Virtualizing and Opening up the Telco Network

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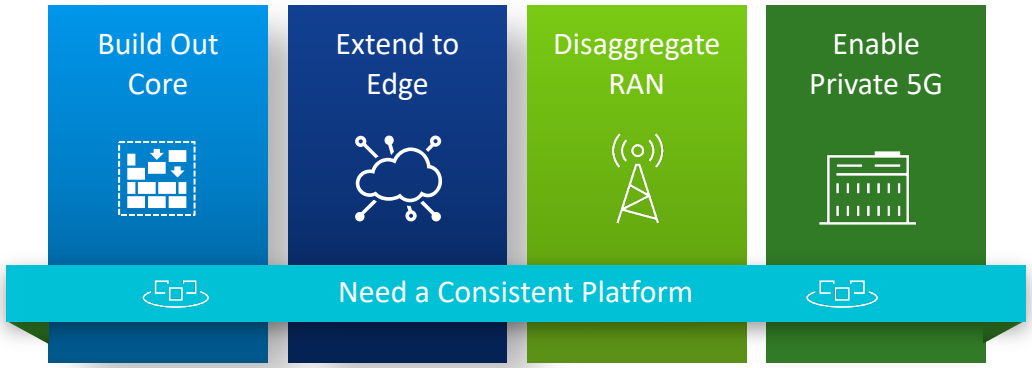
vmware®

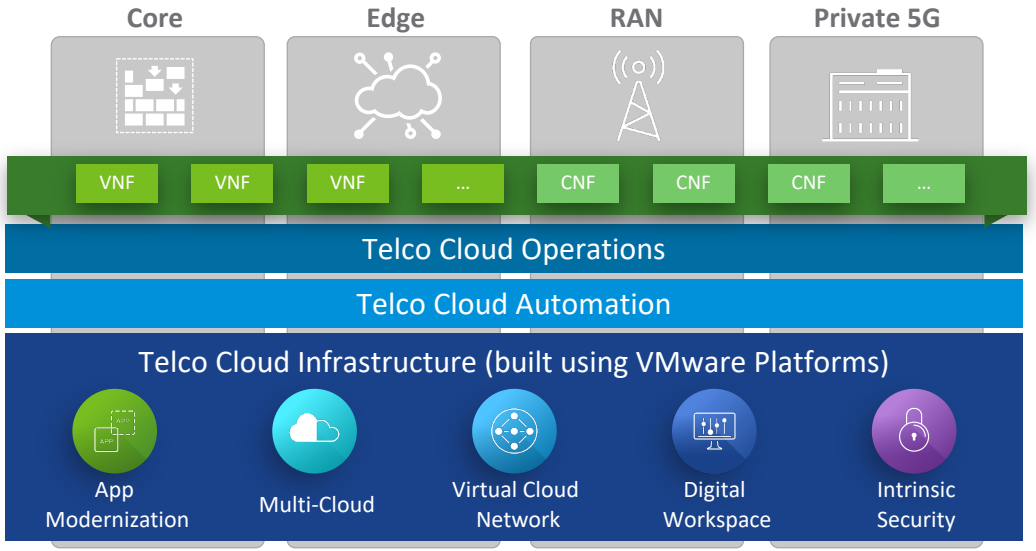
Platforms to enable Telco Horizontalization

