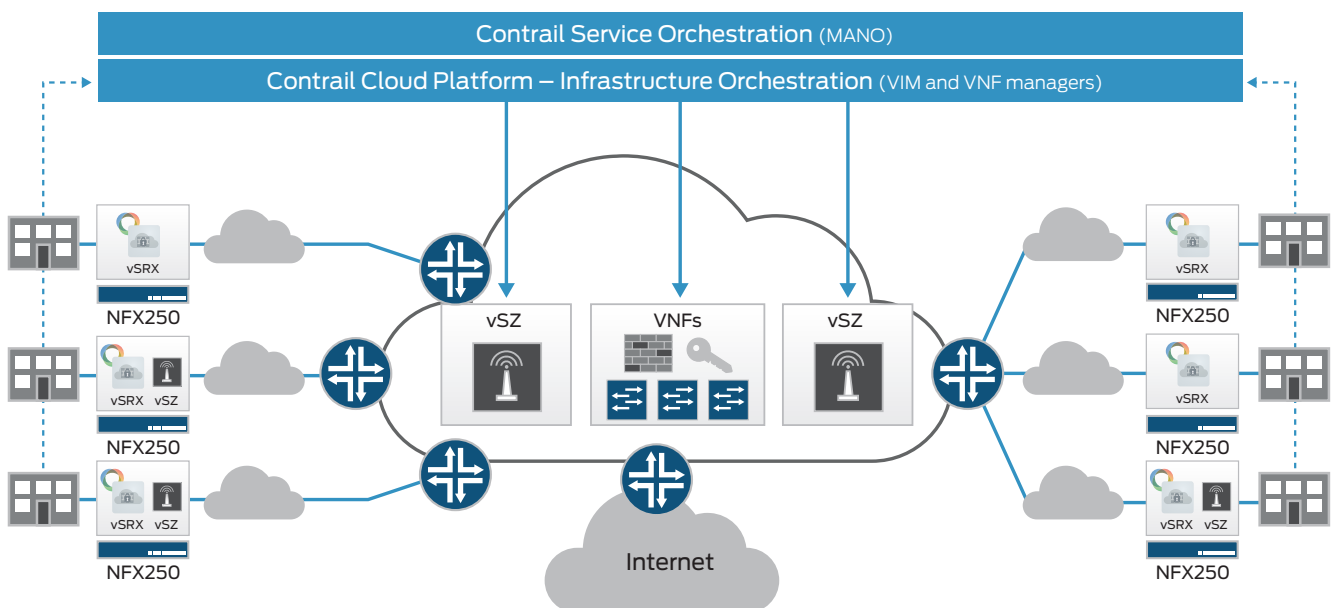

Contrail Service Orchestration (MANO)

Contrail Cloud Platform – Infrastructure Orchestration (VIM and VNF managers)

