

Modernizing and Monetizing the RAN

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Any Application, Any cloud

Deliver optimal QoE on any cloud



5G e-Health



5G Manufacturing



5G Public Safety



5G Learning



5G Retail



5G eSports



Enterprise Edge

- Smart manufacturing
- Smart factory
- Stadium



RAN

- Radio access
- Cloud Centralized Unit (CU)
- Cloud Distributed Unit (DU)



Provider Edge

- Multi-access edge network
- Content delivery network
- Gaming / AR/VR
- SD-WAN



Core

- 4G / 5G network
- Mobile core control plane
- Voice over LTE / 5G

VMware Telco Cloud Portfolio

Consistent infrastructure | consistent operations | multi-cloud automation

Telco Cloud Portfolio



Enterprise Edge



RAN



Provider Edge



Core



Multi-Cloud



Telco Cloud Operations



Telco Cloud Automation



Tanzu for Telco



Telco Cloud Infrastructure



Multi-Cloud Platform

Telco Cloud Platform

VMware Telco Cloud Momentum

Telco Cloud & Assurance

140+

Mobile Subscribers

900M+

Certified VNFs/CNFs

220+

Telco SD-WAN

100+

Telco IaaS Cloud

100+

Total VMs Deployed

3M+

Solving Traditional RAN's Challenges

Traditional RAN



- Disaggregated RAN with choice
- Virtual functions on horizontal platform
- Reduce overall CapEx



- Centralized system management
- Reduce OpEx



- Rapid innovation
- Free from initial legacy equipment
- Elastic operations to meet customer demands

Telco Cloud Platform RAN



Open
Ecosystem



More
Efficient



More
Flexible

RAN Modernization and Journey to Cloud



Cloud Native Model

- Adapt the network for the use cases and resources (C-vRAN)
- Provision dynamically and decommission RAN capacity where/when needed
- Enable mobility of workloads in most appropriate locations



Automation & Programmability

- Management consistency across virtualized domains
- Software-Defined Networking control over RAN components
- Cloud-Native and DevOps automation paradigms



Power of Choice

- General COTS (vRAN) vs. specialized hardware
- Open API for multi-vendor best-of-breed RAN implementations (O-RAN)
- Increased competition driving lower CAPEX and improved innovation cycles

Service Velocity

Smarts

Cost Optimization
(Disaggregation)

