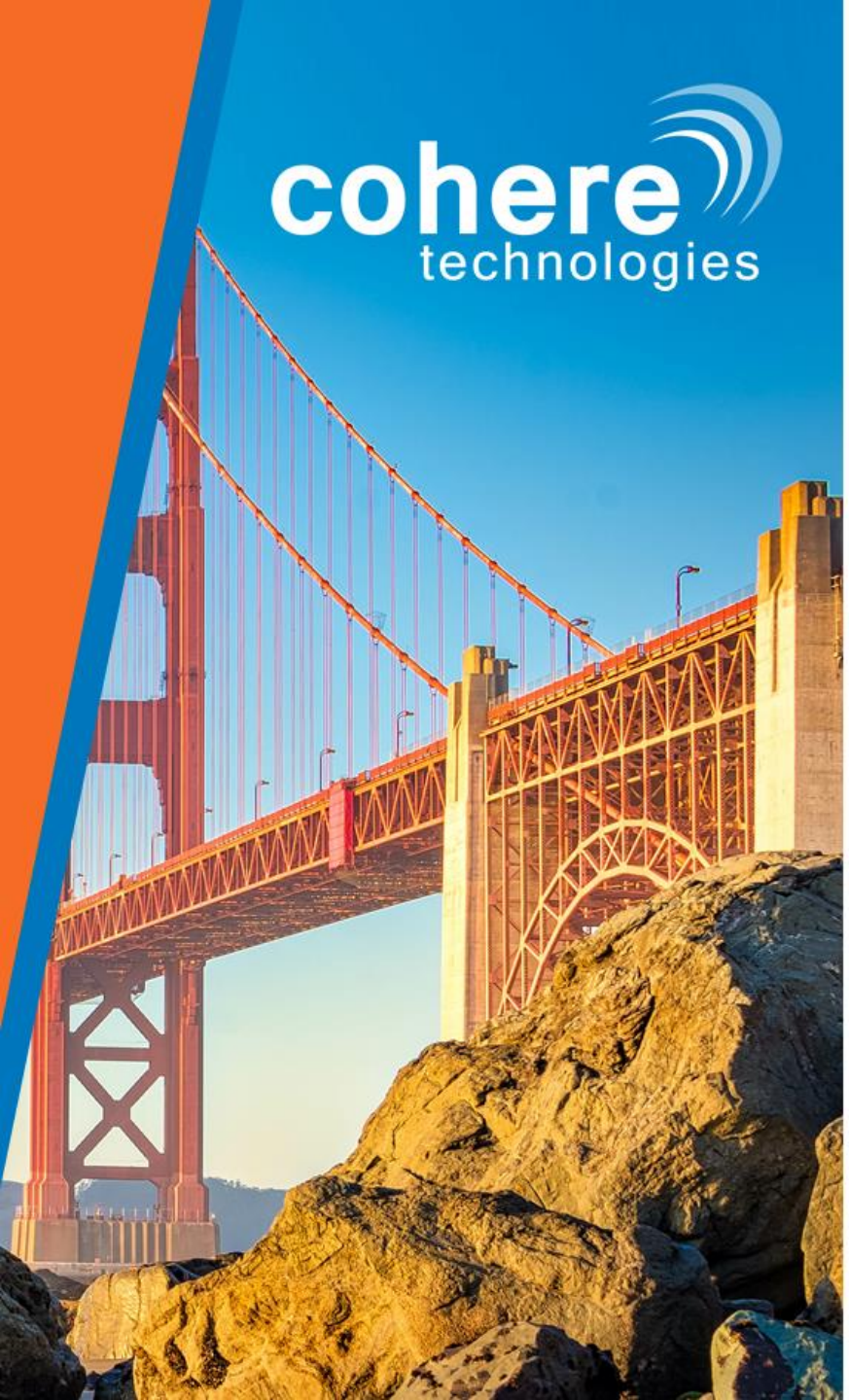
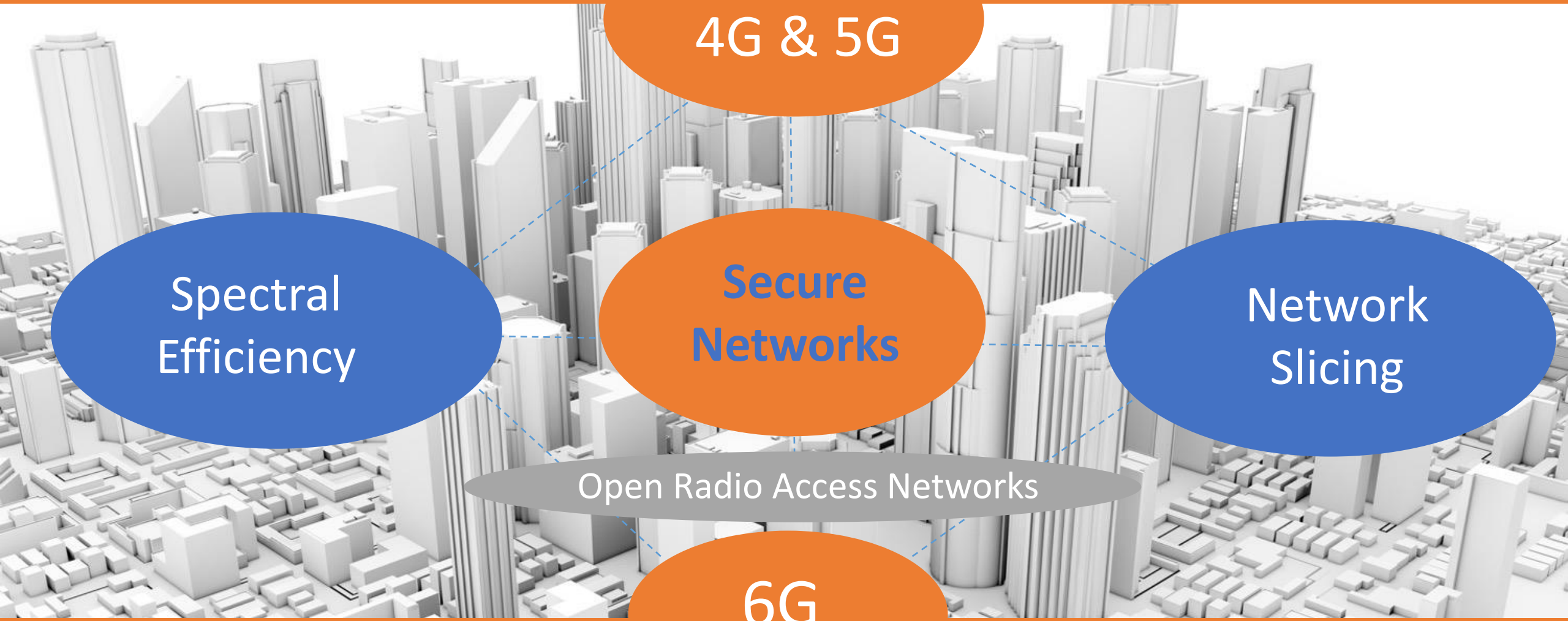


Driving MAC & PHY Innovation with FlexRAN™ & O-RAN

Cohere Technologies & VMware

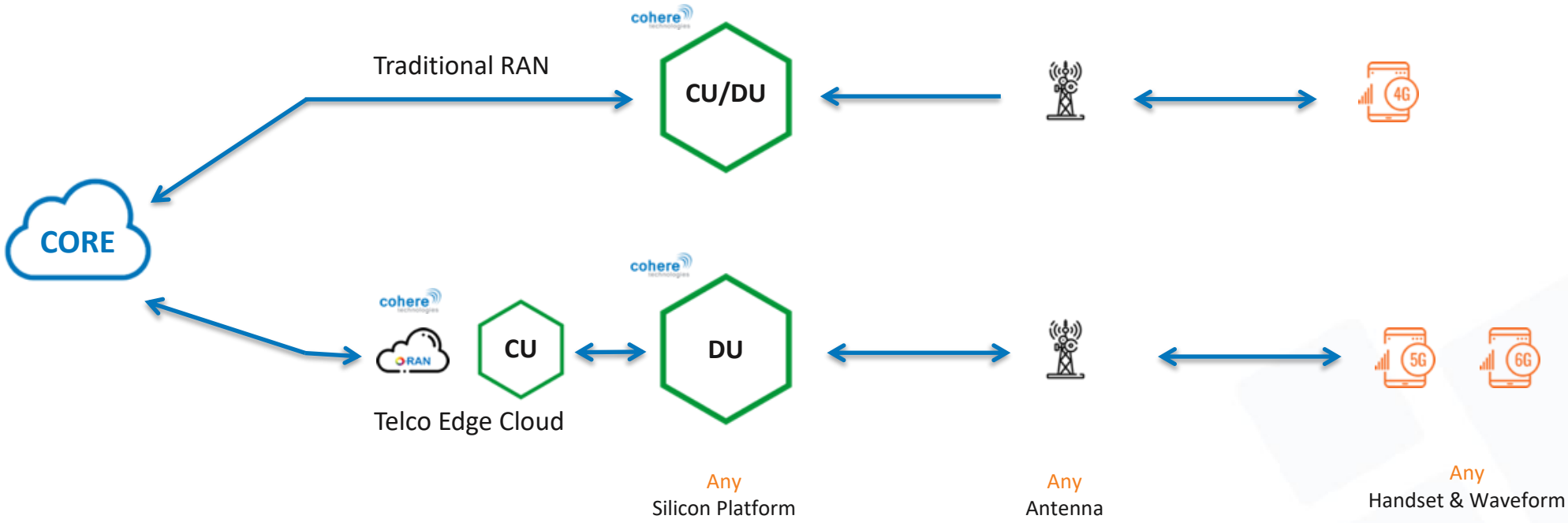
Cohere Is Solving Spectrum & Performance Challenges