vSRX
NFX250

vSRX vSZ
NFX250

vSRX vSZ
NFX250

vSZ

VNFs

vSZ

Internet

vSRX
NFX250

vSRX
NFX250

vSRX vSZ
NFX250

Figure 3: Distributed Cloud CPE with Ruckus vSZ WLAN controller and NFX250

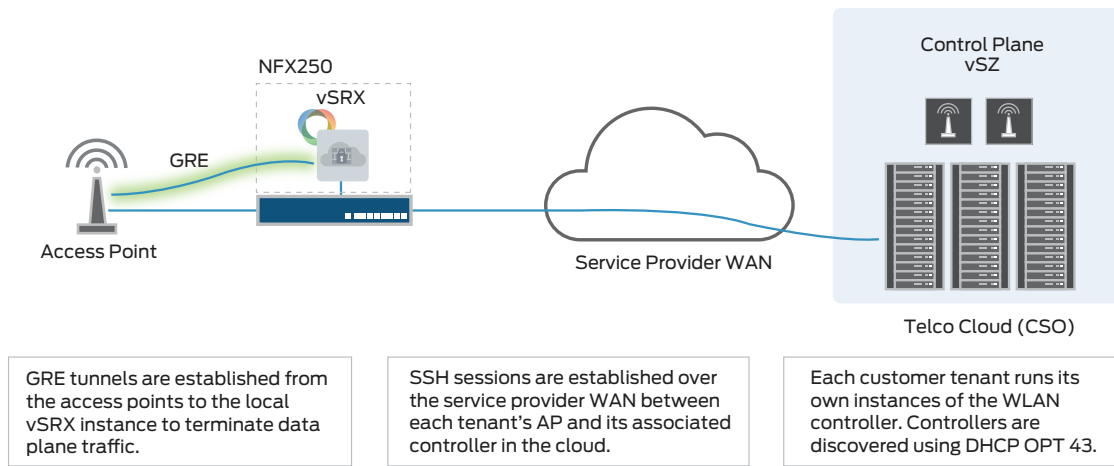| GRE tunnels are established from the access points to the local vSRX instance to terminate data plane traffic. | SSH sessions are established over the service provider WAN between each tenant's AP and its associated controller in the cloud. | Each customer tenant runs its own instances of the WLAN controller. Controllers are discovered using DHCP OPT 43. |

Figure 4: Distributed Cloud CPE architecture featuring a centrally hosted control plane with local data plane breakout

When the distributed controller architecture is deployed with both distributed control and data planes, the maximum degree of multitenancy can be accomplished. This architecture is optimal when a large number of tenants and services are deployed at each remote location. A dedicated pair of control and data plane elements can be allocated on a per tenant, per floor, or per office basis. Each hosted WLAN can leverage its own dedicated resources, providing complete service isolation at the hypervisor layer. Tenant-specific network profiles are mapped to reserve controller instances hosted on the NFX250 platform deployed at the enterprise location.

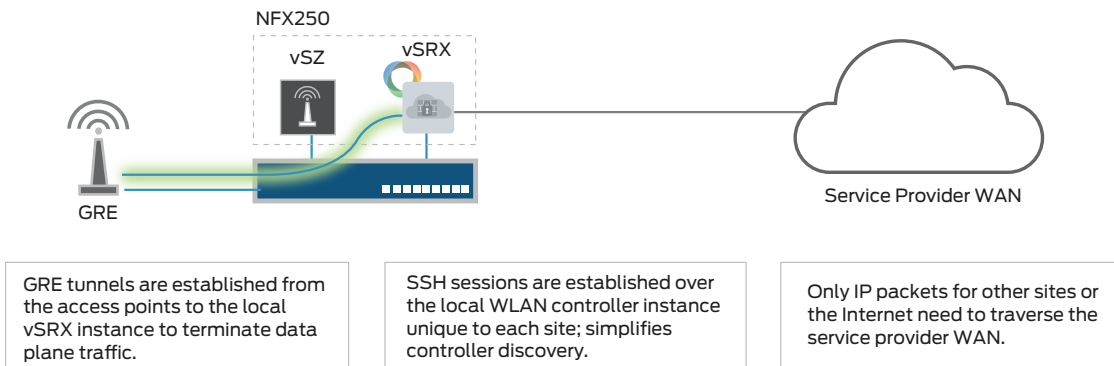| GRE tunnels are established from the access points to the local vSRX instance to terminate data plane traffic. | SSH sessions are established over the local WLAN controller instance unique to each site; simplifies controller discovery. | Only IP packets for other sites or the Internet need to traverse the service provider WAN. |

Figure 5: Distributed Cloud CPE architecture featuring a local control plane with local data plane breakout, optimized for service scale and multitenancy

Solution Components, Features and Benefits

Juniper Networks Cloud CPE with Ruckus Wireless vSZ WLAN controller provides a powerful end-to-end NFV solution that enterprise customers and service providers can easily deploy to configure managed WLAN services.

