



# Ruckus Wireless: Using NFV to enable scalable managed WLAN service offerings

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A conversation with  
Steve Hratko, Director of Service Provider Marketing,  
Ruckus Wireless  
By Monica Paolini  
Senza Fili



# Ruckus in the NFV ecosystem

Ruckus leverages the ETSI NFV architecture to enable mobile operators and other service providers to offer managed WLAN services and to strengthen the supporting business case.

Seeing a rapidly growing demand for managed services in the service provider market, Ruckus has developed applications, along with APIs and a Services Manager, that enable mobile operators and other service providers to leverage virtualization to widen the services they offer to the enterprise and public venue markets.

In particular, virtualization enables operators to cost-effectively serve smaller businesses, remote field offices, and public venues that today are often underserved. Virtualization also deepens the relationship with enterprise and public-venue customers by supporting new services, such as location-based ones.

Ruckus's main focus is at the application layer. The SmartCell Gateway, or SCG, is the first function to be virtualized, supported by the

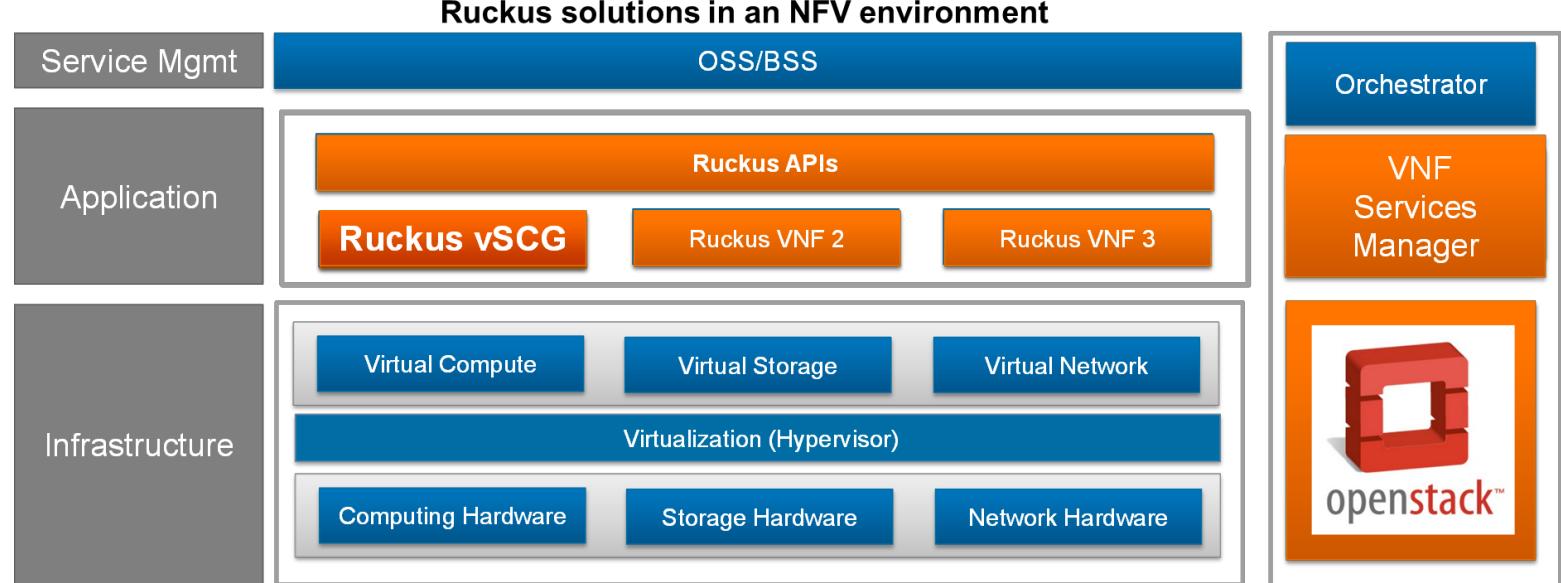
necessary APIs for integration with service management tools (e.g., OSS or BSS). The vSCG runs on open source KVM or VMware hypervisors that dynamically instantiate virtual machines as required in the underlying x86 hardware.