Telco/CSP Priorities



Transform telco networks using cloud infrastructure, spanning core, edge and RAN

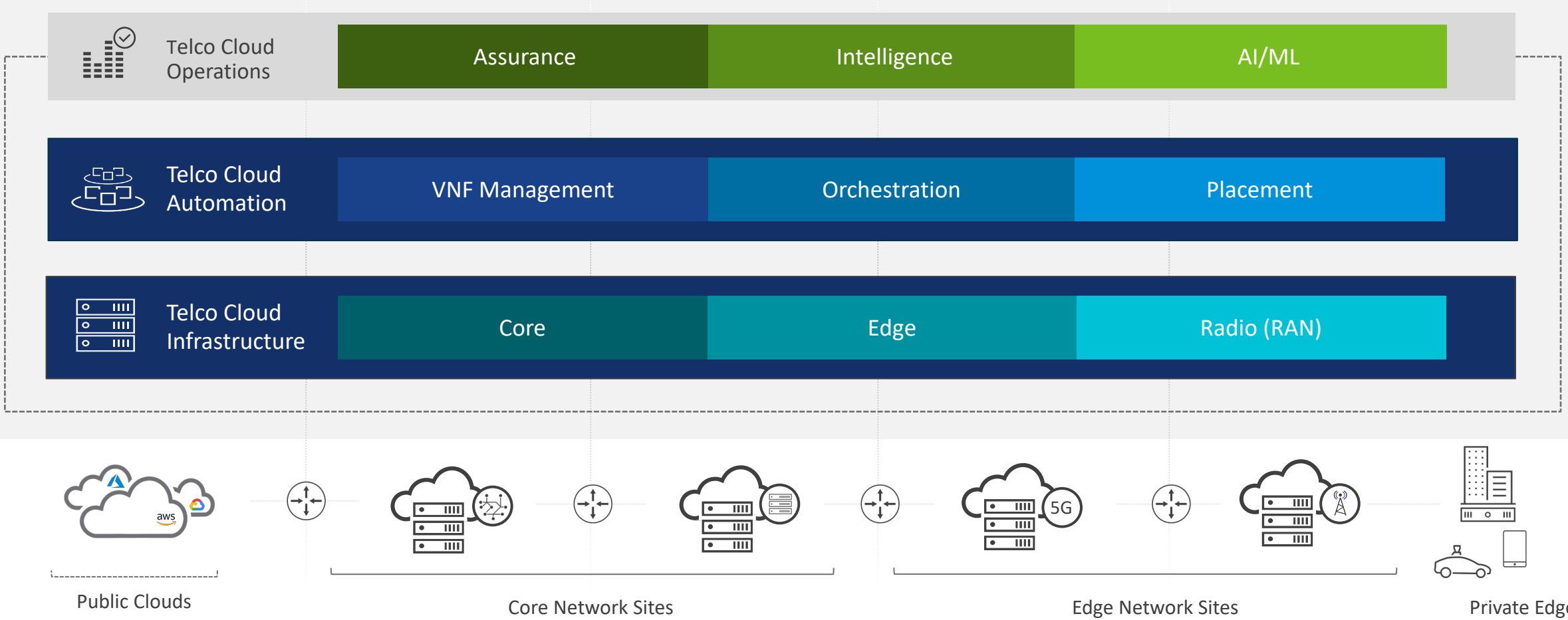
Telco Cloud Platform



- Create a unified, developer-friendly, multi-cloud “Telco Edge Cloud Architecture” to enable carriers to accelerate their business
- Enable an open, disaggregated, and vendor-agnostic ecosystem