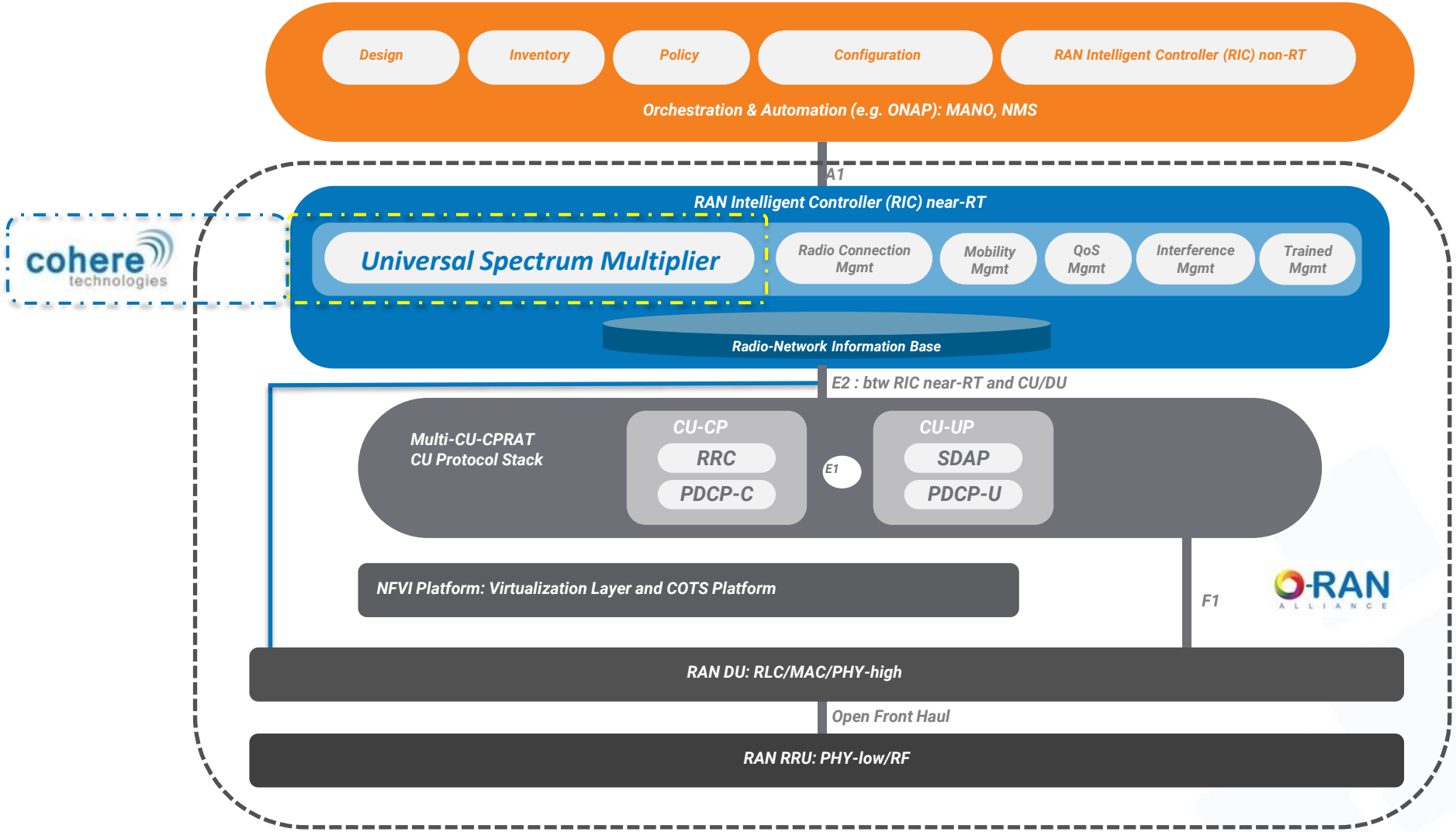
cohere technologies

We Build Software That Improves Mobile Networks

Universal Spectrum Multiplier software can be integrated with the cellular Base Station (CU/DU) or in the Telco Cloud as an xApp with the near Real-Time RAN Intelligent Controller (RIC)



The O-RAN Opportunity



Modernize Your RAN

Making the RAN Open & Programmable

Yusuke Kanamori

Director, Product Marketing

September 6th

Any Application, Any Cloud

Deliver an optimal experience for customers on any cloud

5G e-Health

5G Manufacturing

5G Public Safety

5G Learning

5G Retail

5G eSports

Public Cloud

- Data center expansion
- Cloud bursting
- Disaster recovery

Enterprise Edge

- Smart manufacturing
- Oil & Gas
- Stadium

RAN

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

Provider Edge

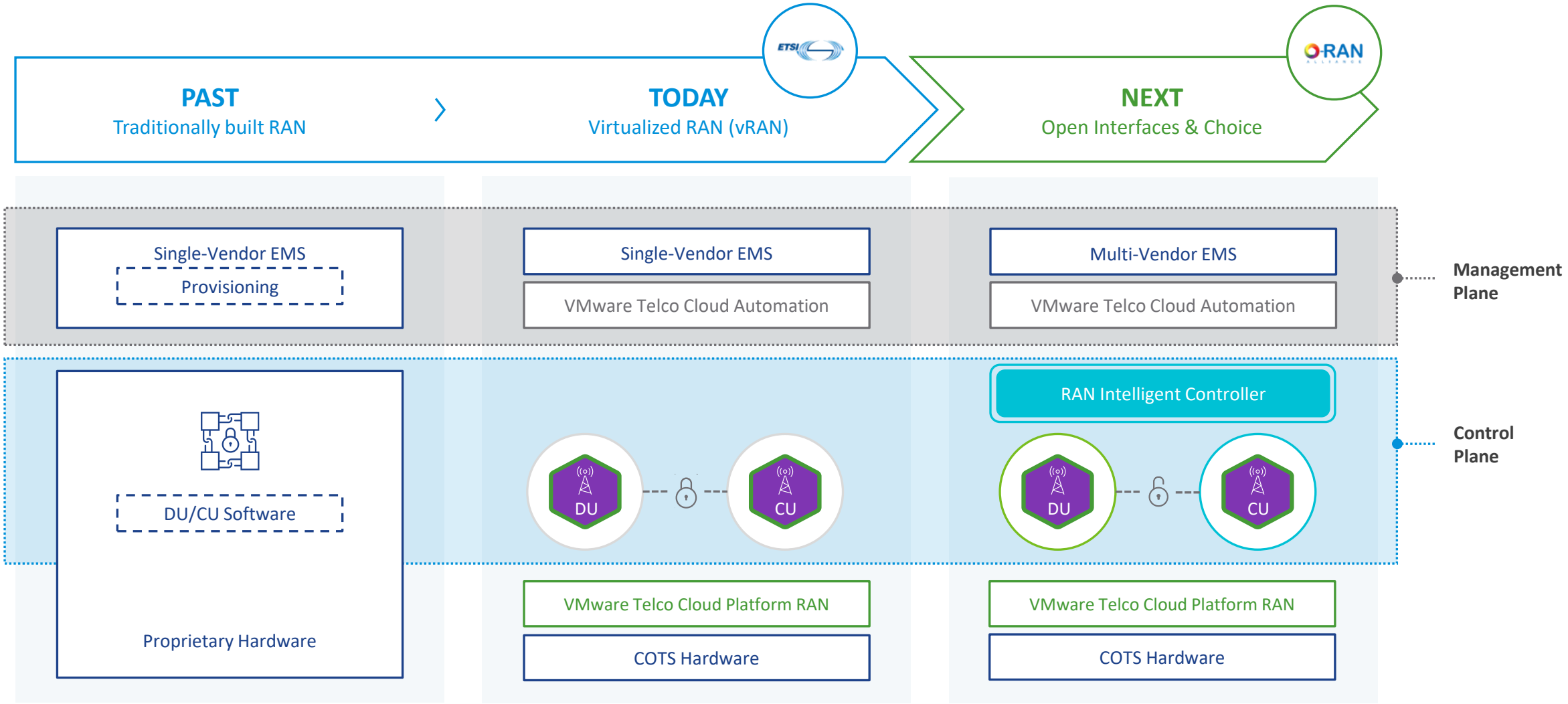
- Multi-access edge network
- Content delivery network
- Gaming / AR/VR
- SD-WAN