To help operators transition gradually into NFV, Ruckus provides a Services Manager that enables operators to manage the SCG within a virtualized network. The Services Manager rests on top of OpenStack. Ruckus expects that some operators might use a third-party services management system to provide this function.

Built on the SCG-200, which is also available as an appliance-based solution, the vSCG implements all WLAN control-plane functions. All data-plane traffic is routed to a separate WLAN gateway and

from there to the internet. This approach allows (although it does not require) mobile operators to use a distributed network of WLAN gateways that handle data-plane traffic locally, and to concentrate WLAN controller functions in a centralized data center. With this approach, mobile operators can address performance and scalability requirements separately in the control and data planes.

This architecture was designed to give mobile operators and other service providers flexibility in how to provision and operate managed WLAN services. In a multitenant WLAN approach, multiple customers can share a vSCG instance. This keeps costs and time to market down, and is best suited to medium and small customers.



Source: Ruckus

Alternatively – or for a subset of customers – the service provider may allocate a dedicated instance of the vSCG. This solution requires more network resources than the multitenant one, but in both cases new enterprise customers do not require a separate, dedicated piece of hardware, as they would in a non-virtualized environment.

## Using NFV to enable scalable managed WLAN service offerings

A conversation with  
**Steve Hratko, Director of Service Provider Marketing, Ruckus Wireless**

**Monica Paolini.** In this conversation that is part of the Senza Fili report on the NFV ecosystem, we talk with Steve Hratko, Director of Service Provider Marketing, Ruckus Wireless, about NFV in carrier Wi-Fi deployments in the enterprise, public areas, and venues.

Steve, can you tell us about Ruckus's position within the NFV ecosystem and, more generally, within the mobile space?

**Steve Hratko.** Ruckus has long been a provider of Wi-Fi infrastructure equipment to enterprises and service providers. We target different verticals within the service provider community, including mobile operators, cable operators and wireline operators.

We've developed a variety of back-office applications that support Wi-Fi deployments. One of them is the wireless LAN controller, which provides the management function for APs. We also have applications that provide location-based services, as well as applications that are focused on reporting and analytics.

More and more we're focused on taking these applications up into the cloud. In some cases, they started out running on proprietary hardware, such as the SCG-200. This application has now been ported onto KVM and VMware's vSphere hypervisors.

The vSCG is designed specifically to run in the service provider cloud. It can run in their data

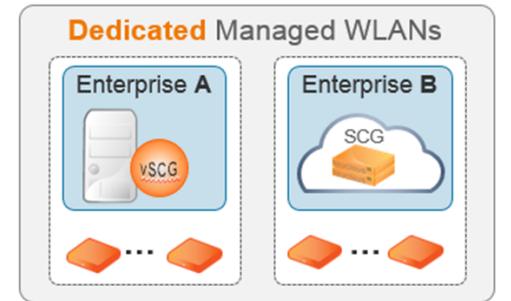
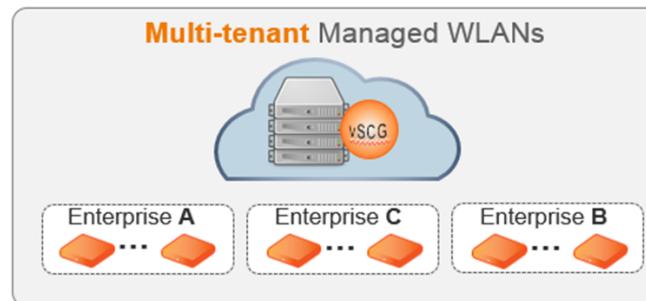
center, allowing them to offer a virtualized wireless LAN controller to support a WLAN service that they would then deploy.

**Monica.** Your solution helps mobile operators and wireline providers to work more closely with the enterprise. Why do mobile operators want to work on enterprise Wi-Fi deployments, and why would the enterprise want to have mobile operators manage some of their Wi-Fi infrastructure?

**Steve.** Ruckus is in a unique position, because we do work with a variety of enterprise verticals, including public venues, and we also work with service providers. One of the things we see is that, more and more, Wi-Fi is becoming a utility for businesses of all kinds, as well as public venues. It's something that we expect to be there.