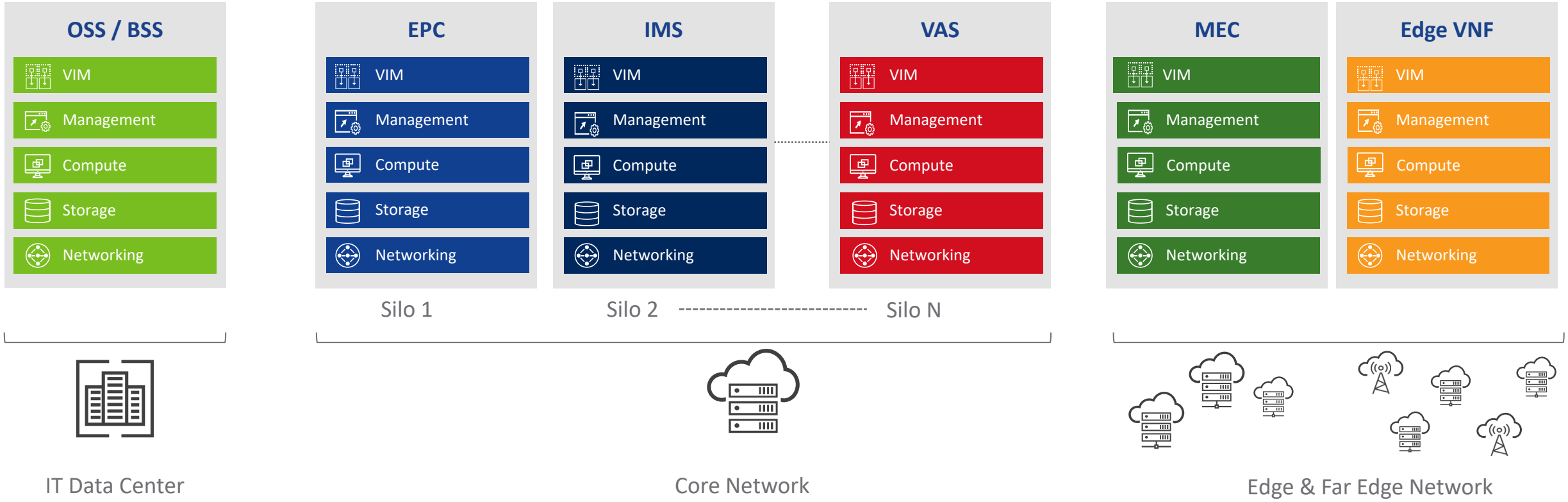
VMware Telco Cloud Stack

From Infrastructure to Analytics & Intelligence for Network Core | Edge | Radio



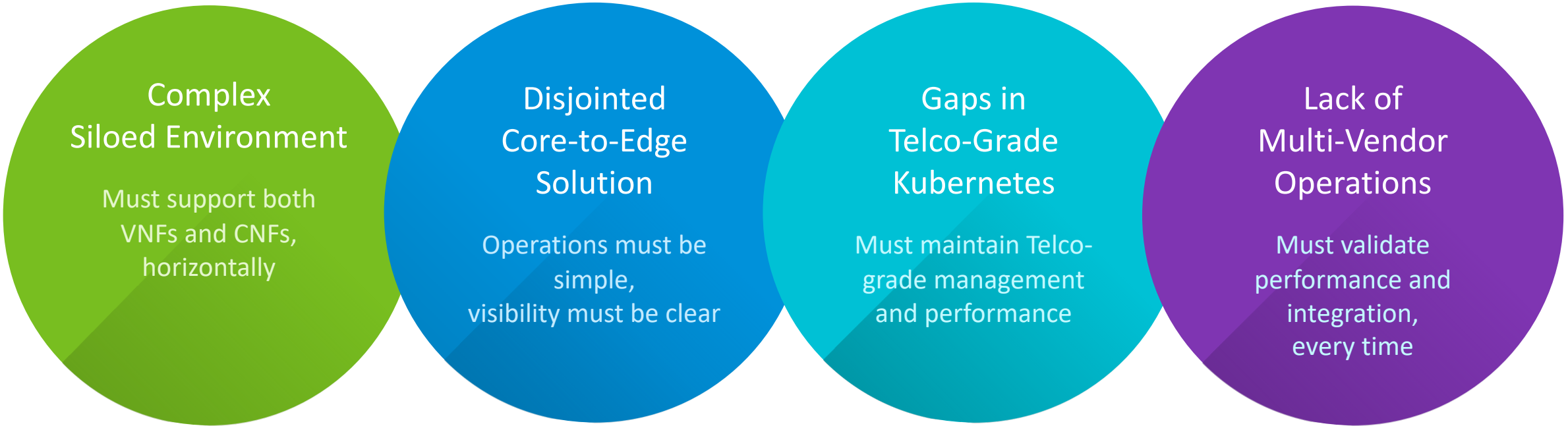
The Telco World Today

Siloed and Disparate Network Infrastructure Increases Network Complexity and Costs