Core

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

Path to RAN Disaggregation and Modernization

From physical to virtual to open RAN



VMware Telco Cloud Platform RAN

Flexible RAN platform with bare metal equivalent performance

Certified CNFs

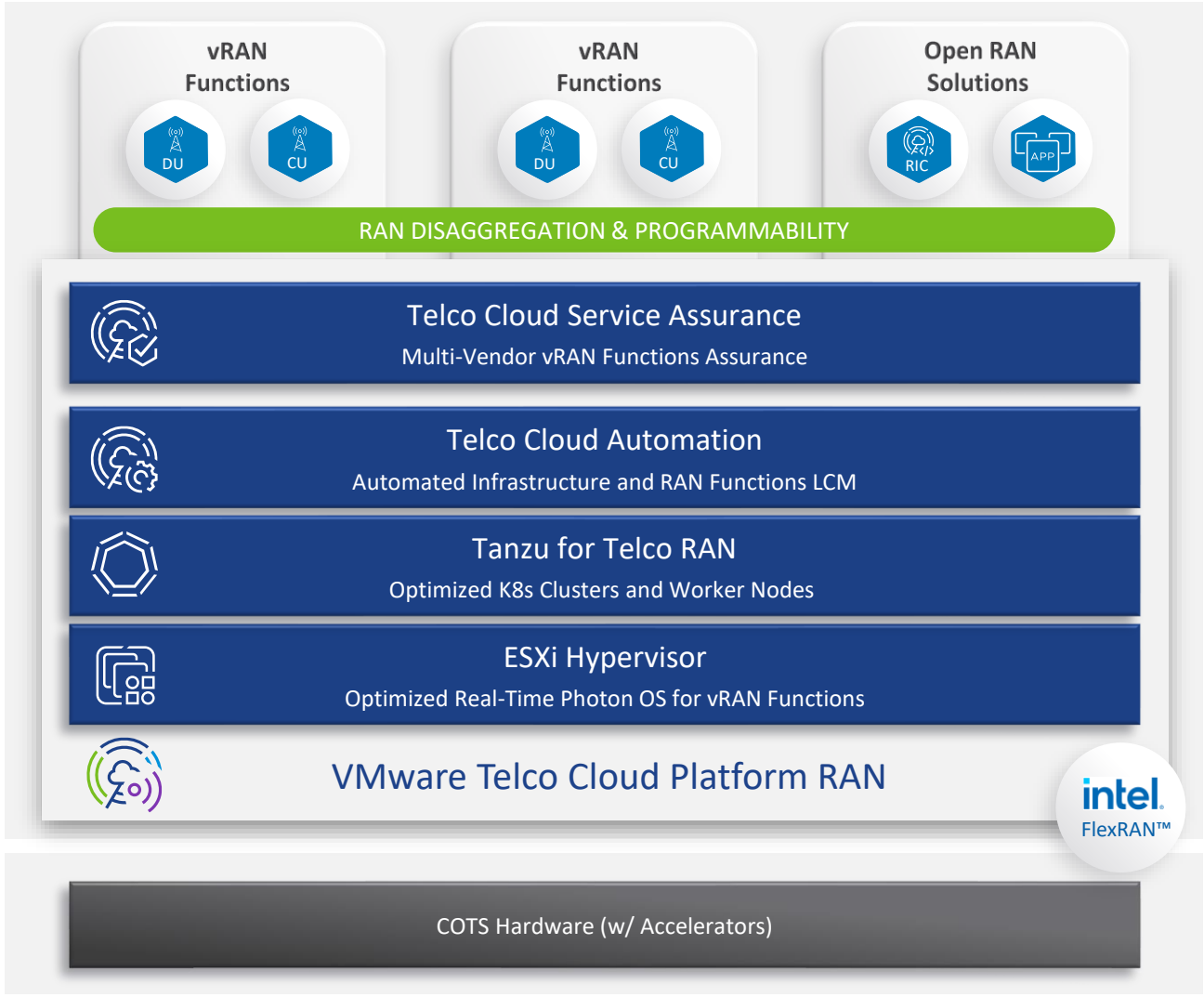
- RAN-focused ecosystem
- Open API
- Performance & Resource Optimization

Cloud-Smart Automation

- Consistent operations – Core to RAN
- Infrastructure automation
- On-demand infrastructure resource optimization

RAN-Optimized Platform

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



RAN Assurance

- Intelligent fault and performance management
- Service visibility and service health
- AI/ML-based automated RCA, correlation and service Impact
- Closed-loop remediation

Optimized CaaS

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

Certified Hardware

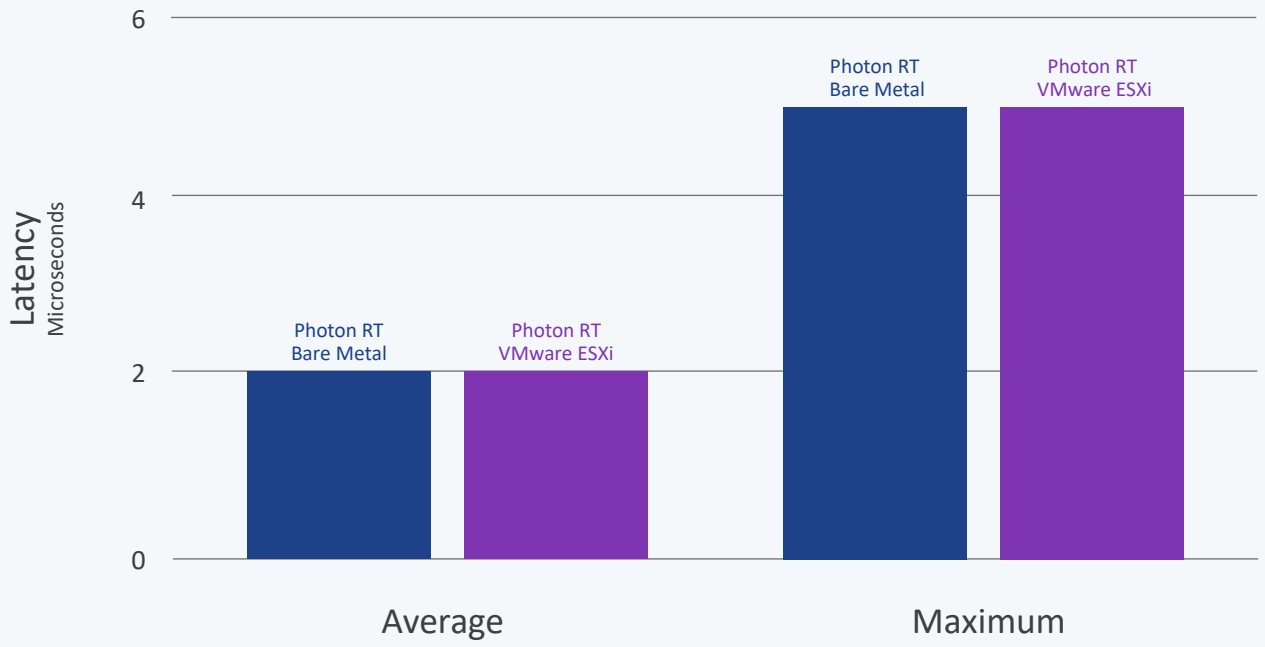
- Dell EMC PowerEdge
- Nokia AirFrame Open Edge
- Intel