If you go into an airport, a convention center, a hotel, a coffee shop, you expect Wi-Fi to be there. It's not something that the venue is trying to monetize directly. It's just like electricity, like running water: you just have to have it.

### Multi-tenant and dedicated managed WLAN in a virtualized environment



Source: Ruckus

In some cases, these public venues or enterprises have the expertise to put the network in themselves. In other cases they are looking for a managed service. Their expertise is in running coffee shops, fast food restaurants, airports; they're not networking companies. They're looking for third parties to come in and roll out Wi-Fi infrastructure within their facility, to support not just basic Internet connectivity, but a variety of value-added services, like location-based services.

Mobile operators are great candidates to provide this type of service. We've been working with mobile operators in all geographies, and they're all very interested in providing managed services.

There are several reasons for this. Number one, managed services are an opportunity to sell a service to someone that generates revenue on a monthly recurring basis, which is always a good thing. It also offers the opportunity that, once you get installed in the enterprise or public venue, you can then upsell. You're not just selling Wi-Fi, but selling them backhaul while you're at it.

Second, if you're a mobile operator, once you get a foothold within that account, you could potentially come back at a later date and start to plan for LTE small cells.

Once you get in there with a service that is mission critical for public venues, enterprises and SMBs, you can upsell from there. There's a lot of opportunity for near-term revenue, a lot of opportunity to upsell, and a lot of opportunity to position later on for things like LTE small cells,

because you've got the footprint indoors within the venue.

**Monica.** What are the advantages that mobile operators gain from virtualization in this context?

**Steve.** One of the keys for operators, certainly larger operators, is that when they look at rolling out a managed service for SMBs and public venues. They're not looking to roll it out for one or two customers, they're looking to roll it out for hundreds or thousands of customers, because they do everything at scale.

One of the beauties of virtualization is that it makes it easy for an operator to start turning up a managed service for a large number of accounts. One particular sweet spot is always the SMBs, and many operators focus on that market because SMBs traditionally do not have large IT staffs, or any IT staff.

What happens next is that the Wi-Fi APs have to be deployed on the customer's premises. There are already partners of ours that do that. The service provider doesn't necessarily need to go on site to deploy. They can arrange for that to be done by third parties that specialize in deploying networks in

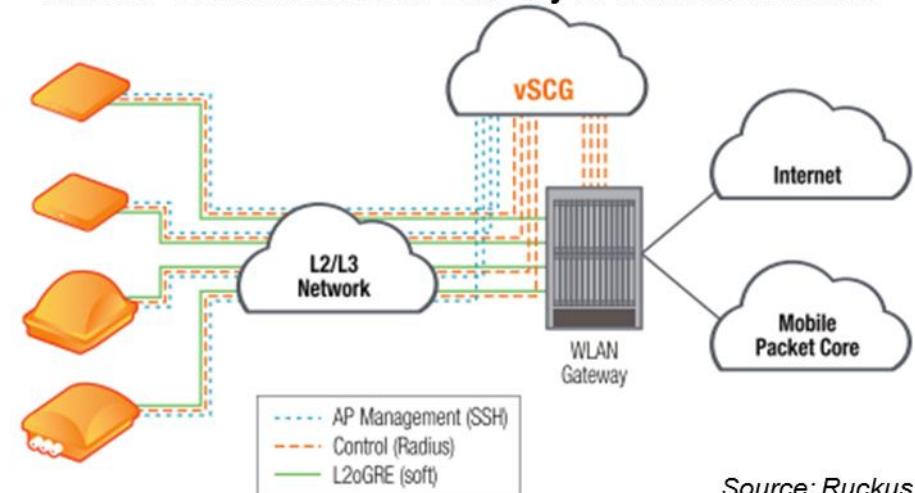
hospitals, hotels, convention centers, etc.

Then all the back-end applications, things like the WLAN controller function or the location-based services function, can reside back in a data center. All back-office functions can be brought back to a centralized data center, where the service provider has a lot of technical expertise and the functions can all be virtualized.

There are a lot of efficiencies that come with taking things like the WLAN controller and location-based technology and virtualizing it, especially when you're trying to build for scale.