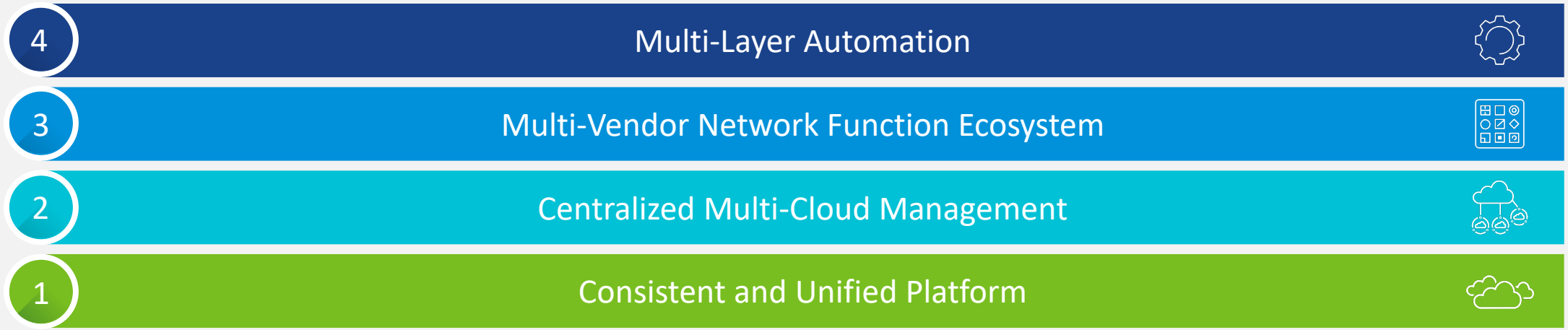
Challenges Must Be Overcome

Modernize Siloed and Monolithic Cloud to Agile Environment with Cloud-Native Technologies



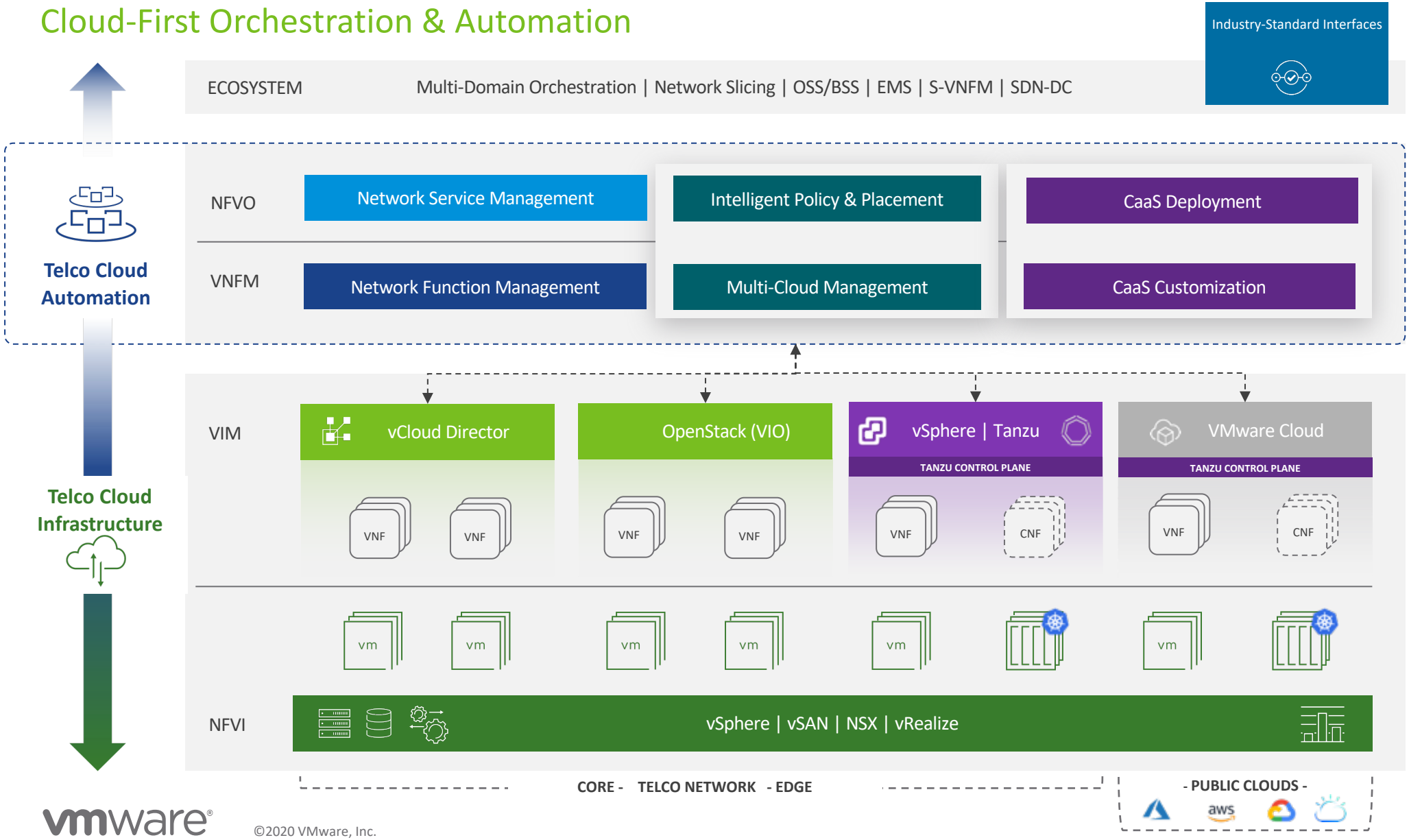
Transforming to a horizontal and cloud native architecture