RAN-Optimized Platform

Meeting stringent latency requirements of 5G

Latency Measurement

System Response Time from Idle to Active



VMware ESXi vs. Bare Metal

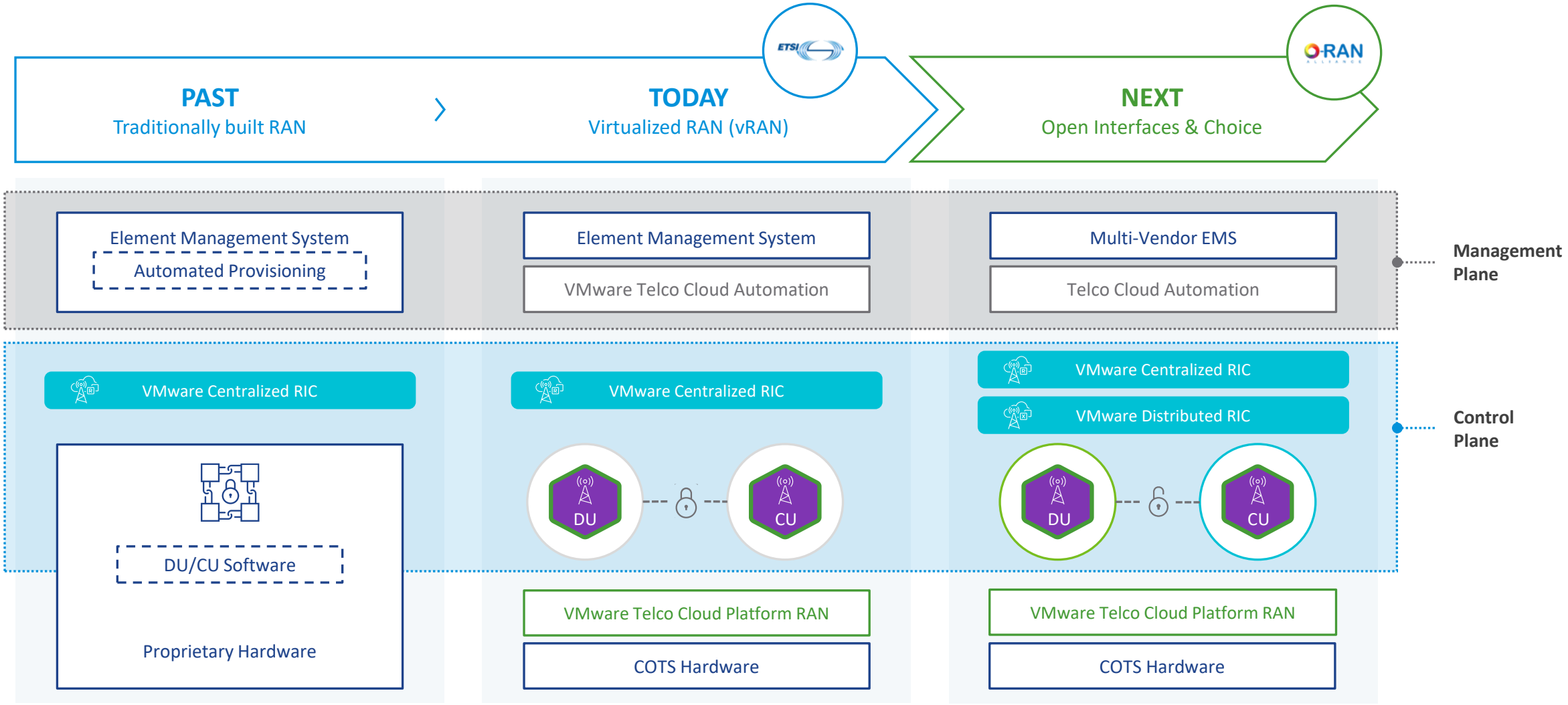
No latency differences

Ideal for Telco RAN workloads

*industry benchmark cyclic test done by VMware

Path Towards Open RAN

Making the RAN programmable with VMware RAN Intelligent Controllers



Why VMware RIC?

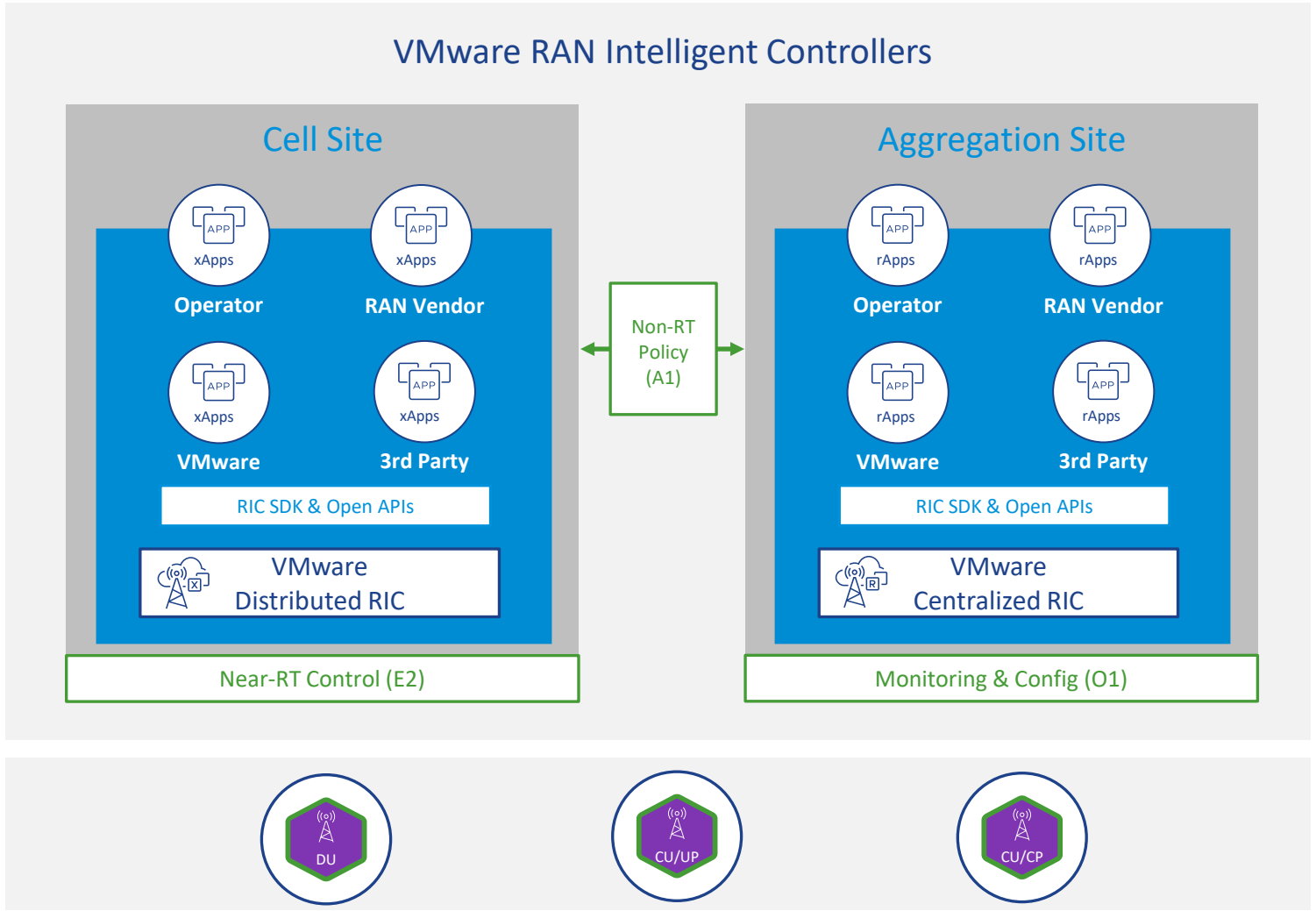
Abstracting the complexity of the RAN through programmability and intelligence

Faster Innovation

- Simplify app development with VMware RIC SDKs and Open APIs
- Introduce near-RT apps fast with vibrant ecosystem partners
- VMware RIC SDK partner program to accelerate and grow ecosystem of Apps

Programmability & Intelligence

- Access the control plane to program the RAN
- Efficient and intelligent use of radio resources
- Reduce operational complexity



Improved Observability

- Capture millions of event per second
- Analyze and process events & data with AI/ML
- Automated optimization improves QoE and network performance
- User and device-level SLA management

Supports Traditional & vRAN

- Support both traditional and vRAN
- Introduce non-RT apps in existing deployments
- Pave seamless path towards true open RAN

