Dynamically Allocate RAN Slice Resources with SLA Assurance

IS-Wireless Collaboration Delivers New Opportunity to Capitalize on Open Radio Access Networks

SOLUTION AT A GLANCE

IS-Wireless and VMware have collaborated to develop a solution that allows CSPs to offer enterprise customers RAN slices with guaranteed SLAs in a dynamic, highly efficient manner. By working with *VMware RAN Intelligent Controller*, the solution exploits the programmatic capability of an O-RAN compliant network to allocate RAN slices dynamically based on demand.

VMware is a member of the O-RAN Alliance. IS-Wireless is also a member of the O-RAN Alliance.

About IS-Wireless

IS-Wireless develops and delivers 5G and 4G Radio Access Network solutions. The company is engaged in multiple deployments worldwide, including at *hub4industry* where together with *hubraum*, the tech incubator of Deutsche Telekom, it delivered an industry-grade private 5G network in Poland for Industry 4.0. Other deployments include *Digital Catapult*, the UK authority on advanced digital technology.

For more information, see *https://www.is-wireless.com/*

The Power of a Programmable RAN

Telcos need a modernized, cloud-based radio access network (RAN) to become competitive in the 5G marketplace. In practical terms, this means a move to the O-RAN Alliance's architecture, which disaggregates the RAN by decoupling the RAN control and management plane from the data plane. The result is much-needed software-defined programmability in the RAN.

The RAN Intelligent Controller, or RIC, is the key functional component introduced by O-RAN that enables this programmability. The RIC abstracts the underlying RAN and presents a standard interface to host applications that implement advanced radio resource management (RRM) functions. As the entire framework is based on open interfaces, these applications can be developed by a RIC vendor, a RAN vendor, the host operator, or by third parties. RIC applications can be used to optimize the network, reduce energy usage, improve subscriber experience, or create new revenue-generating services.

By opening the RAN to the programmatic capability of multiple suppliers, communication service providers (CSPs) are freed from their dependency on the monolithic systems of traditional RAN vendors and empowered to develop — and capitalize on — new services.
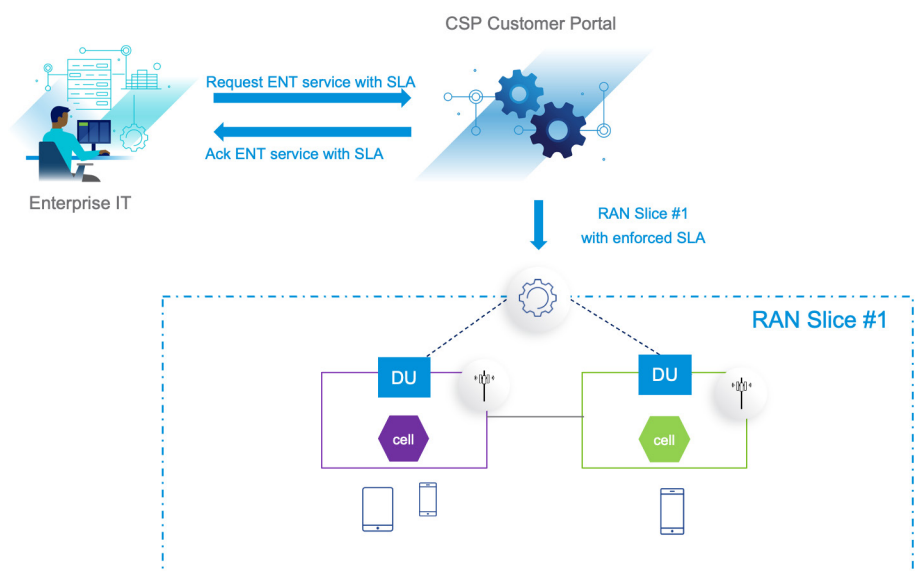

FIGURE 1: How the IS-Wireless xApp works with VMware Distributed RIC to dynamically and efficiently allocate resources for RAN slices with SLAs.

RAN PROGRAMMABILITY

The RAN intelligent controller gives applications from different vendors access to the functions running in the control and management planes of your radio access network, empowering you to program and optimize your RAN by using methods like artificial intelligence and machine learning.