Accelerate Innovation Cycle Through Better Network Design End-to-End



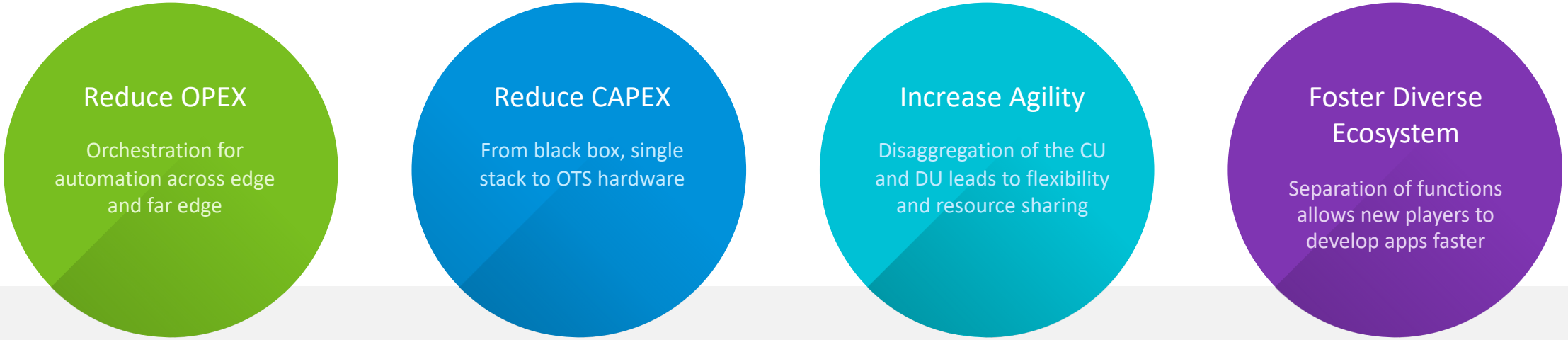
VMware Telco Cloud Platform

Cloud-First Orchestration & Automation



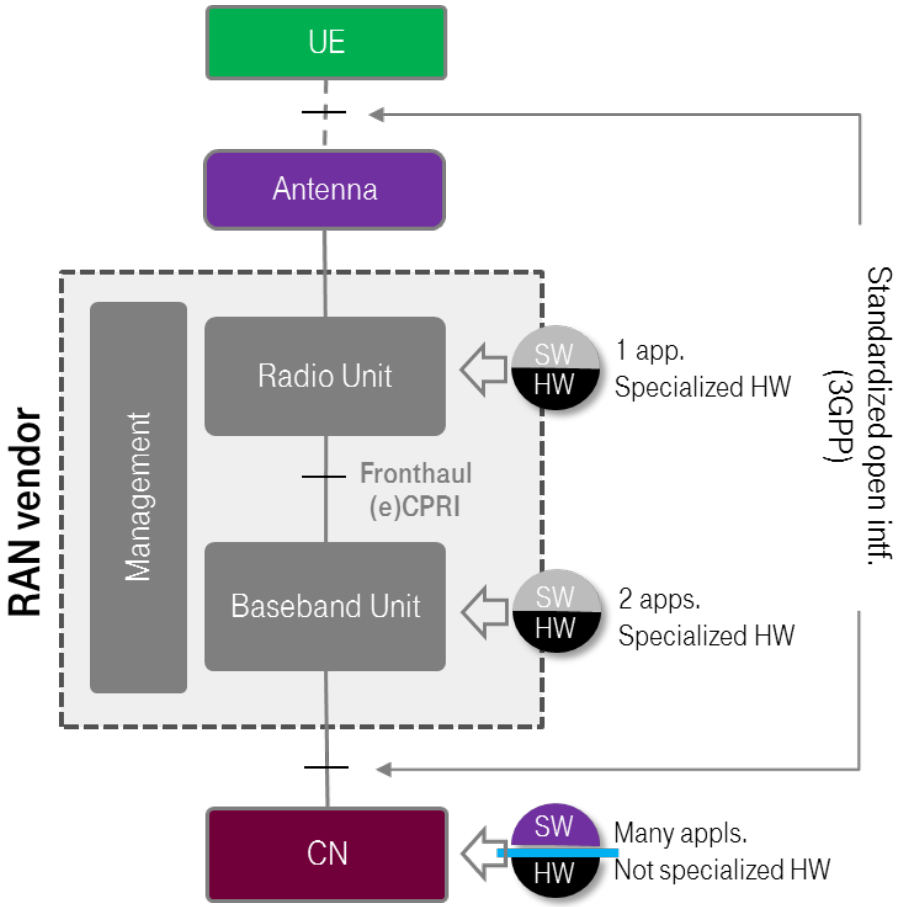
How does this apply to O-RAN?