VMware RIC Vision

Support any app, any RAN, any cloud

Innovative Use Cases

- Automation
- Optimization
- Monetization

Cross-Vendor Support

- RAN Vendor
- 3rd Party
- Operator
- VMware

Diverse RANs

- Open RAN
- Traditional RAN
- 4G & 5G

Multi Cloud

- VMware Platform
- Hyperscalers
- Bare Metal

VMware active participation in standardization

Shaping the future of open RAN

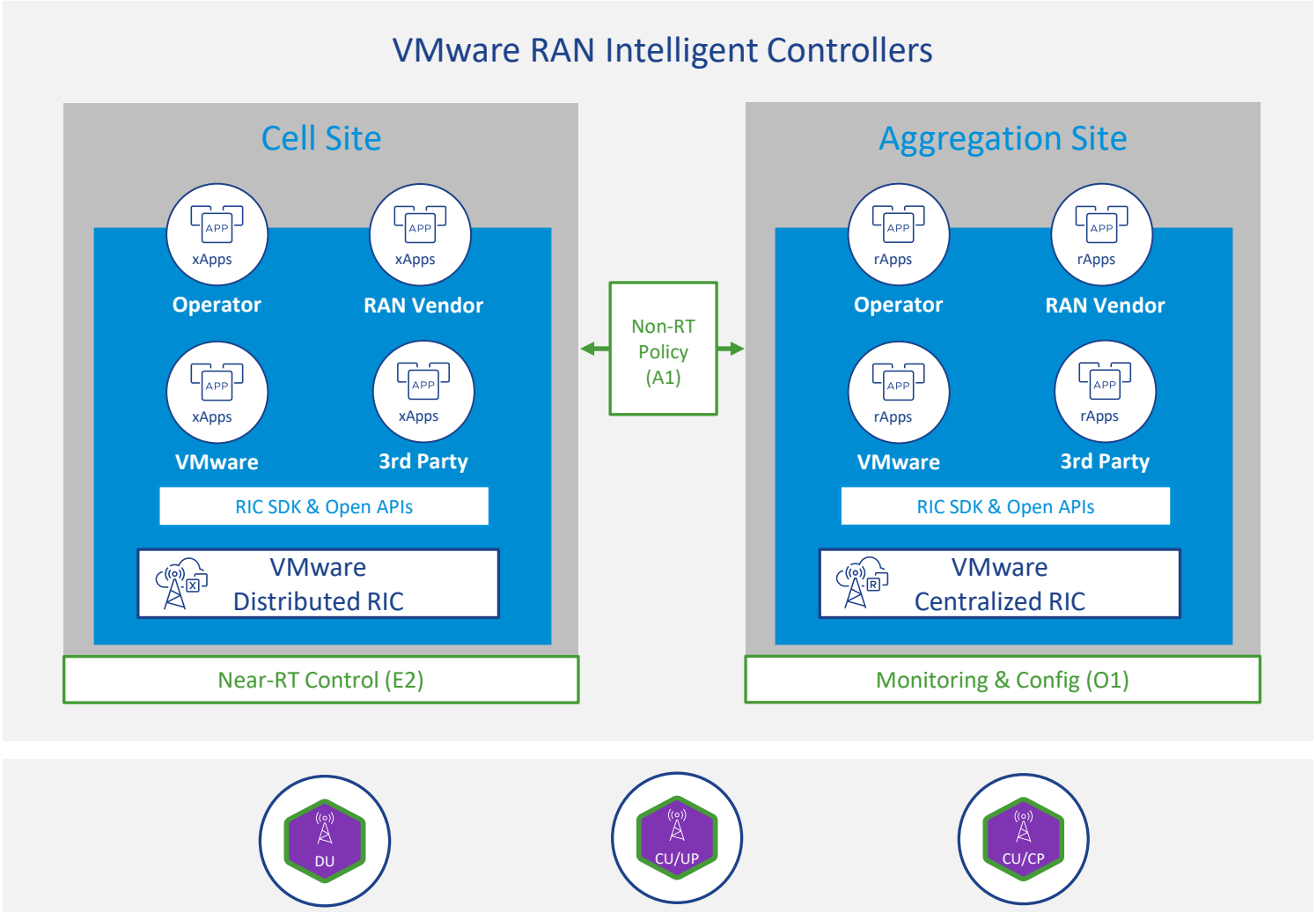
WG1: Use cases and overall Architecture

WG6: The Cloudification and Orchestration

- Lead definition of IMS and DMS interface to O-Cloud

WG3: The Near-real-time RIC & E2 interface

- Lead xApp SDK/API standardization
- Contribute to EA2P and E2SM specification



MVP-C: The Minimum Valuable Plan for O-RAN

- Lead MVP-SMO work plan

WG10: OAM

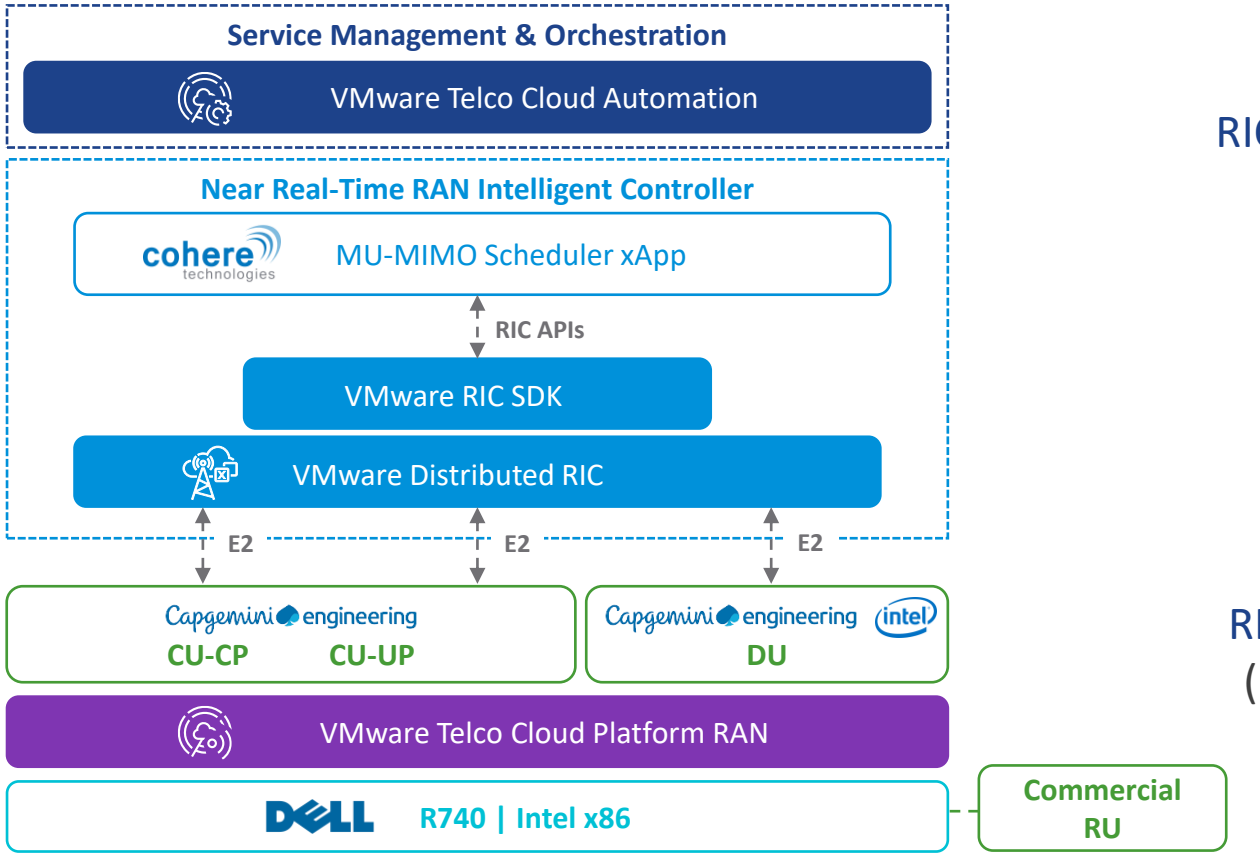
- Contribute on rApp and xApp config and resource definition