Telco Cloud Platform RAN: A Multi-Services Hub

Common horizontal platform for RAN & custom 5G applications

Certified CNFs

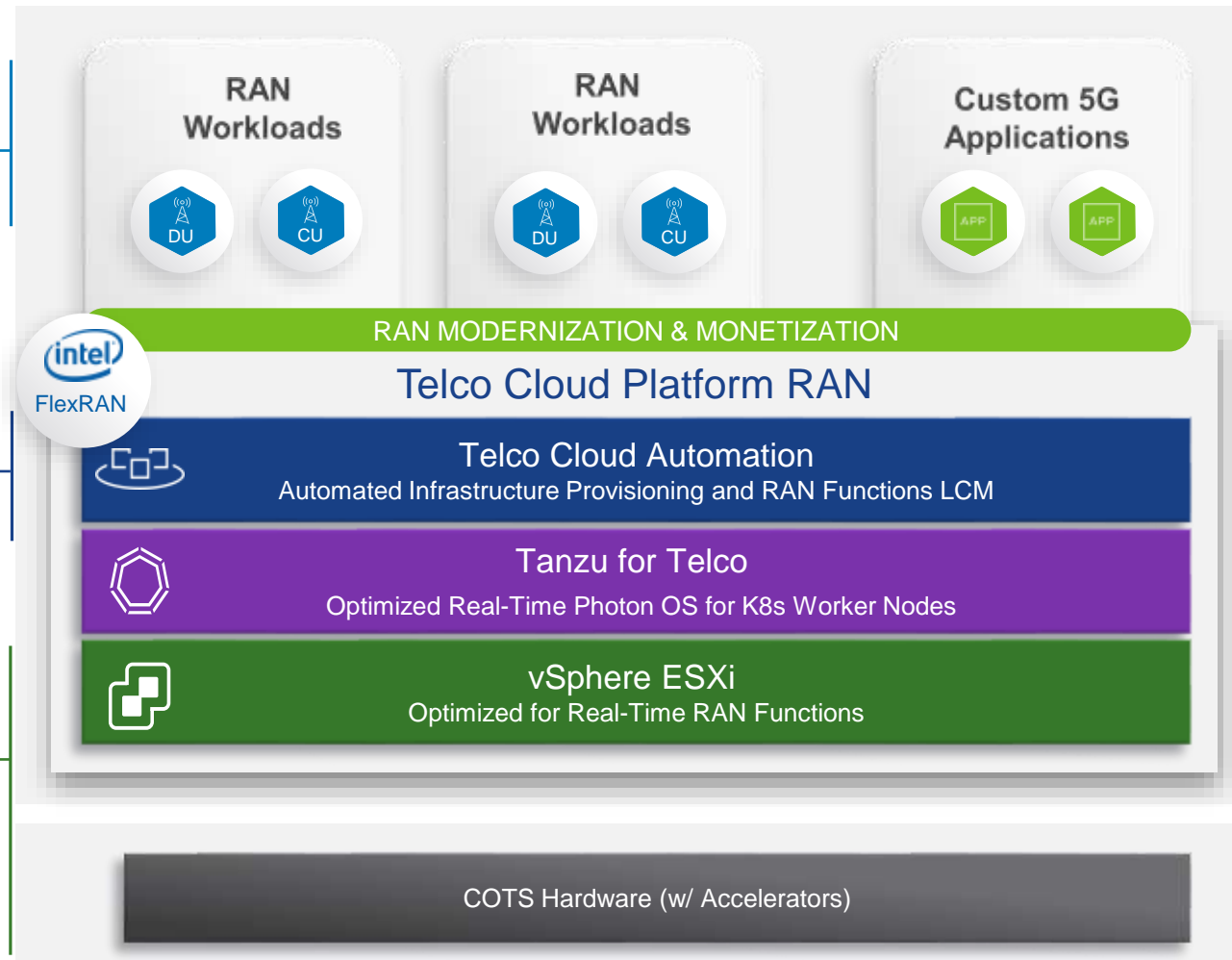
- RAN-focused ecosystem
- Open API
- Performance & Resource Optimization

Cloud-First Automation

- Consistent operations – Core to RAN
- Infrastructure automation
- Programmable resource provisioning

RAN-Optimized Platform

- RAN-driven performance
- Intrinsic Security
- Ready for O-RAN migration



5G Multi-Services Hub

- Build, deploy, operate 5G apps
- RAN-as-a-Service
- Service innovation at RAN

Optimized CaaS

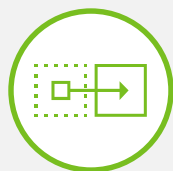
- Tanzu Basic for RAN
- Distributed K8s clusters
- Standard CAPI
- RAN specialized plugins (DPDK, SR-IOV, MACVLAN, etc.)

Certified Hardware

Building a Cloud Native Platform using Telco Cloud Automation (TCA)

Automation of the Day 0, Day 1, & Day 2 Operations

Infrastructure Automation



- Design & Deployment of Infrastructure Building Blocks, using ZTP.
- Choose Domain Specific Architecture, & Software Components.



Day 0 & Day 1

CaaS Automation



- Design & Deploy the CaaS environment.
- Automate the deployment & configuration of Add-ons, & CaaS plugins.
- Real-time optimization



Day 0 & Day 1

Late Bindings



- Run-time configuration of the Platform based on CNF requirements.
- Configuration Management of the deployed software add-ons and plugins.