In the old days, you would have had to actually purchase the proprietary hardware chassis that the application ran on. Each time you turned up another customer, you might need another chassis. It has to be ordered. It has to be installed, cabled and configured. Not anymore. The operator

### Ruckus' virtual SmartCell Gateway in a mobile network



Source: Ruckus

buys rack after rack of x86 blade servers, and all they need to do is load a hypervisor and spin up another virtual machine, just keep loading vSCG applications onto each instance of the virtual machine, and it's very easy to scale.

**Monica.** That makes it easy to scale from the operational point of view. From a marketing point of view, it gives the operator the ability to actually meet the requirements and the cost expectations of big players, small players, and anything in between. They're much more flexible, in terms of being able to reach the whole market. The enterprise market is, from this point of view, underserved, so there is much more potential than is realized.

**Steve.** Absolutely. This is what will enable managed services to take off, because you can turn them up quickly. It's very cost effective for the operator. And it becomes cost effective for whoever's purchasing the services, be it a public venue or an SMB.

They like the idea of a managed service, but it certainly has to fit within their price point. Technologies like network functions virtualization take a lot of cost out while at the same time speeding up deployments. It takes cost out by getting away from proprietary hardware, and operationally it's so much easier to turn up services, and engineers cost money.

**Monica.** Can you share with us some of the learning that is going on from working with the operators?

**Steve.** Different operators are focusing on different aspects of a managed services offering. The opportunity for recurring revenue by selling a service to businesses is always valuable to them. They all look at upselling. Often there's something else they want even more than the Wi-Fi business. Sometimes it's the backhaul business. In other cases they are focused on site acquisition. This is of great interest to mobile operators who excel at outdoor footprint, where they typically mount a base station on the roof of a building or they lease space on a tower. Going indoors is a completely different proposition, and over the course of the next decade, most of the new cellular builds are going to occur indoors. These builds are driven by data traffic and data is mostly an indoor phenomenon. Data doesn't lend itself to an outdoor, walking-around experience.

Part of going indoors is the site acquisition issue. One of the best ways to move indoors is to look for a service that's mission critical to the people who control the venue. Wi-Fi is such a service. Once you get a footprint with Wi-Fi, it becomes a lot easier to come back with other services. One of those services is small cells. LTE small cells are a very popular topic, and something that really goes hand in hand with a Wi-Fi deployment.

**Monica.** Along with the potential for a shared deployment in terms of real estate acquisition, are there also ways that NFV is going to make it easier for an operator to manage the two infrastructures at the same time?

**Steve.** Absolutely, and we're certainly focused on virtualizing all the back-end systems associated with Wi-Fi.

The same thing is going on in the cellular world. The LTE small cells can talk to an EPC. There's a lot of work going on now, in terms of taking all those traditional functions, like Serving Gateways and PDN Gateways, and virtualizing them as well. It's a trend that's sweeping through the industry. Anything sitting in a data center is going to be running on KVM or VMware soon enough.

**Monica.** In terms of your virtualization solution, what are the functions that it makes sense to virtualize?

**Steve.** In theory, everything can be virtualized, and, in time, everything will be virtualized. Right now, one trend that we see is the separation of the data plane from the control plane.

Operators that we're working with that are deploying managed services country-wide or continent-wide will typically run out of a single data center, or maybe two data centers for redundancy. You could run a managed service across the United States from just two data centers. Those data centers are where all the back-end systems are, the WLAN controllers and the related applications. All the control-plane traffic, the traffic from the APs to the WLAN controller that is associated with managing and controlling those APs, that traffic flows to these data centers.

The actual data-plane traffic, more often than not, does not need to go to a centralized data center. Instead, it goes to a regional data center and then from there to the internet. There'll be some services that require access to data-plane traffic, but you'll do those as close to the user as possible and then take that traffic and move it off to the internet or end network.

It's very common for the data and the control traffic to go in different directions, because they need different types of services. It isn't always this way. Sometimes, the user plane and the data plane will go together, but more and more, they're just fundamentally different in terms of what they need, so they'll get separated out.

In the control plane, anything that's compute-centric is automatically a candidate for virtualizing. Data-plane traffic, which involves high-speed forwarding of packets, may stay on a router, as these platforms can hardware-accelerate these flows. But even the data-plane functions are all headed for the cloud. The compute functions are the easiest things to move into the cloud because they are tailor-made for that environment.