WG2: The Non-real-time RIC & A1 Interface

- Contribute to Non-real-time RIC and R1 services

RAN Innovative powered by Cohere & VMware RIC

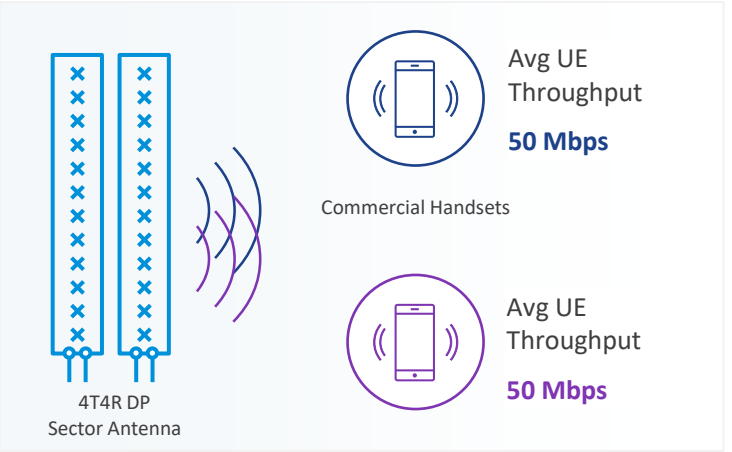
Helping Vodafone to increase 2x in spectrum efficiency and 5G cell capacity



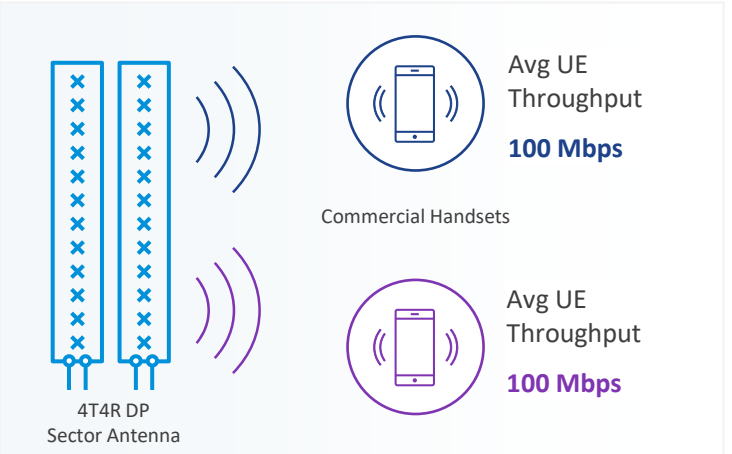
Links

1. Vodafone PR
2. VMware Blog With Vodafone and partners, VMware demonstrates how to accelerate innovation in the RAN

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



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

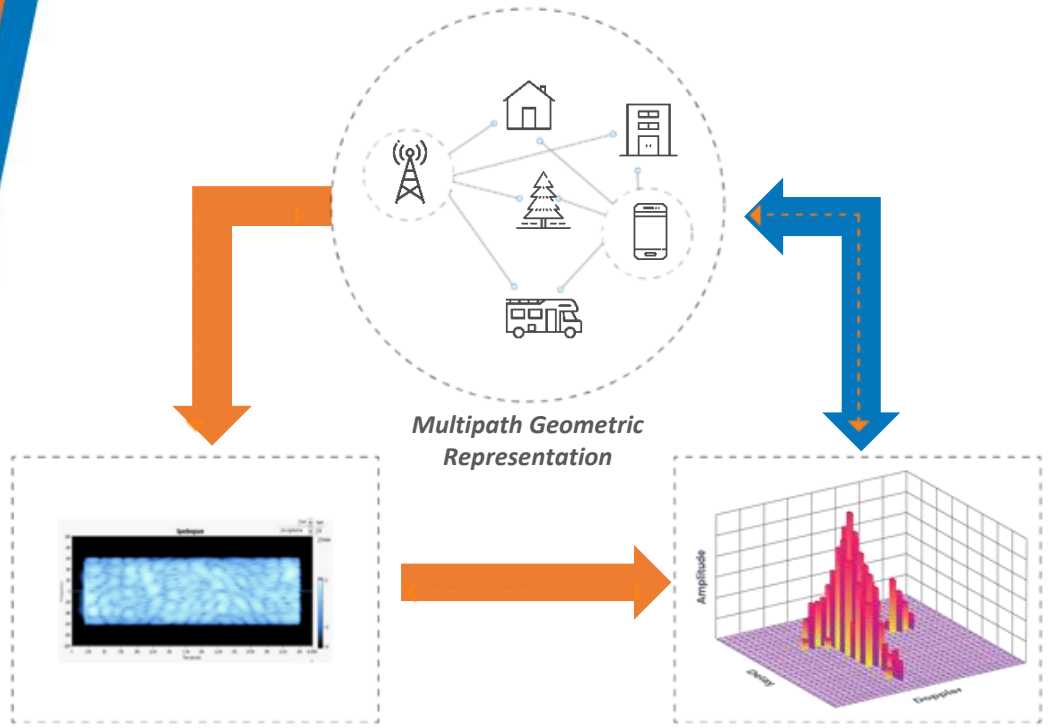


COHERE INNOVATIONS

A Peek Under the Hood with O-RAN & Cloud

Universal Spectrum Multiplier Software

Cohere uses **Delay-Doppler to more accurately model the channel** to enable ~2x Spectrum Multiplier MU-MIMO gain in both **FDD** & **TDD** spectrum – for 4G, 5G and 6G (OTFS)



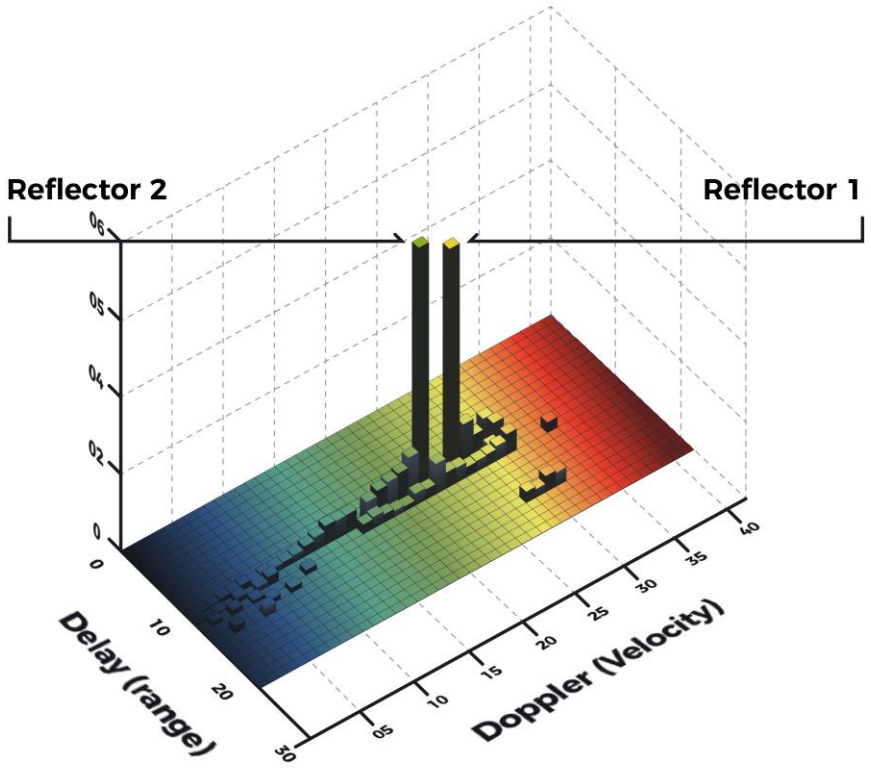
Cohere utilizes UL Reference Signals and DL CQI to Accurately Determine & Predict Channels Between Transmitters & Receivers

Cohere channel estimation reveals all dominant reflectors which resolves MU-MIMO challenges

Software enables fully isolated, multiple beams – without the need for explicit UE feedback

By slowing down channel aging, the result is more predictable channels, improved spectrum reuse, performance and capacity