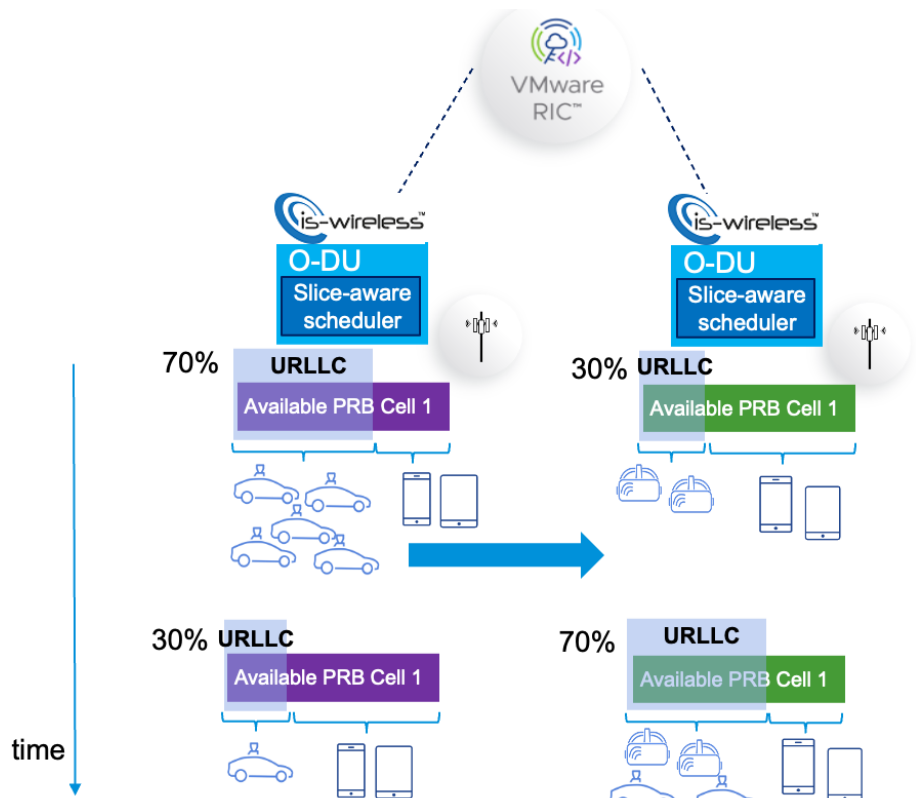*Demo Video: Activating Network Programmability with VMware RIC*

FIGURE 2: Performing slice-aware scheduling by using the IS-Wireless xApp with VMware RIC.

RAN Slice Services

5G network slicing is a technology that allows CSPs to offer dedicated RAN 'slices' to different enterprise customers. Each slice is an independent logical network sharing the same underlying resources as other slices as well as normal consumer subscribers. RAN slices are an attractive solution for both enterprises and CSPs – Enterprises get access to a secure network with guarantees of access and bandwidth for their employees and devices; CSPs get a premium, revenue-generating service offering.

The challenge for CSPs lies in how to guarantee the SLAs that enterprises demand when signing up to the service without impacting the service offered to other subscribers. Enterprises will, of course, expect full access to their slice 24/7 at the contracted bandwidth. But RAN resources are limited, and the success of a telco's business is based on its ability to monetize resources efficiently while signing up as many enterprise and retail consumers as possible. They need to service as many customers as they can without compromising on quality.

Collaborating to Benefit Operators

By working together, VMware and IS-Wireless have drawn on the core capabilities of each company to create new solutions that illustrate how operators can benefit from the move to the O-RAN architecture.

One such solution that the companies have developed allows CSPs to offer enterprise customers RAN slices with guaranteed SLAs in a dynamic, highly efficient manner. The solution exploits the programmatic capability of an O-RAN compliant network to allocate RAN Slices dynamically based on demand from enterprise-customer users.

5G network slicing is a technology that allows CSPs to offer dedicated RAN slices to different enterprise customers. Each slice is an independent logical network sharing the same underlying resources as other slices as well as normal consumer subscribers.

RAN slices are an attractive solution for both enterprises and CSPs: Enterprises get access to a secure network with guarantees of access and bandwidth for their employees and devices; CSPs get a premium, revenue-generating service offering.

The challenge for CSPs, however, lies in how to guarantee the SLAs that enterprises demand when signing up to the service without impacting the service offered to other subscribers. Enterprises will, of course, expect full access to their slice 24/7 at the contracted bandwidth. But RAN resources are limited, and the success of a telco's business is based on its ability to monetize resources efficiently while signing up as many enterprise and retail consumers as possible. They need to service as many customers as they can without compromising on quality.

Tapping RAN Programmability to Control Resources for RAN Slices

The solution developed by VMware and IS-Wireless uses the RAN programmability delivered by VMware Distributed RIC to monitor and dynamically control resources available to RAN slices to meet the SLAs negotiated with enterprise customers. The concept is simple and effective: Based on real-time traffic conditions per cell as reported by O-RAN compliant IS-Wireless software libraries, a PRB Allocation xApp residing on VMware Distributed RIC changes allocates Physical Resource Blocks (PRBs) on each cell to deliver the per-UE minimum throughput required under an SLA while optimizing the use of resources. When enterprise users aren't present in the coverage area, RAN resources can be reassigned for general subscriber use.