Innovation. Agility. Speed.



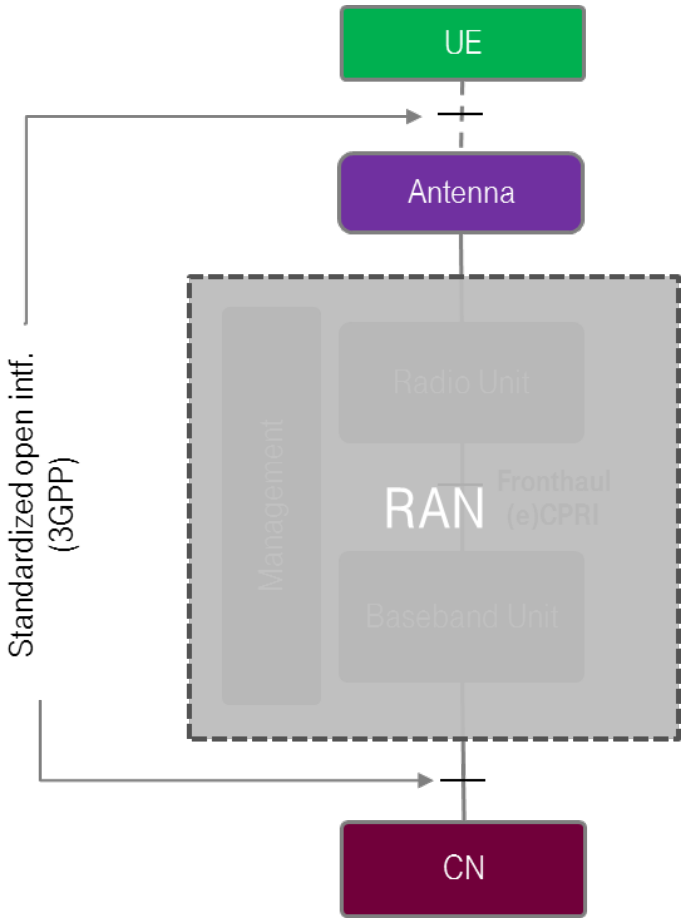
Separate scheduler functions | Increase spectral efficiency | Develop new x-apps by 3rd parties | Innovate Faster

Currently Radio Access Networks are closed, innovation is slow



- Challenging transformation of RAN towards cloudified and software-driven deployment and operations
- Limited programmability ⇨ low flexibility for 5G new services introduction
- Vendor market relatively closed (3 main vendors), even with RAN dominating overall Network Capex
- Limited innovation

