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 vRAN and, eventually, 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

• Optimize the placement of DUs and CUs through programmable resource provisioning

• Use the same common platform to virtualize the RAN now and migrate to O-RAN in the future.

• Deploy and operate both RAN and non-RAN workloads on a horizontal platform

• Transform the RAN into a 5G multi-services hub

• Use a security-hardened Linux host called Photon OS that is optimized for running containers on VMware vSphere®

• Isolate containerized network functions (CNFs) on virtual machines and the VMware hypervisor, VMware ESXi™, to establish a strong security boundary

• Automate lifecycle management of infrastructure, Kubernetes clusters, vRAN functions, and 5G services

Virtualizing the RAN to Start Solving Lingering Problems

5G's massive performance improvements to offer services like enhanced mobile broadband (eMBB), ultra-reliable, low latency communication (URLLC), and massive machine-type communications (mMTC) is achieved by the redesigning of antennas. The frequency characteristics of the new 5G antennas, however, require communication service providers (CSPs) to deploy far more of them than the previous generations of mobile networks, increasing cost and complexity.

While 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 virtualize RAN functions and further disaggregate them 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.

In addition, 5G gives CSPs the opportunity to generate new revenue streams by providing value-added services to different enterprise verticals. Offering new 5G services relies on the ability to develop, deploy, and operate applications close to their end customers, making the RAN the prime location to do so. For these new 5G services to scale across distributed RAN sites, a common horizontal platform to support both vRAN functions and custom applications becomes essential.

Another key rational for virtualizing 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. Therefore, the ability to host a multitude of network functions regardless of their locations and to automate operations across 5G networks are also integral aspects of virtualizing the RAN.

About VMware Telco Cloud Platform RAN

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 O-RAN.

VMware Telco Cloud Platform RAN transforms the RAN into a 5G multi-services hub that enables CSPs to develop and deploy custom 5G applications alongside vRAN functions while delivering superior quality of 5G services and customer experience from RAN sites. As a result, CSPs can monetize the RAN.

VMware Telco Cloud Platform RAN helps CSPs virtualize 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 O-RAN by giving

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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 late-binding capabilities of VMware Telco Cloud Automation let you dynamically 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.
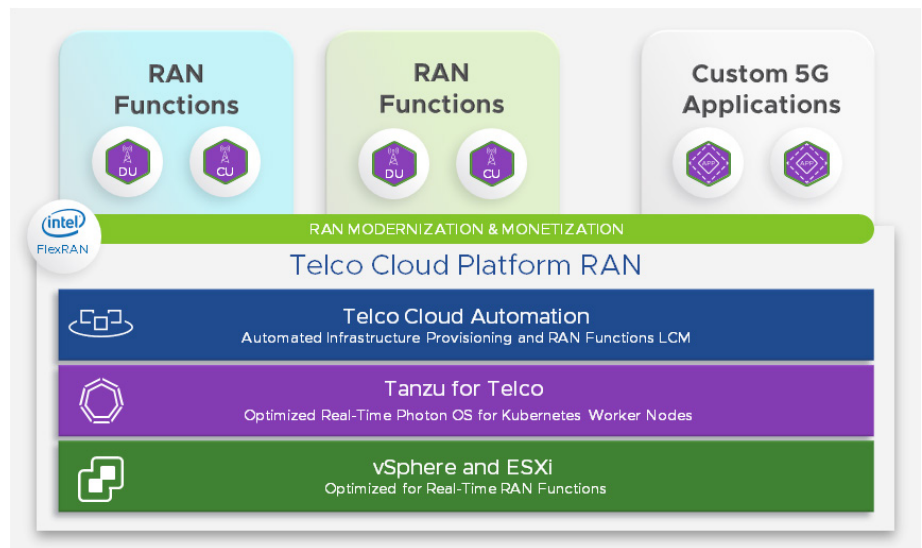

FIGURE 1: VMware Telco Cloud Platform RAN modernizes the RAN into a 5G multi-services hub that equips CSPs monetize 5G at the edge.

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-first 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 or exceeding the stringent performance and latency requirements inherent to RAN. VMware Telco Cloud Platform RAN is also capable of developing, deploying and operating non-RAN workloads on the same platform.

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:

• 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.