With dynamic, traffic dependent allocation of the resources assigned to a slice, the network can handle more overall traffic and users without compromising on Quality of Service. CSPs can build revenue-generating models based on enterprise customer business preferences and differentiate service offerings through SLAs. The solution can release up to 20% extra capacity for the operator to service general customers, while also offering visibility into the performance of each slice.

IS-Wireless Liquid RAN

The IS-Wireless Liquid RAN software can be deployed as O-DU, O-CU or combined O-DU/O-CU. The software can be deployed on various infrastructure (computers, servers, cloud). Hardware requirements depend on the network configuration and performance of the used processor.

IS-Wireless Liquid RAN O-DU is an advanced implementation of O-RAN Distributed Unit. With the unique IS-Wireless approach, flexible split and move of 5G NR functions (protocol stack layers) between O-DU and O-CU units is possible. Main benefits of the Liquid RAN architecture include:

- Flexible software and hardware implementations allow scalable cost-effective solutions.
- Split architecture allows for better RAN coordination, control performance features, load management, and real-time performance optimization.
- Configurable functional splits will enable adaptation to various use cases, such as variable latency on transport.
- Feature-rich software supports various 5G functions, including 5G slicing.

Demonstrating the Benefits of Open RAN

VMware and IS-Wireless have shown that the benefits of O-RAN can be delivered without any loss of efficiency or performance. The two companies have deployed IS-Wireless' O-RAN compliant Distributed and Centralized Units on minimal hardware

VMWARE RIC AT A GLANCE

VMware RIC lets you programmatically manage and control your radio access network (RAN). The RAN intelligent controllers from VMware enable third-party application developers to tap into network data, process it, and use it to modify RAN behavior.

VMware Distributed RIC hosts near-real-time applications (xApps), and VMware Centralized RIC runs non-real-time applications (rApps). These apps introduce new use cases — automation, optimization, and service customization — that fuel innovation across a telecommunications network.

KEY BENEFITS

- **Multi-vendor interoperability and a vibrant partner ecosystem** – use a vendor- and technology-agnostic platform and tap pioneering solutions.

- **Network optimization** – gain network-wide observability and automate optimization with AI/ML.

- **Efficiency** – reduce energy consumption and improve spectrum utilization by using applications from various partners.

RIC SDK PARTNER PROGRAM

A rich developer ecosystem is critical to the successful adoption of open RAN technology. The VMware RIC SDK Partner Program expands access to and simplifies the development of RIC applications. The program gives partners access to RIC SDKs as well as training videos and application developer support. To find out more, visit *https://techpartnerhub.vmware.com/programs/vmware-ric*

LEARN MORE

For more information about the VMware Telco Cloud or VMware RIC, call 1-877-VMWARE (outside North America, dial +1-650-427-5000) or visit *https://telco.vmware.com/*

using a real-time operating system and then taken advantage of the orchestration and automation functionality of *VMware Telco Cloud Platform RAN*. The solution was based on a single node Kubernetes cluster deployed on Photon OS, with orchestration and automation for CNF lifecycle management provided by *VMware Telco Cloud Automation*. In a lab test environment, VMware Telco Cloud Automation onboarded the CNFs for the IS-Wireless Centralized Unit (CU) and Distributed Unit (DU) and instantiated them with user-supplied configurations. In our test deployments, it takes 10-20 minutes to get a fully functional RAN site ready to serve end users.

VMware Telco Cloud Platform RAN is a cloud-native RAN solution that is designed specifically for running RAN functions. It provides a RAN modernization path for CSPs evolving from legacy Radio Access Networks (RAN) to virtualized RAN (vRAN) and on to Open RAN. VMware Telco Cloud Platform RAN is powered by field-proven virtualization, carrier-grade Containers as a Service (CaaS), and cloud-smart automation.

VMware and the Path to a Disaggregated, Programmable RAN

For the past five years, VMware has been methodically introducing new telco cloud solutions and changing expectations in the service provider industry about modernization. With an established footprint in telco cloud deployments globally, VMware has been expanding its capabilities to address the challenges in the disaggregation of the RAN.

With a horizontal platform that enables workload consistency from the core and the RAN to the public cloud, we've revealed what is possible – simplicity, speed, agility, and far-reaching automation. The objective is to enable our customers to modernize their entire networks, simplify their operations with end-to-end consistency, and further disaggregate their RAN.