O-RAN is standardizing an open (disaggregated) RAN architecture



Disaggregate

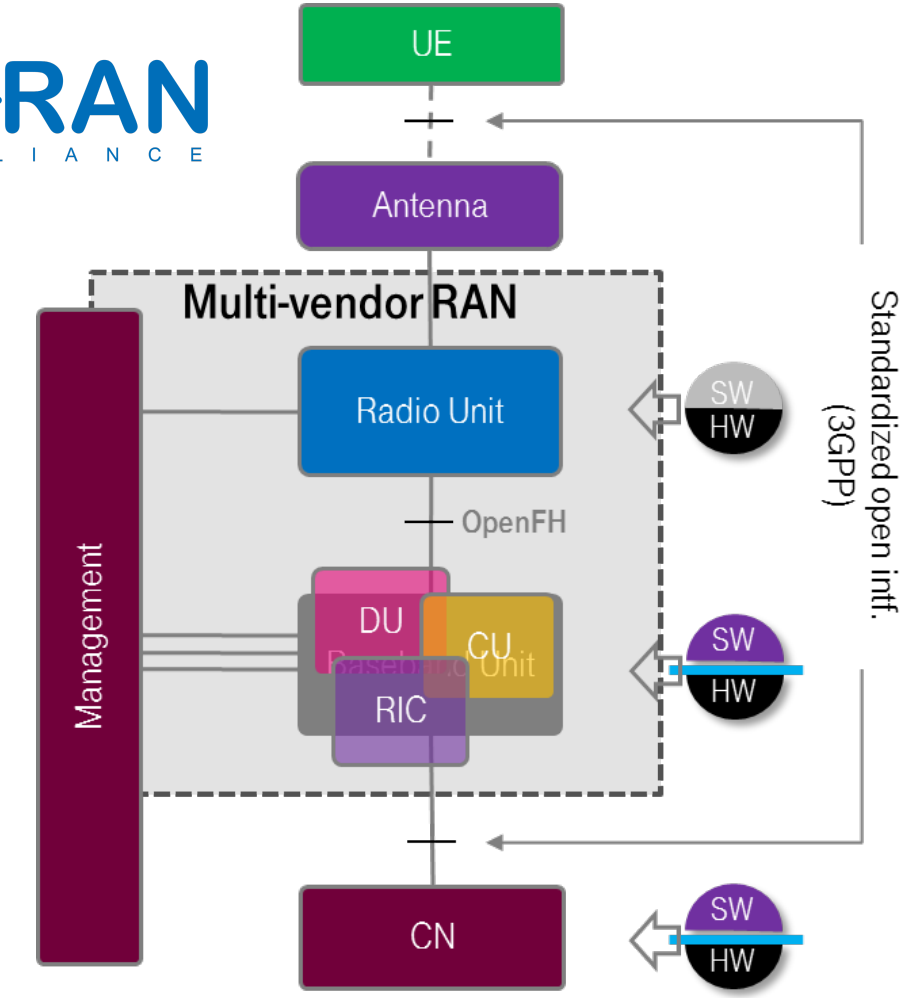
Open Ecosystem

Open Interfaces