Day 0 & Day 1 & Day 2

Life Cycle Management



- Software upgrades.
- Life Cycle Management of the deployed software add-ons and plugins.

Day 2

CI/CD Integration



- Building & Automating Software Pipelines
- Gitops Framework for CNFs, & Platform Software

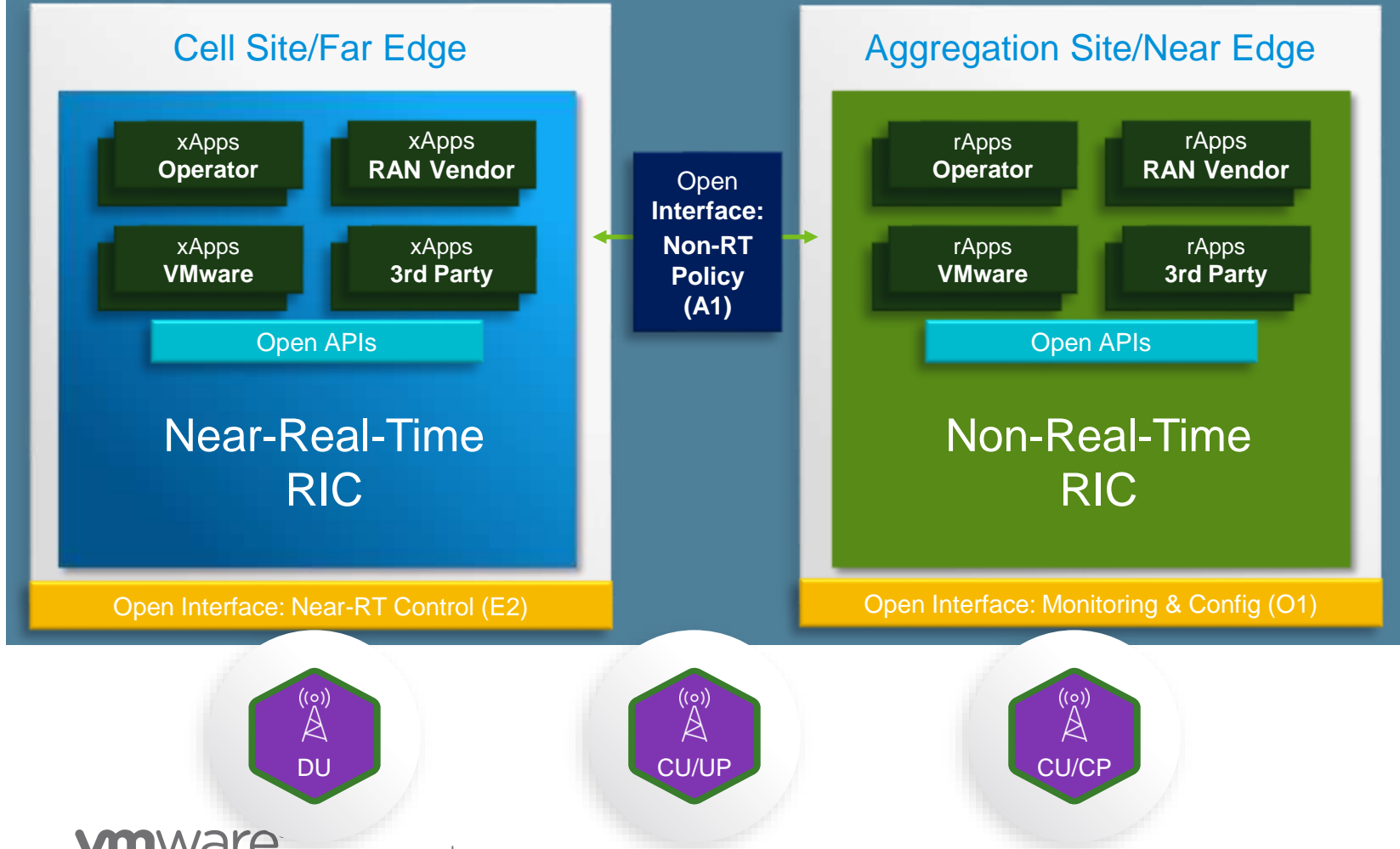


Day 2

VMware RIC (RAN Intelligent Controller)