**Monica.** For operators this is a gradual process, and they have flexibility in the choice of a transition path.

**Steve.** It'll go in stages. You've already got a lot of routers that forward packets. You might leave those in place, but take all the compute functions and virtualize those. x86 technology is pretty amazing. You can actually forward packets at pretty high speed in that environment.

**Monica.** Today we're talking mostly about mobile operators, but what are other service providers doing in this space? The enterprise market is attractive to them as well.

**Steve.** The managed services market is really starting to take off. There are certain verticals where it's always been strong, like hospitality. That's a really interesting market for managed service providers, because hospitality is one of those where you can charge for the Wi-Fi service. It's a utility, but it's a utility that you can charge extra for. That always attracts MNOs to that particular vertical, but operators of all kinds are getting involved.

We work with cable operators who are becoming interested in managed services. Wireline operators have long been in the managed services business. There are systems integrators and value-added resellers that are also in the business of providing managed services. It's a market with a lot of different players.

Typically, different managed services providers will go after specific verticals. They might go after the SMB market, hospitality, K-12, and the list goes on. K-12 is a very big market now. It's the largest Wi-Fi market in the world by a wide margin, and it will get even larger with the FCC's E-Rate funding.

Typically, it's a vertical market that you focus on with a managed service. The managed service might involve only managing the back-office systems, and the APs are the responsibility of the venue or business. In other cases, you manage everything. You're providing not just back-office

management, but management of APs on site. Again, even that aspect of the business can be subcontracted out to people that specialize in that function.

There are a lot of different verticals to go after, and there are a lot of different ways in which the offering can be bundled. The anchor for making it all work is to be able to virtualize the back end. Otherwise, it becomes too difficult, too expensive, and too slow.

**Monica.** At Ruckus, how did you decide to go this way? Was it mostly driven by what you heard from operators, or was it an internal, organic evolution?

**Steve.** A combination of factors. We certainly take input from our customers all the time. They often have some of the very best ideas. Also, it was clear that the industry was moving rapidly towards managed services. They are becoming a huge opportunity for service providers of all types, going forward.

As we looked at the challenge with managed services, we realized that you have to automate as much as possible in order to make it scale, so that a large, tier one MNO or MSO can be in a position where they could roll out a couple of hundred customers a week. A large operator will operate on that scale. To do that, everything needs to be automated. Virtualization enables you to do that sort of thing. It's a clear trend in terms of what the end users and the venues want. It's a great opportunity for operators, and they're all coming into it from different directions.

We think broadly about managed services providers, which can include mobile operators, systems integrators, VARs and MSOs that are all going after this market very aggressively. But almost always, they target specific verticals where they try to solve specific problems, such as shopping malls, or K-12, or multi-dwelling units, etc.

**Monica.** For some enterprises, not having to manage Wi-Fi can be attractive. But there are some other enterprises, especially the large ones, that instead might prefer to manage their own Wi-Fi infrastructure.

**Steve.** The real sweet spot, as always, is SMBs. It's smaller businesses that don't have a thousand people in their IT department like a major bank would have, or a large insurance company.

Then there are public venues – i.e., any business that the public is allowed to walk into – such as hotels, convention centers, and airports. In a public venue you have to have Wi-Fi, it has become a utility. They won't come to your business if you don't have it.

Enterprises are a little bit different, in that a large enterprise will have a huge IT staff at their major locations. In some cases, these businesses are set up such that they have a handful of large sites and thousands of remote offices. It may be a Fortune 500 company with 5,000 remote offices, and it is interested in a managed service for those remote offices.

It's the very large enterprises at their major locations where it's a harder sale. The sweet spots are typically public venues and SMBs.

**Monica.** Many of the changes that operators have to do in their cellular networks are not just technical. They are cultural, because virtualization forces them to think of operations in a different way. Are you seeing that as well with the virtualization of Wi-Fi managed services?

**Steve.** There's no question that it's a major transition from the way operators used to do things, but many of the larger operators are well down the virtualization path.

When you operate a major data center, like any of the large, tier-one operators do, they have hundreds of vendors. As much as possible, you can greatly simplify all aspects of running that sort of environment if you get away from proprietary hardware that has to be managed, cabled and powered separately. They're all seeing this, and virtualization is a move they have to make.