Juniper, Ruckus Cloud CPE Wi-Fi Solution	Centralized Cloud CPE	Distributed Cloud CPE
Solution Components	*At Customer Site:* • Third-party NIDs or NFX250 Network Services Platform • Ruckus APs *At Cloud (Data Center or POP):* • Contrail Service Orchestration • vSRX virtual firewall and (optional) vMX virtual routing solution • Ruckus vSZ controller VNF (control plane VNF) • Third-party VNFs (optional)	*At Customer Site:* • NFX250 platform with: – vSRX virtual firewall and (optional) vMX virtual routing solution – Ruckus vSZ controller VNF (control plane VNF) – Third-party VNFs (optional) – Ruckus APs *Cloud (Data Center):* • Contrail Service Orchestration • vSRX virtual firewall and vMX virtual routing solution • Third-party VNFs (optional)
Features	• Contrail Service Orchestration – Offers an open NFV architecture built from the ground up using standard protocols, open APIs, and YANG data models – Supports multiple NFV use cases, including centralized and distributed Cloud CPE deployments – Offers an open VNF ecosystem with Juniper and third-party VNFs in the cloud, including Juniper (vSRX, vMX), Ruckus (vSZ), and third-party VNFs • Ruckus BeamFlex+ and SmartCast quality of service (QoS) • Large, scalable deployments (10,000 APs; 100,000 clients per vSZ instance)	• NFX250 platform, open and programmable – Supports multiple VNFs: Juniper Networks vSRX and vMX, Ruckus vSZ, and third-party VNF • Zero-Touch Provisioning (ZTP) with NFX250 • WAN independence with SD-WAN on the NFX250 • WLAN controller VNF at the branch or central site, local data plane traffic switching • Ruckus BeamFlex+ and SmartCast quality of service (QoS)
Benefits	• Easy to automate, manage, and deploy with Contrail Service Orchestration, Ruckus controller, and additional complex VNFs centralized in service provider data center and lean branch with NFX250 or NIDs • Open NFV architecture for best-of-breed solution • End-to-end solution: CPE, access, edge, core, with scalability, performance, and reliability • Carrier-grade network deployments (10,000 APs, 100,000 clients per vSZ instance) • Exceptional user experience and performance under heavy traffic conditions with Ruckus SmartCast QoS and BeamFlex+ adaptive RF technology	• Easy to automate, manage, and deploy with Contrail Service Orchestration centralized in data center and Ruckus Wi-Fi controller VNF centralized or distributed on NFX250 • Open and programmable NFV architecture and APIs for best-of-breed market solution enabled with NFX250, Contrail Service Orchestration • Plug-and-play solution with ZTP on NFX250 and Ruckus APs • Exceptional user experience and performance under heavy traffic conditions with Ruckus SmartCast QoS and BeamFlex+ adaptive RF technology

Summary—Juniper and Ruckus Deliver Superior End-to-End Managed WLAN Services

Juniper Networks Cloud CPE revolutionizes traditional managed services, overcoming the challenges associated with service deployment, agility, management, and evolution by simplifying and automating the creation and delivery of customizable services from a comprehensive, vertically integrated, open NFV solution. The Cloud CPE solution supports multiple flexible deployment models with unprecedented scale for expanding out onsite and scaling up in the cloud. The Cloud CPE solution enhances network performance, lowers costs, and delivers differentiated services that elevate customer satisfaction and ultimately lead to increased profitability.

When combined with the Ruckus Wireless SmartZone virtual WLAN controller, the Cloud CPE solution lets service providers and enterprises alike simplify and cost effectively deploy managed WLAN services. Service providers can quickly and easily integrate best-in-class WLAN solutions into their managed service offerings without integrating and deploying new dedicated hardware.

Next Steps

For more information about Juniper Networks Cloud CPE solution, please contact your Juniper representative, or go to www.juniper.net/us/en/solutions/nfv/cloudcpe/. For information about the Ruckus virtual SmartZone controller, please consult https://www.ruckuswireless.com/.

About Ruckus Wireless

Ruckus Wireless, a part of Brocade, delivers simply better wireless for approximately 70,000 enterprise, service provider, government and small business customers worldwide. The company is focused on technology innovation, partner ecosystems, and customer service—yielding the best possible wireless experience for the most challenging indoor and outdoor environments. For more information, visit www.ruckuswireless.com.

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at Juniper Networks or connect with Juniper on Twitter and Facebook.

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