Agile innovation & optimization for RAN

VMware RAN Intelligent Controller Solution



Moving RAN Intelligence to the Cloud

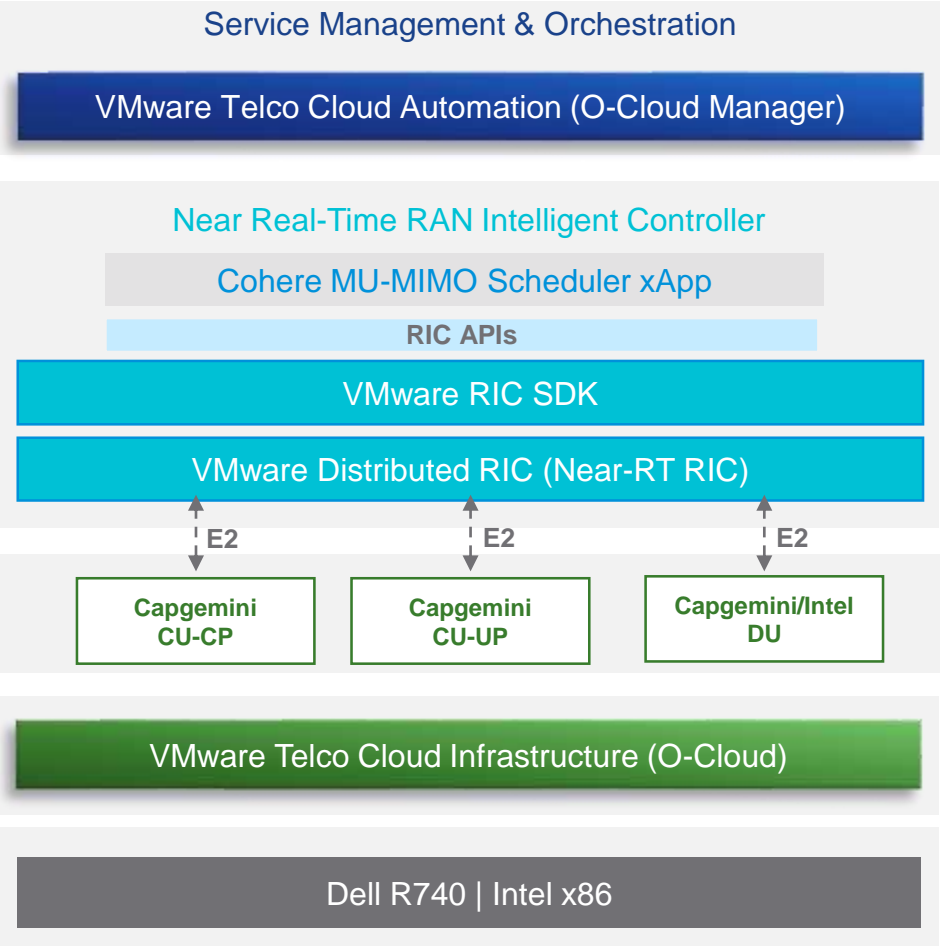
- Better optimization due to wide-area visibility & more/advanced compute availability
- Cell site & far edge simplification driving OpEx reduction

