Telco Cloud Platform RAN

Modernizing the Radio Access Network to Automate Lifecycle Management and Monetize 5G Services

AT A GLANCE

VMware Telco Cloud Platform RAN™ is powered by field-proven virtualized compute coupled with VMware Telco Cloud Automation™ and VMware Tanzu™ for Telco RAN, a telco-grade Kubernetes distribution. VMware Telco Cloud Platform RAN paves a clear path to RAN modernization by enabling CSPs to evolve from their traditional RAN to a disaggregated vRAN and, ultimately, open RAN.

KEY BENEFITS AND CAPABILITIES

- Run virtualized baseband functions, virtualized distributed units (vDUs), and virtualized central units (vCUs) in accordance with stringent RAN performance and latency requirements
- Gain flexibility and agility while maintaining equivalent performance to bare metal solutions
- Automatically provision underpinning infrastructure resources at the time of vDU and vCU instantiation for RAN optimization
- Use the same common platform to disaggregate the RAN now and migrate to open RAN in the future
- Use a security-hardened Linux host called Photon OS that is optimized for running containers on VMware vSphere®
- Isolate vDUs and vCUs on virtual machines and the VMware hypervisor, VMware ESXi™, to establish strong security boundaries
- Automate lifecycle management of infrastructure, Kubernetes clusters, vRAN functions, and 5G services
- Monitor and manage your RAN for high availability with closed-loop automation and remediation

Disaggregate the RAN to Start Solving Lingering Problems

While communication service providers (CSPs) have started virtualizing, and in some cases containerizing, their core networks, the radio access network (RAN) is still often being built and operated with legacy purpose-built hardware equipment because of the stringent requirements associated with RAN. To lower the costs of deploying 5G, CSPs must disaggregate RAN functions so that different virtualized RAN (vRAN) functions can be instantiated on a horizontal platform and deployed at the locations that best serve their functional purposes.

Another key rational for disaggregating the RAN is to use a consistent virtualization architecture and cloud-native principles in 5G networks, from the core to the RAN. This move becomes particularly important when CSPs construct logical end-to-end networks tailored to different 5G services. As a result, the ability to host a multitude of network functions regardless of location, to automate operations, and to assure the uptime of services across 5G networks are integral aspects of modernizing the RAN.

VMware Telco Cloud Platform RAN Blazes a Trail to Modernization

VMware Telco Cloud Platform RAN is powered by field-proven virtualized compute solution coupled with Tanzu for Telco RAN, a telco-grade Kubernetes distribution, and *VMware Telco Cloud Automation*. The platform paves a clear RAN modernization path: CSPs can move from their traditional RAN to vRAN now and start to move in the direction of open RAN.

VMware Telco Cloud Platform RAN helps CSPs disaggregate RAN functions on a horizontal platform optimized for the RAN using the Intel FlexRAN software reference design. The same platform becomes the foundation for moving to open RAN by giving CSPs the flexibility to evolve toward the future without disrupting their operations and overhauling their network design. Furthermore, VMware Telco Cloud Platform RAN simplifies CSPs' operations with consistency across distributed RAN sites, regardless of the vRAN functions each site hosts. Simplified operations are achieved through centralizing cloud-smart automation, which reduces OpEx.

Key Capabilities and Benefits of VMware Telco Cloud Platform RAN

VMware Telco Cloud Platform RAN is a cloud-native RAN solution designed specifically for running virtualized baseband functions, virtualized distributed units (vDUs) and virtualized central units (vCUs), meeting the stringent performance and latency requirements inherent to RAN.

RAN-Optimized Platform

VMware Telco Cloud Platform RAN enables CSPs to deploy multi-vendor DUs and CUs on a common horizontal platform at RAN sites best suited to perform their functional purposes. The platform provides RAN-specific performance enhancements, such as the following:

AUTOMATION AND PROGRAMMABILITY TO OPTIMIZE THE RAN

VMware Telco Cloud Platform RAN delivers the automation and programmability needed for a 5G future and the rise of edge computing.

- Programmable resource provisioning optimizes where to locate DUs and CUs. When you onboard a virtualized RAN function, you can programmatically adjust the underpinning platform availability and resource configuration based on the function's requirements.
- To meet high-performance, low-latency requirements, DUs can be placed at the far edge near users.
- CUs, which might not need to meet the same high-performance, low-latency requirements as DUs, can be automatically placed or dynamically moved to be closer to the core to maximize resource utilization.

These resource provisioning capabilities of VMware Telco Cloud Automation let you move DU and CU resources on demand to improve resource utilization or to add more resources when necessary.

If, for example, you need more resources for DU automation, you can move CU resources closer to the core.