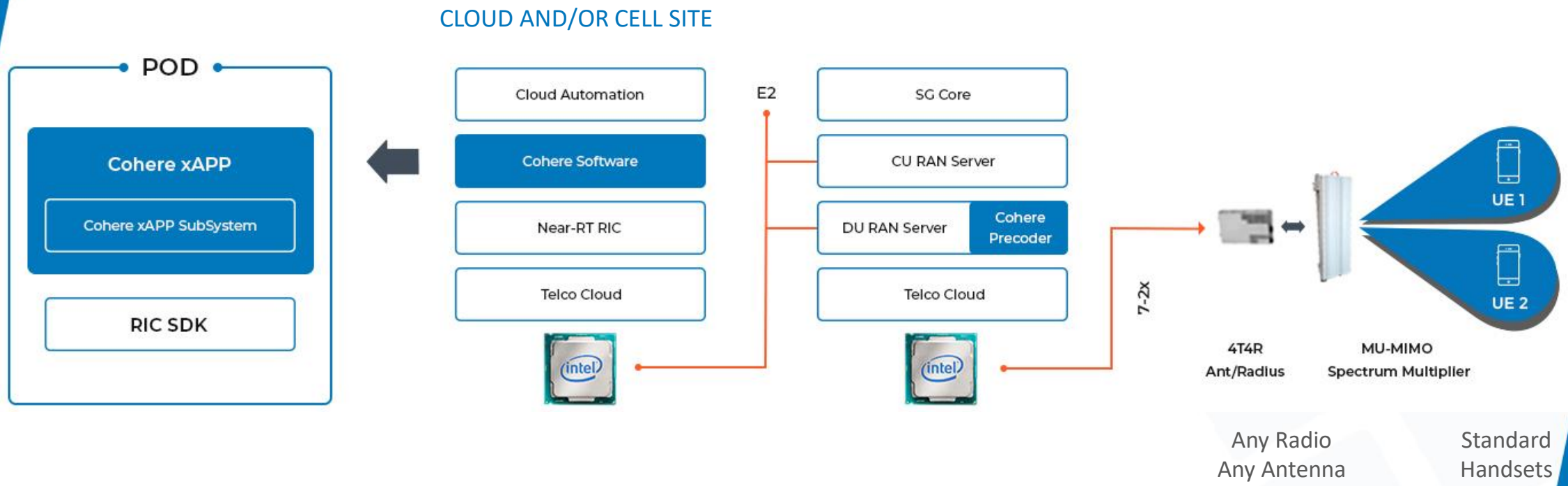
Delay Doppler Channel Model



Predictable into the future (100 msec) which improves channel estimation and prediction as well as enables disaggregation of scheduler and other functions

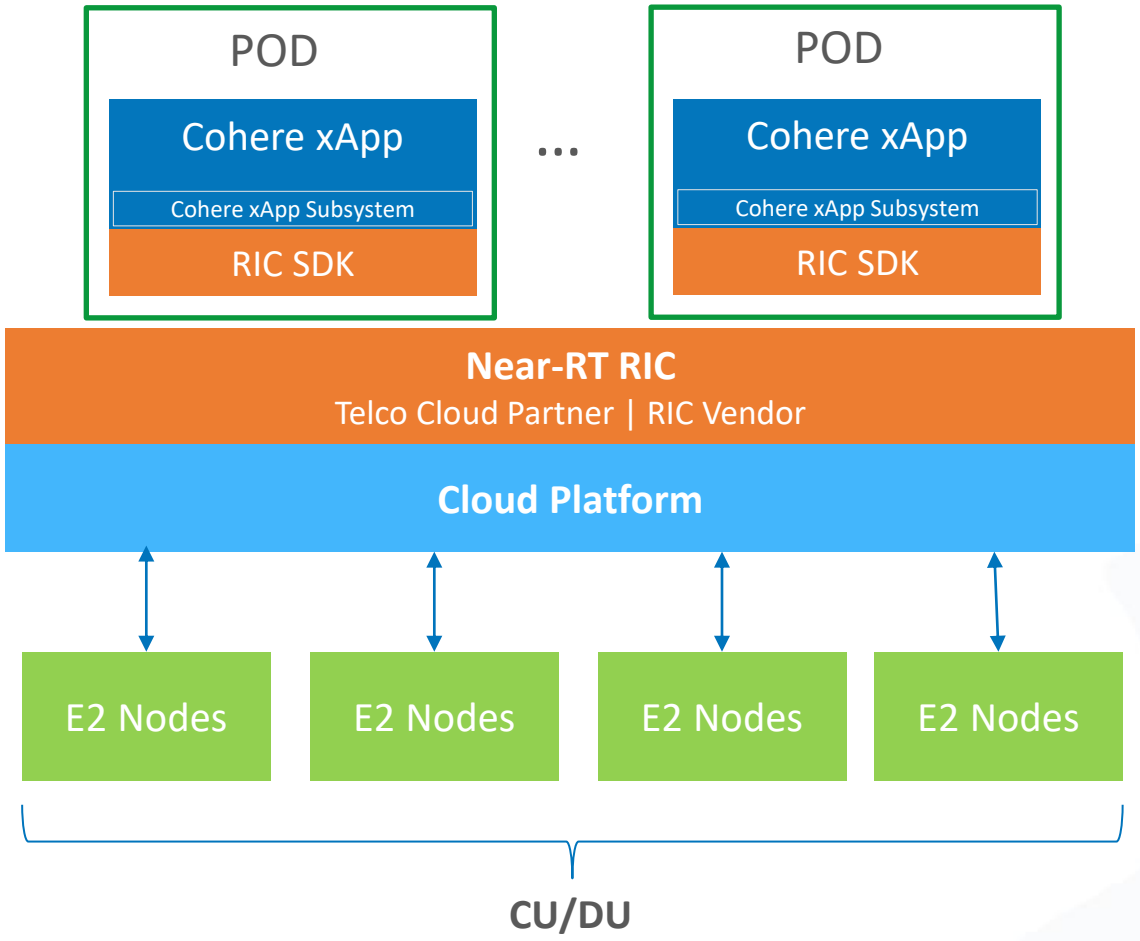
Cohere Software Product & Technology

Cohere software can be integrated within the DU, or can operate in the cloud as an xApp in the near-RT RIC enabling CoMP and ICIC