Improving RAN Monetization

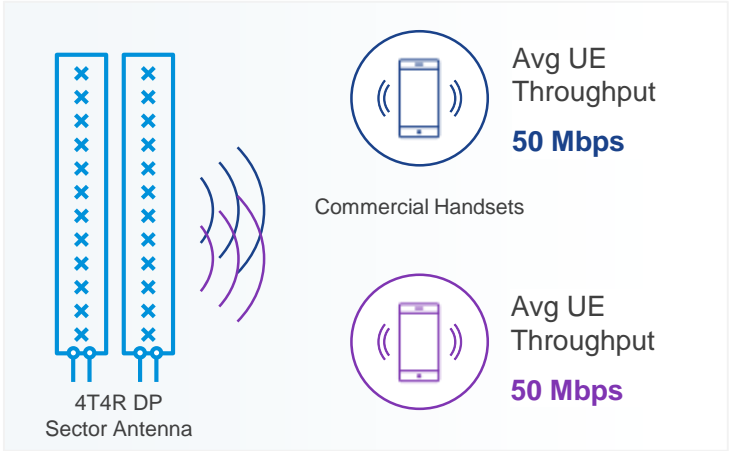
- Introduce new capabilities for innovative services with open interfaces
- New revenue streams driven by open app ecosystem

RAN Innovative App by Cohere & VMware RIC: MU-MIMO

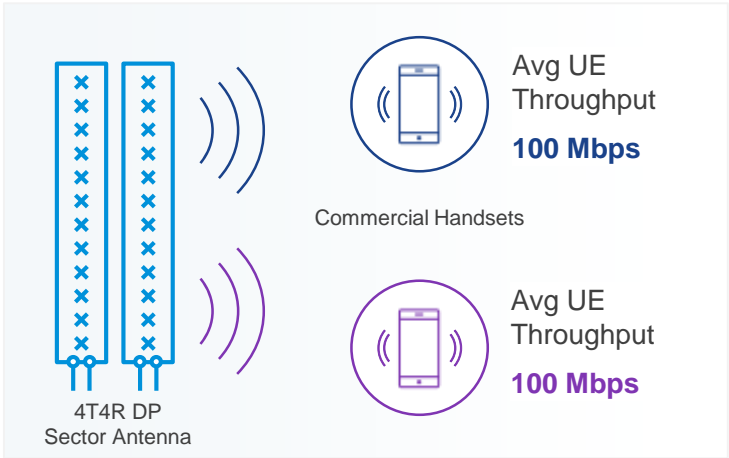
The result: Nearly 2x increase in spectrum efficiency and 5G cell capacity



RIC/xApp **OFF**
(SU-MIMO)







RIC/xApp **ON**
(MU-MIMO)



Innovative Use Cases Delivered by Apps

Rich and vibrant app ecosystem powered by VMware RIC SDKs

USE CASES (rApp/xApp)		APP PROVIDER
MU-MIMO Optimization		Cohere
Energy Savings		VMware
VoNR Traffic Steering		VMware
Geolocation		Polte
Traffic Steering, QoS Admission Control		Capgemini (Altran)
KPI Monitoring, QoS Scheduling Control		VMware