Virtualization requires some change within the mobile network operator and cable operator community, but there's no other way to survive. When you're running massive data centers, you have to move everything onto x86 servers, and then just load applications onto virtual machines as appropriate.

It's such a good fit for their environment that it's coming fast. Many of the larger customers are already well versed on all aspects of virtualization. Even as we get down to tier two mobile network

operators, there is still very good knowledge on virtualization. They've been looking at this space for a while. They understand their operational challenges better than any of us, and they know they need to go this way.

**Monica.** If we look at what's going to happen over the next five years, what should we expect from Ruckus Wireless, and from the industry, for Wi-Fi managed services and virtualization?

**Steve.** Managed services are a huge opportunity for the remainder of the decade. It is a great opportunity for operators, in terms of a stronger relationship with key end users, recurring revenue streams, and site acquisition. This is very important, especially for setting up for new technologies like LTE small cells.

We're doing everything we can to enable a more compelling offering. Some of that is by developing a broad selection of Wi-Fi access points that are designed, in some cases, for specific vertical markets. We work with a large network of partners to reach key verticals such as K-12 or hospitality.

We do a lot of work on virtualization. We will continue to focus on developing new applications to operate in a virtualized environment.

Service providers will eventually run most applications in a virtualized x86 environment, but the transition will take time. There's still a lot of proprietary hardware out there, but over the course of the decade that will all change.

## Glossary

<b>AP</b>	Access point
<b>API</b>	Application programming interface
<b>BSS</b>	Business support system
<b>EPC</b>	Evolved Packet Core
<b>ETSI</b>	European Telecommunications Standards Institute
<b>FCC</b>	Federal Communications Commission
<b>GRE</b>	Generic Routing Encapsulation

<b>IT</b>	Information technology
<b>K–12</b>	Kindergarten through 12th grade
<b>KVM</b>	Kernel-based Virtual Machine
<b>L2</b>	[OSI] layer 2
<b>L2oGRE</b>	Layer 2 over GRE
<b>L3</b>	[OSI] layer 3
<b>LAN</b>	Local area network
<b>LTE</b>	Long Term Evolution
<b>MNO</b>	Mobile network operator
<b>MSO</b>	Multiple-system operator
<b>NFV</b>	Network Functions Virtualization
<b>OSI</b>	Open Systems Interconnection

  
**OSS**	Operations support system
**PDN**	Packet data network
**SCG**	SmallCell Gateway
**SDN**	Software-defined network
**SMB**	Small and medium-sized business
**SSH**	Secure Shell
**VAR**	Value-added reseller
**VNF**	Virtualized network function
**vSCG**	Virtual SmallCell Gateway
**WLAN**	Wireless local area network

This conversation is included in the Senza Fili report “The emergence of the NFV ecosystem: Laying the foundation for a new way to run mobile networks,” available for download from [www.senzafiliconsulting.com](http://www.senzafiliconsulting.com).

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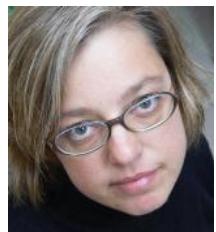
## About Senza Fili



Senza Fili provides advisory support on wireless data technologies and services. At Senza Fili we have in-depth expertise in financial modelling, market forecasts and research, white paper preparation, business plan support, RFP preparation and management, due diligence, and training. Our client base is international and spans the entire value chain: clients include wireline, fixed wireless and mobile operators, enterprises and other vertical players, vendors, system integrators, investors, regulators, and industry associations.

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## About the interviewer



Monica Paolini, PhD, is the founder and president of Senza Fili. She is an expert in wireless technologies and has helped clients worldwide to understand technology and customer requirements, evaluate business plan opportunities, market their services and products, and estimate the market size and revenue opportunity of new and established wireless technologies. She has frequently been invited to give presentations at conferences and has written several reports and articles on wireless broadband technologies. She has a PhD in cognitive science from the University of California, San Diego (US), an MBA from the University of Oxford (UK), and a BA/MA in philosophy from the University of Bologna (Italy). She can be contacted at [monica.paolini@senzafiliconsulting.com](mailto:monica.paolini@senzafiliconsulting.com).