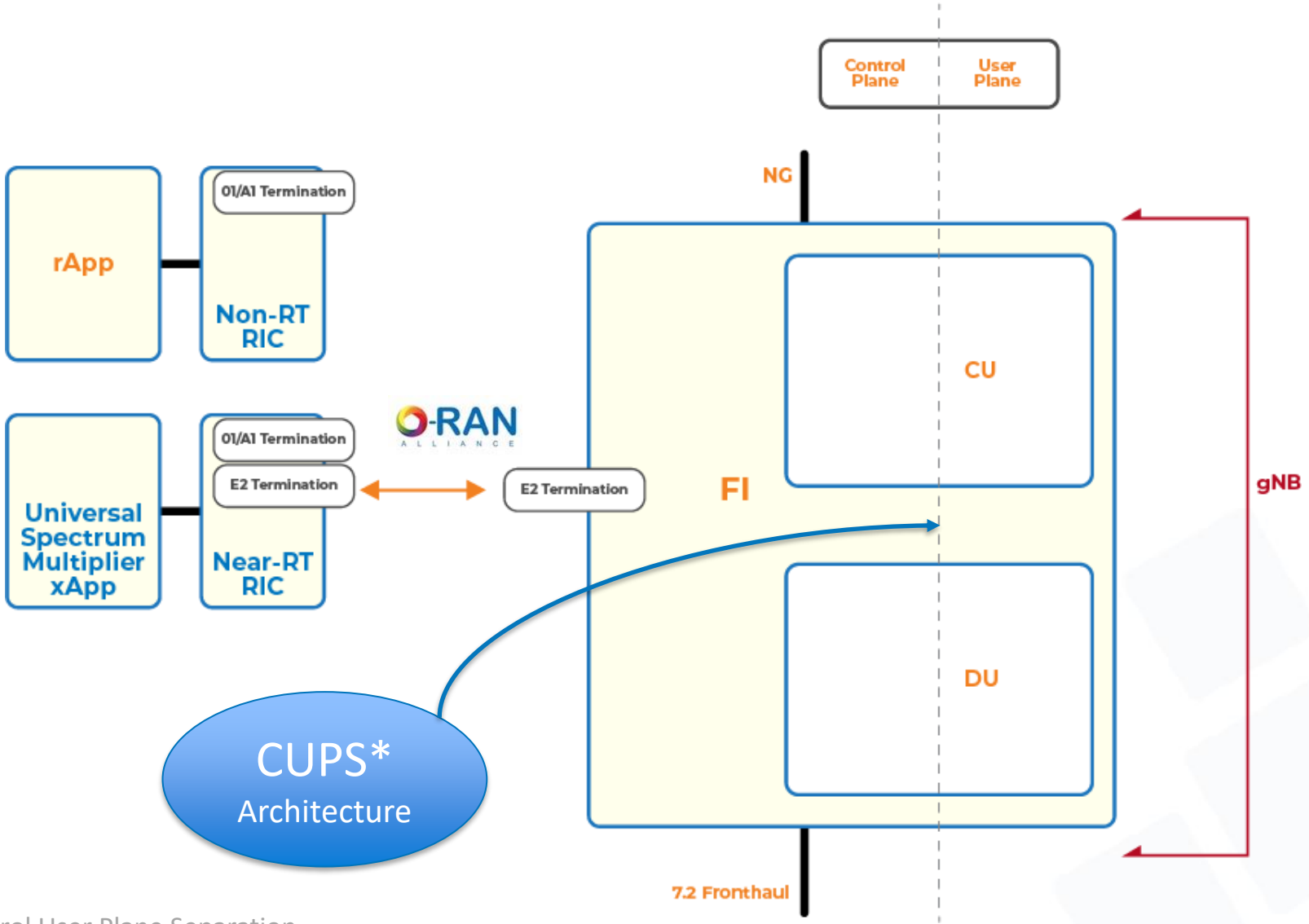


Any Mode (FDD, TDD)
Any Generation (4G, 5G)
Any Antenna array size
Any Mobility

Cohere O-RAN Ecosystem

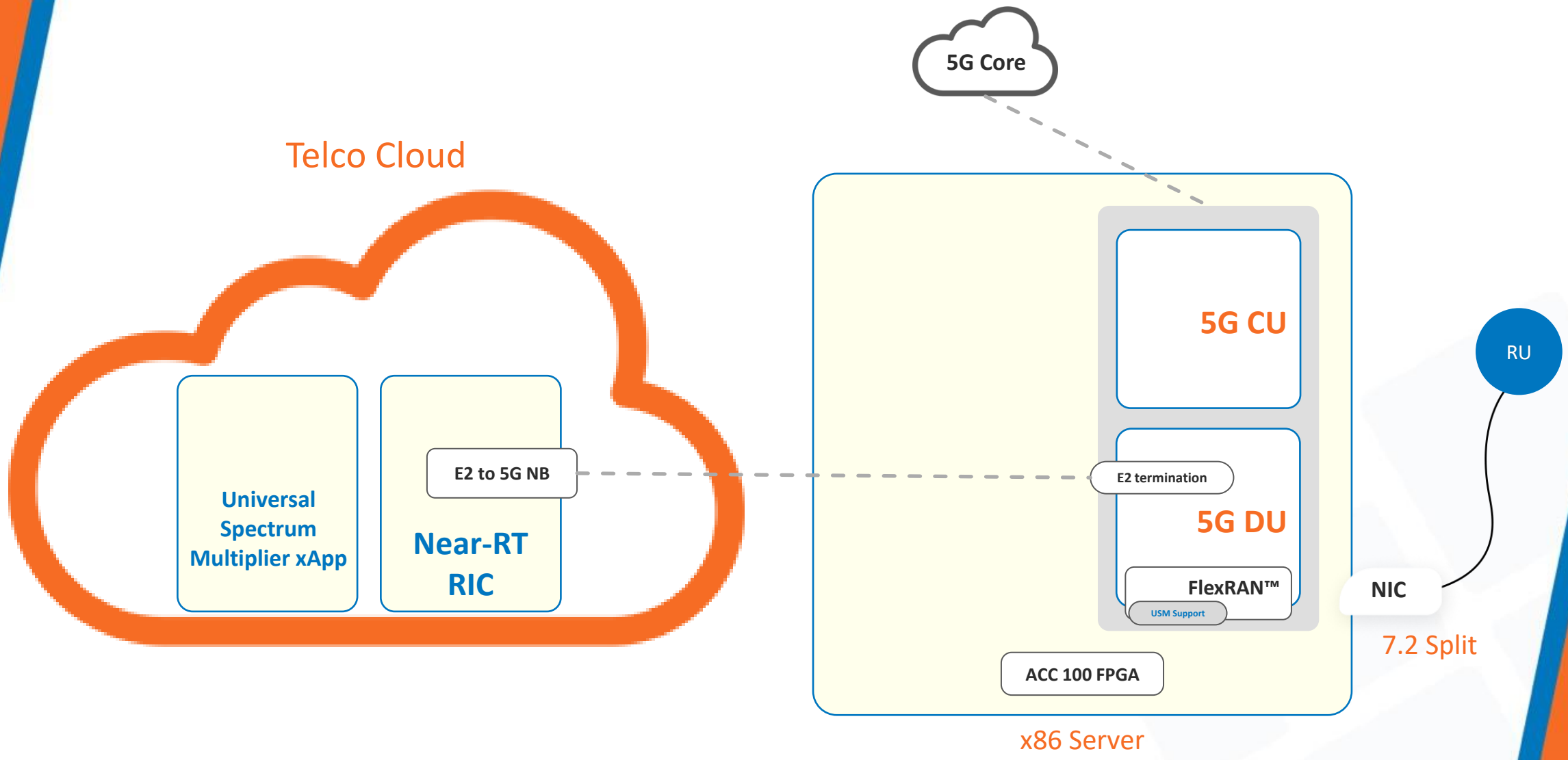


How Cohere Software Fits Within O-RAN

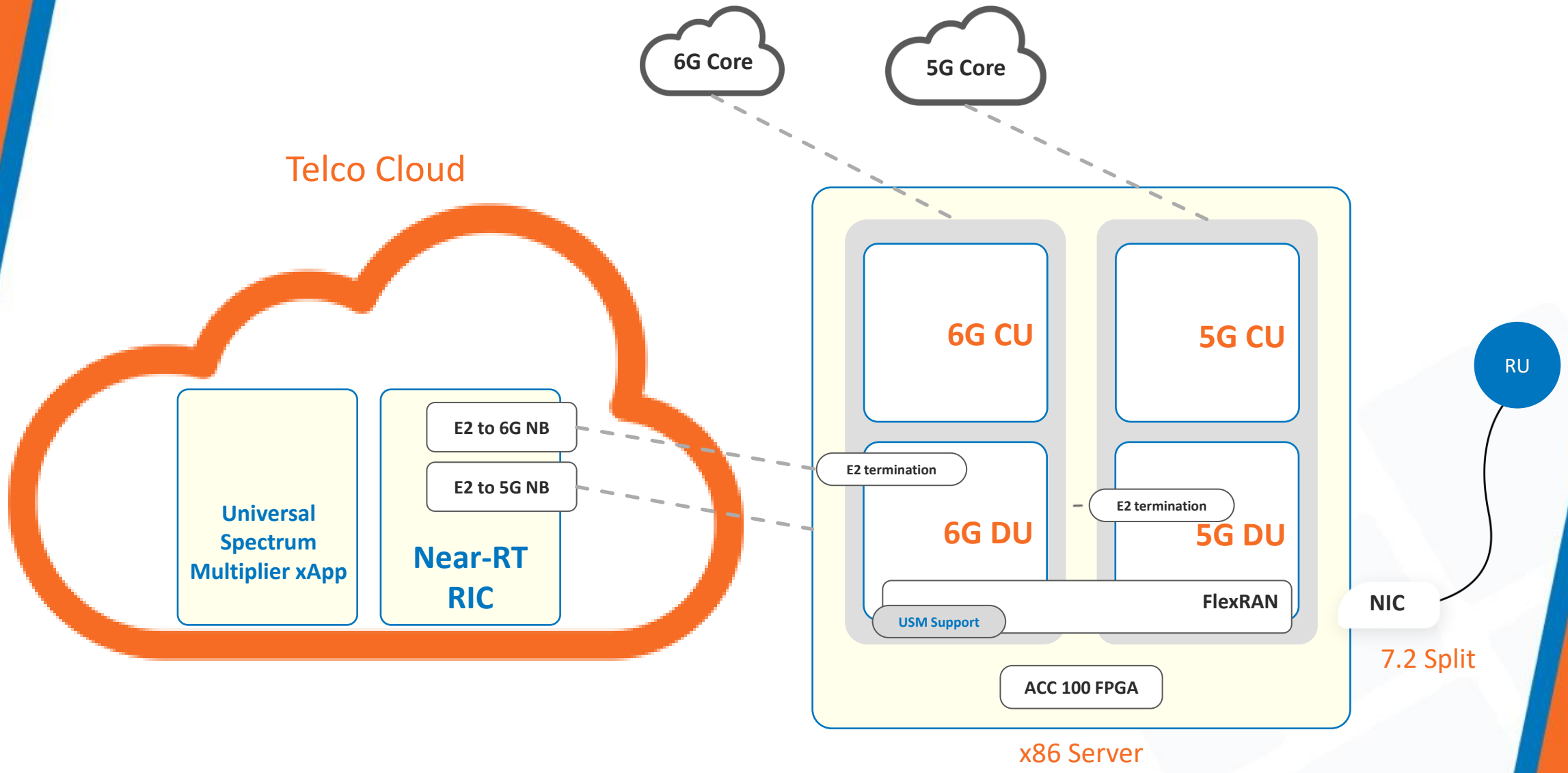


*Control User Plane Separation

Value of Software Innovation



Path to 6G



Thank You

Cohere Technologies

Art King

art.king@cohere-tech.com

www.cohere-tech.com

VMware

Yusuke Kanamori

yusukek@vmware.com

www.vmware.com