MAVENIR

ALTIOSTAR

Capgemini engineering

POLTE



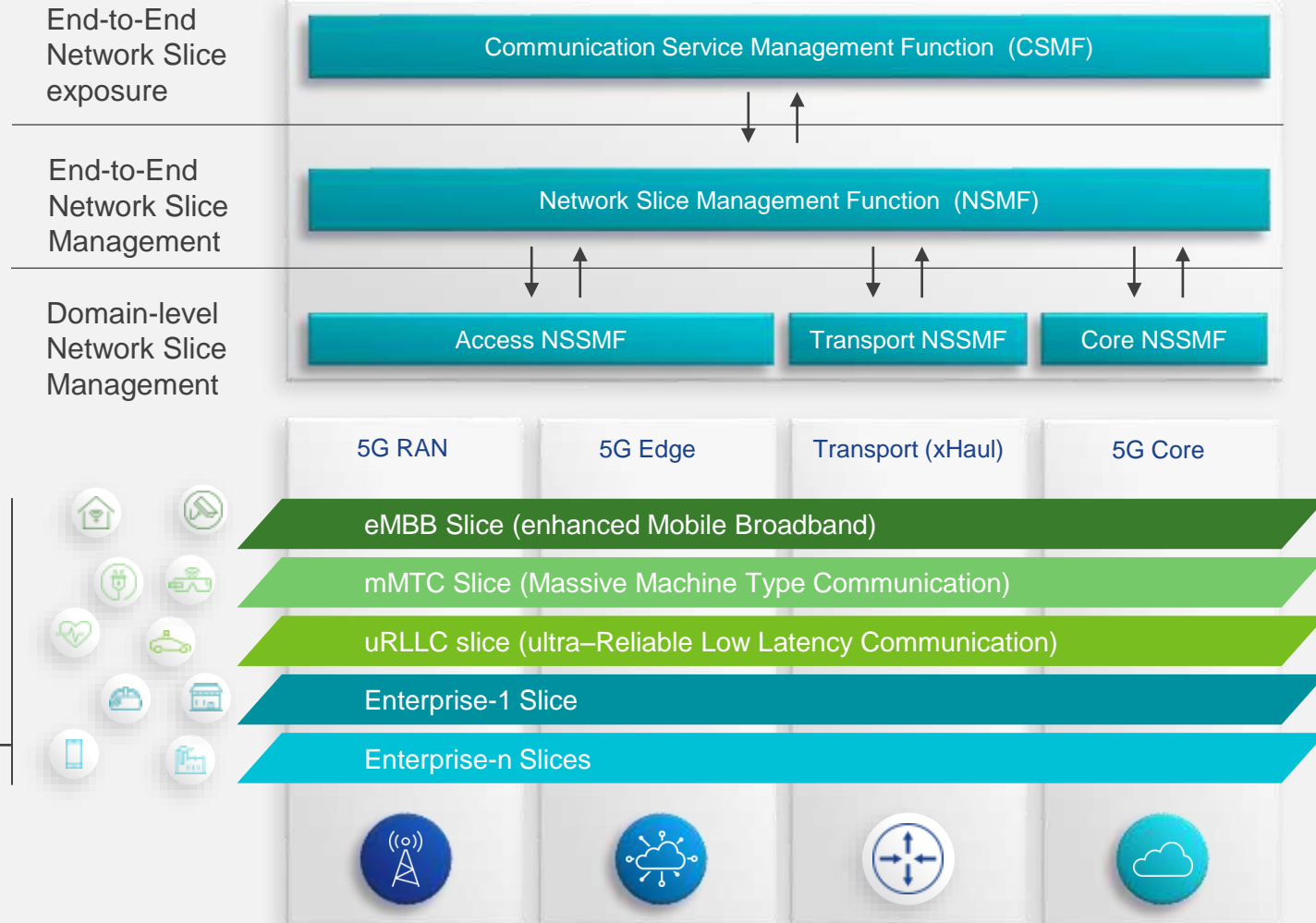
5G Network Slicing – VMware Project Lattice

Same network, new opportunities

Purpose-built network overlays

- On-demand, Isolated/shared, QoS-driven, logical E2E networks
- Custom overlay network compositions to deliver specific SLA requirements
- Shared network infrastructure
- Telecom standards driven
- Management layer (3GPP): CSMF, NSMF, NSSMF