• 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;

RAN WITH A PLAN:
THE 5G MULTI-SERVICES HUB

VMware Telco Cloud Platform RAN equips CSPs to efficiently operate and automate a modernized, flexible RAN platform that transforms the RAN into a multi-services for monetizing 5G services at the edge.
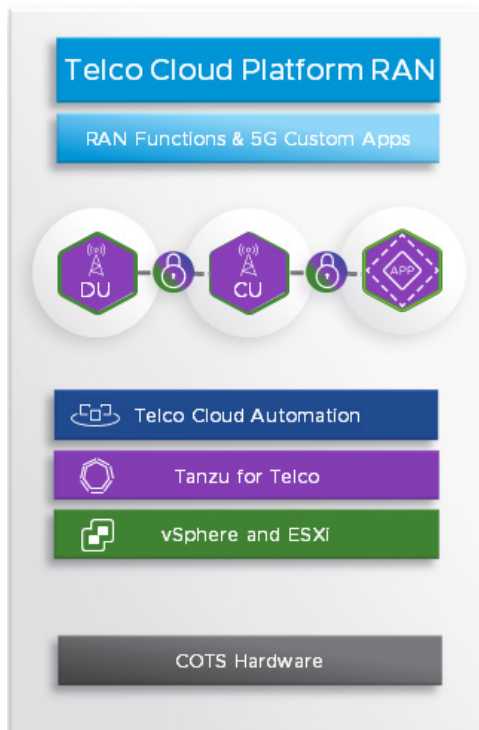
and the separation between the guest and the rest of the hypervisor. The management of the virtualization plane is separated from other systems to safeguard vRAN functions.

Cloud-First 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 for better utilization. This intelligence enables CSPs to dynamically adjust where the functions should be deployed with cloud-first 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 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.

• Automatically discover, register, and create Kubernetes clusters from a centralized location to manage thousands of distributed components with ease.

The capabilities of VMware Telco Cloud Automation now extend from the 5G core to the RAN, providing end-to-end operational consistency for CSPs to radically simplify how they provision and manage their 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 is in conformance with Intel's FlexRAN reference design for our partners to offer RAN-specific performance enhancements, such as PTP, FEC offload, and SR-IOV.

The ecosystem along with the CI/CD pipeline provided by VMware Telco Cloud Automation enables CSPs to onboard, deploy, and update vRAN functions quickly and reliably by removing time-consuming and complex integration work, thereby reducing the time to revenue.

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.

5G Multi-Services Hub

In addition to operating vRAN functions, the horizontal design of VMware Telco Cloud Platform RAN provides flexibility and adaptability for CSPs and their customers to develop and deploy custom 5G applications on the same platform. VMware ESXi with VMware Tanzu for Telco RAN provide both virtualized compute resources and Kubernetes at the cell and aggregation sites.
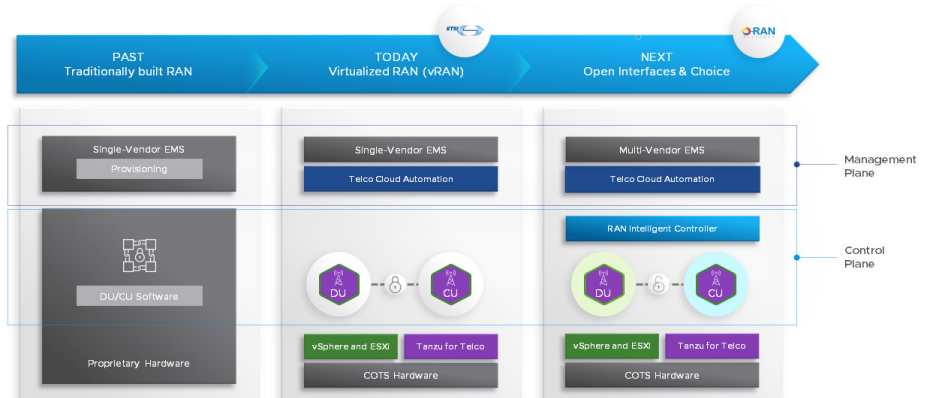
FIGURE 2: VMware Telco Cloud Platform RAN virtualizes the radio access network to blaze a trail of modernization that eventually leads to open RAN.

Operating both vRAN functions and custom 5G applications on the same platform means the applications now have the direct access to the ultra-high speed 5G networks and deliver services from the locations closest to their customers, providing superior service quality and customer experience.

With this flexibility and adaptability, CSPs are now capable of accelerating innovation, all while delivering improved customer experiences directly from the RAN, modernizing it into a 5G multi-services hub for monetization.

Included Components

VMware Telco Cloud Platform RAN comprises the following VMware components.

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

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. Built with VMware's telco cloud vision and principles, VMware Telco Cloud Platform RAN is powered by the field-proven virtualized compute solution, carrier-grade containers as a service (CaaS), and multi-layer automation that are consistent with its 5G core offering. This end-to-end consistency enables CSPs to provision 5G services tailored to different enterprise and consumer markets while providing operational efficiency.

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/