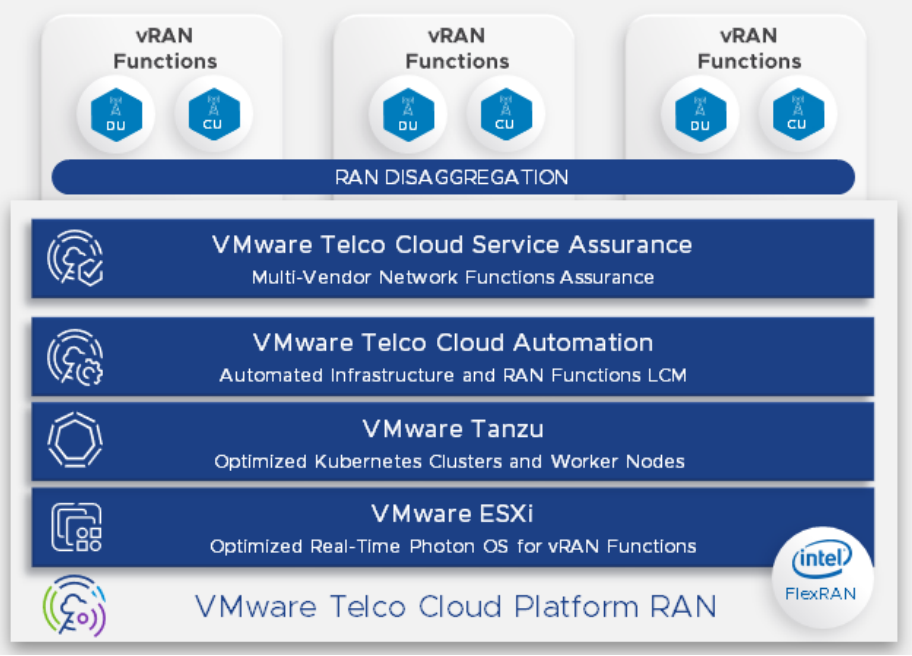


FIGURE 1: VMware Telco Cloud Platform RAN modernizes the RAN into a 5G multi-services hub that equips CSPs monetize 5G at the edge.

- Real-time optimization of VMware ESXi to meet the Precision Time Protocol (PTP) accuracy and latency requirements of virtualized baseband functions, including DUs and CUs.
- Real-time optimization of Photon OS and the Tanzu worker node by supporting various plugins, such as BIOS CNF, CPU manager, NUMA topology manager, Calico, Multus, Macvlan, DPDK modules, and SR-IOV.
- Exposure of virtual hyperthreading to vDUs and vCUs enables a single physical processor to function as two logical processors so that the physical processor can run two independent applications at the same time, improving the performance of vDUs and vCUs as much as 30 percent.
- Optimization of Photon OS improves the scheduling latency of vDUs and vCUs by removing the virtualization overhead, resulting in RAN performance that is equivalent to bare-metal solutions.
- Intel FlexRAN optimization for enhanced dimensioning to ensure the maximum VMware ESXi compute resources are available to RAN functions.

Each vRAN function is isolated with multiple layers to protect functions from unauthorized access. The multi-layer isolation includes the guest OS having its own process protections and permission models; the VM runtime isolating the guest VM; and the separation between the guest and the rest of the hypervisor. The management of the virtualization plane is separated from other systems to safeguard vRAN functions.

Cloud-Smart Automation

VMware Telco Cloud Platform RAN is capable of automatically provisioning thousands of platform instances across distributed RAN sites. Furthermore, by understanding the requirements, such as latency and bandwidth, of each vRAN function intended to be instantiated, the platform programmatically configures the underpinning resources

VMWARE TELCO CLOUD SERVICE ASSURANCE AT A GLANCE

VMware Telco Cloud Service Assurance™ is a multi-vendor, multi-cloud solution that monitors, analyzes, and pro-actively manages multi-vendor physical and virtual environments in a single platform.

VMware Telco Cloud Service Assurance is an optional add-on component for VMware Telco Cloud Platform RAN.

Key Capabilities and Benefits

- Simplify NOC and SOC operations with a centralized, cross-domain view.
- Gain rapid insights with integrated fault and performance management, service management, root-cause analysis, and impact assessment.
- Reduce costs and complexity through automation and optimization for assurance across layers and domains, including the RAN.
- Use closed-loop automation and rapid remediation to reduce OpEx and optimize resources and workloads to meet surges in demand.
- Increase operational efficiency by using AI-based analytics for rapid problem isolation, automatic suppression of extraneous alarms, and automated rule updates.

for better utilization. This intelligence enables CSPs to dynamically adjust where the functions should be deployed with cloud-smart lifecycle management, simplifying Day 0, Day 1, and Day 2 operations while providing telco-grade resiliency and service availability. The platform provides RAN-specific automation, such as the following:

- Reduce RAN sites time-to-deploy by up to 80 percent through automating the provisioning of RAN sites based on standardized templates describing the required appliances and configurations.
- Simplify the onboarding of vRAN functions with validated and standards-compliant packages optimized for the platform.
- Programmatically adjust the underpinning platform availability and resource configuration, based on the requirements of vRAN functions at the time of instantiation.
- Simplify the method to synchronize timing and clocking among vRAN functions with an automation framework that delivers O-RAN-compliant PTP status notifications.
- Automatically discover, register, and create Kubernetes clusters from a centralized location to manage thousands of distributed components across clouds with ease.
- Auto-scale and adapt Kubernetes clusters to meet fluctuations in demand for cloud resources in support of vRAN functions.

The capabilities of VMware Telco Cloud Automation now extend from the 4G and 5G core to the RAN as well as from private to public clouds, providing end-to-end operational consistency to radically simplify how CSPs provision and manage their entire 5G networks.

RAN-Focused Ecosystem

VMware Telco Cloud Platform RAN is hardened through strenuous testing and integration work with key RAN vendors to maximize performance and improve resource utilization. The ecosystem stems from the industry-leading RAN vendors but also includes Intel so that the platform conforms to the Intel FlexRAN reference architecture for our partners to offer RAN-specific performance enhancements, such as PTP, FEC offload, and SR-IOV.

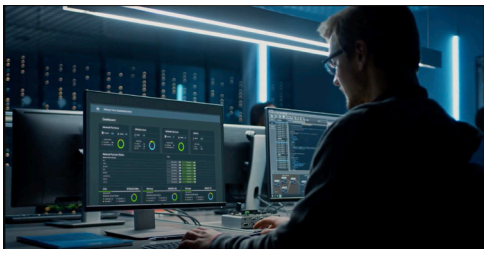
VMware and its RAN partners together test, tune, manage, and scale vRAN functions and their interfaces against the industry's packaging standards so that the performance of vRAN functions is validated and optimized to be telco-grade. In addition, the vRAN functions are continuously validated through upgrades and updates for optimal stability while the update procedures of the vRAN functions are streamlined.

Included Components

VMware Telco Cloud Platform RAN comprises the following VMware components.

FUNCTION	COMPONENT
Compute	VMware vSphere
CaaS orchestration	VMware Tanzu for Telco RAN
Automation	VMware Telco Cloud Automation RAN

VIDEO: RAN TRANSFORMATION FOR 5G



Modernize Your RAN to Monetize 5G: This video explains how you can scale your 5G RAN network with ease.

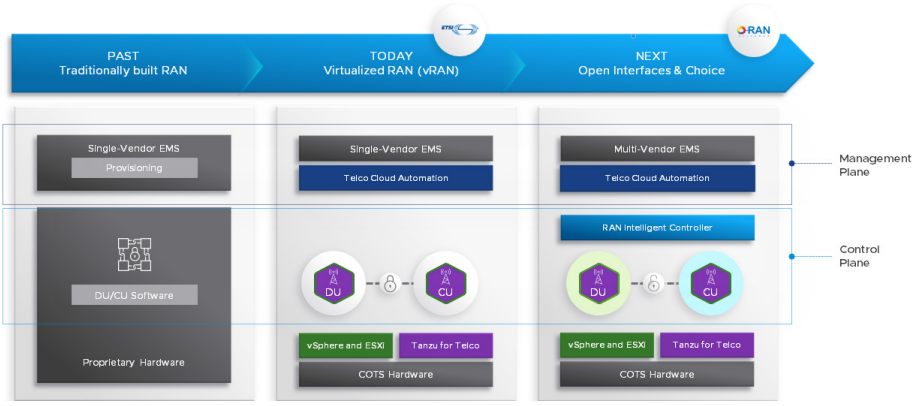


FIGURE 2: VMware Telco Cloud Platform RAN disaggregates the radio access network to blaze a trail of modernization that eventually leads to open RAN.

Optional Component

VMware Telco Cloud Service Assurance is an optional add-on component for high availability, performance, closed-loop automation, and issue remediation. VMware Telco Cloud Service Assurance can monitor an entire network of RAN sites, including physical, virtual, and containerized network functions as well as cloud infrastructure.

True 5G Evolution Starts with RAN Modernization

With VMware, operational consistency is end-to-end, from the core to the RAN. To realize the true value of 5G services, existing disjointed islands of network domains and technologies must function harmoniously across 5G networks. VMware Telco Cloud Platform RAN is powered by a field-proven virtualized compute solution, telco-grade containers as a service (CaaS), and multi-layer automation for rapid site scaling.

LEARN MORE

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