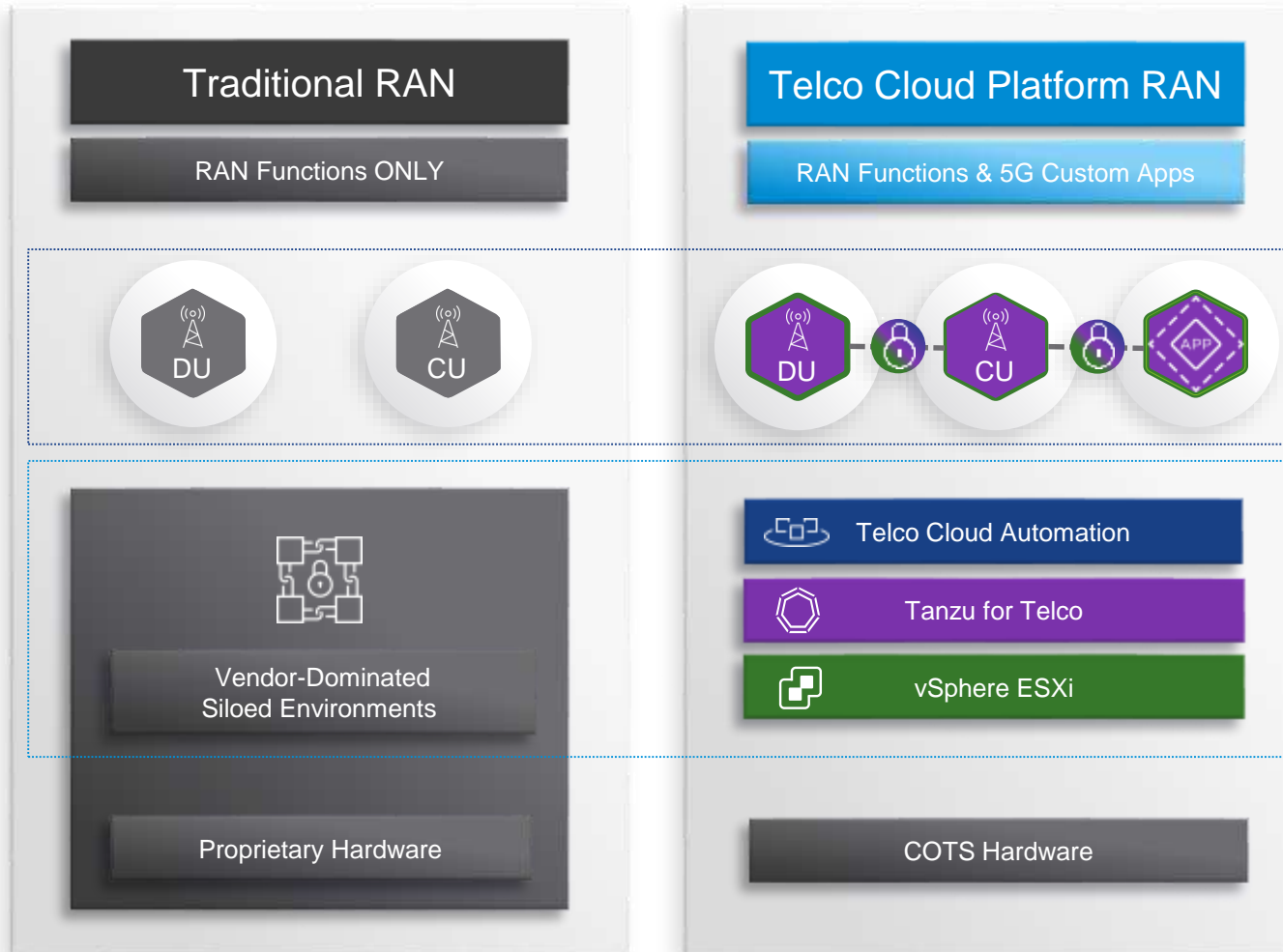
Differentiated service offerings based on use case requirements



Project Lattice: <https://blogs.vmware.com/telco/network-slicing/>

The 5G Multi-Services Hub

Modernize RAN from infrastructure cost center to multi-services hub for monetization



RAN Monetization

- Evolve from proprietary hardware
- Utilize compute at far edge
- Build, deploy, operate 5G apps
- Deliver customer values from RAN

ESXi Virtualization Layer

Deliver network & business flexibilities
Enhance security with workload isolations



Thank You