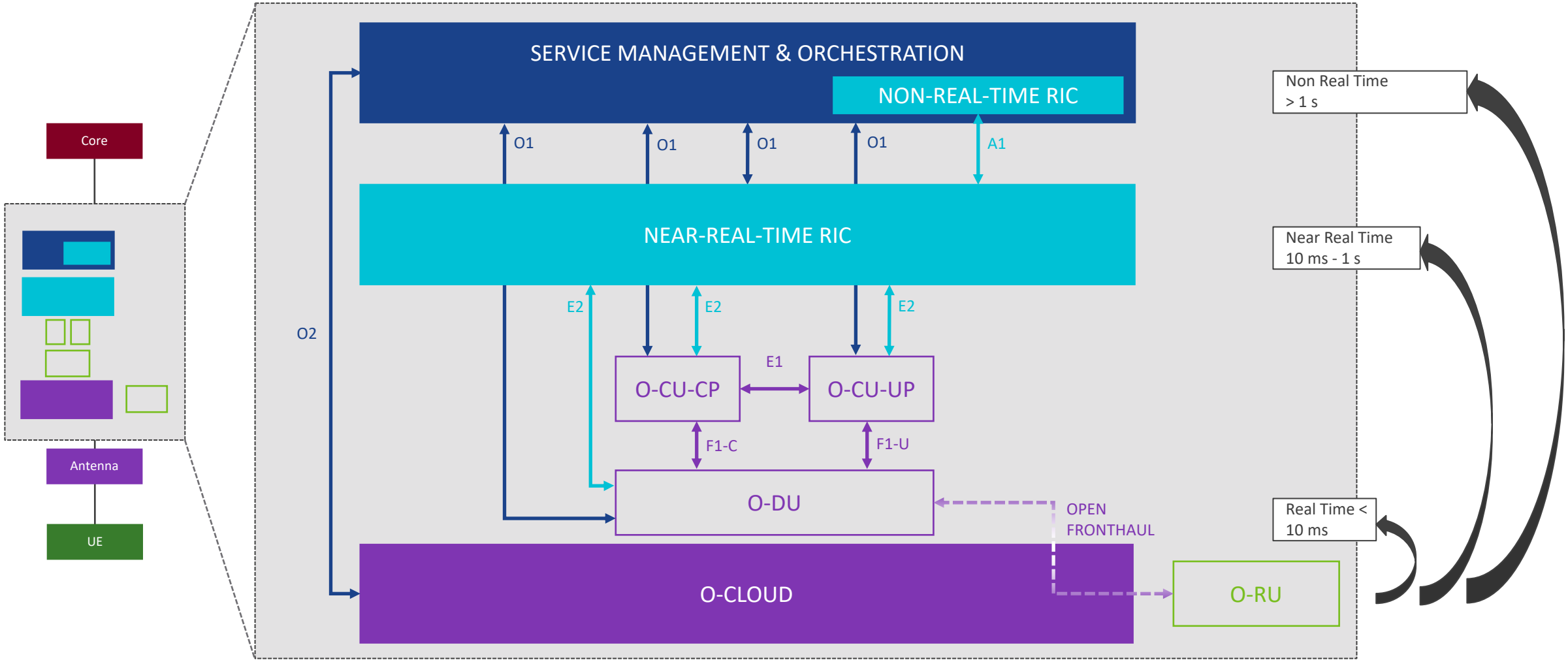
Decoupling HW/SW

AI/ML native

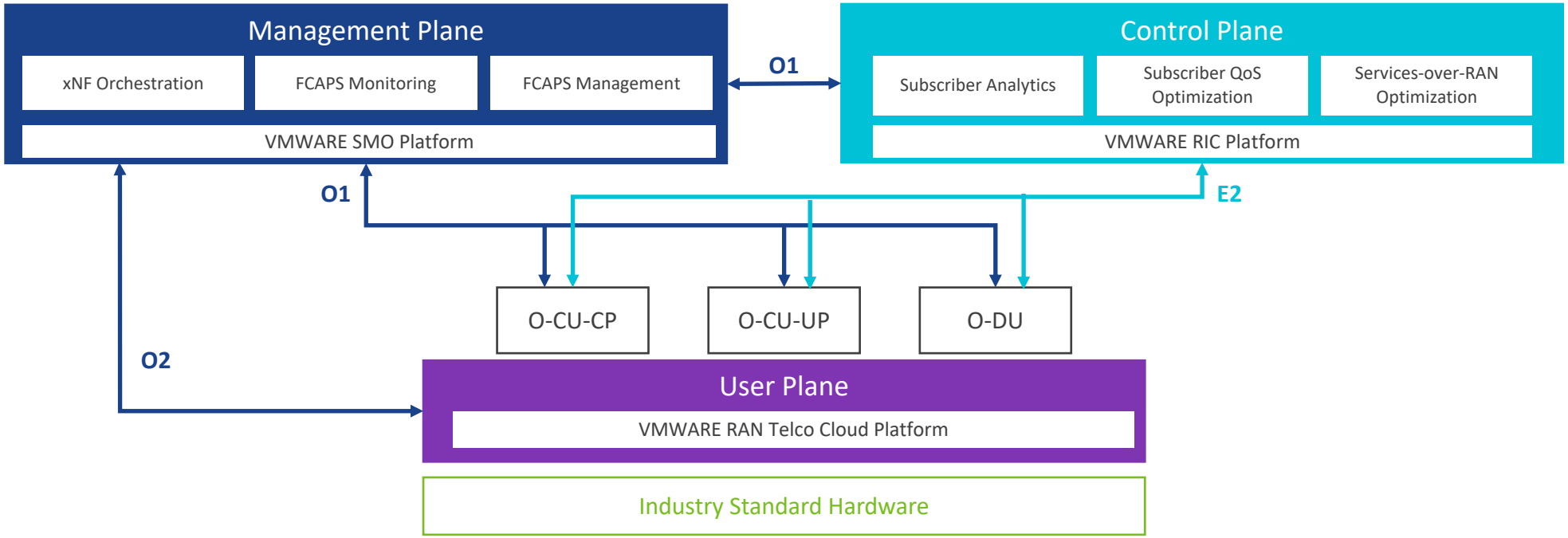
O&M Optimization Loop



O-RAN reference architecture

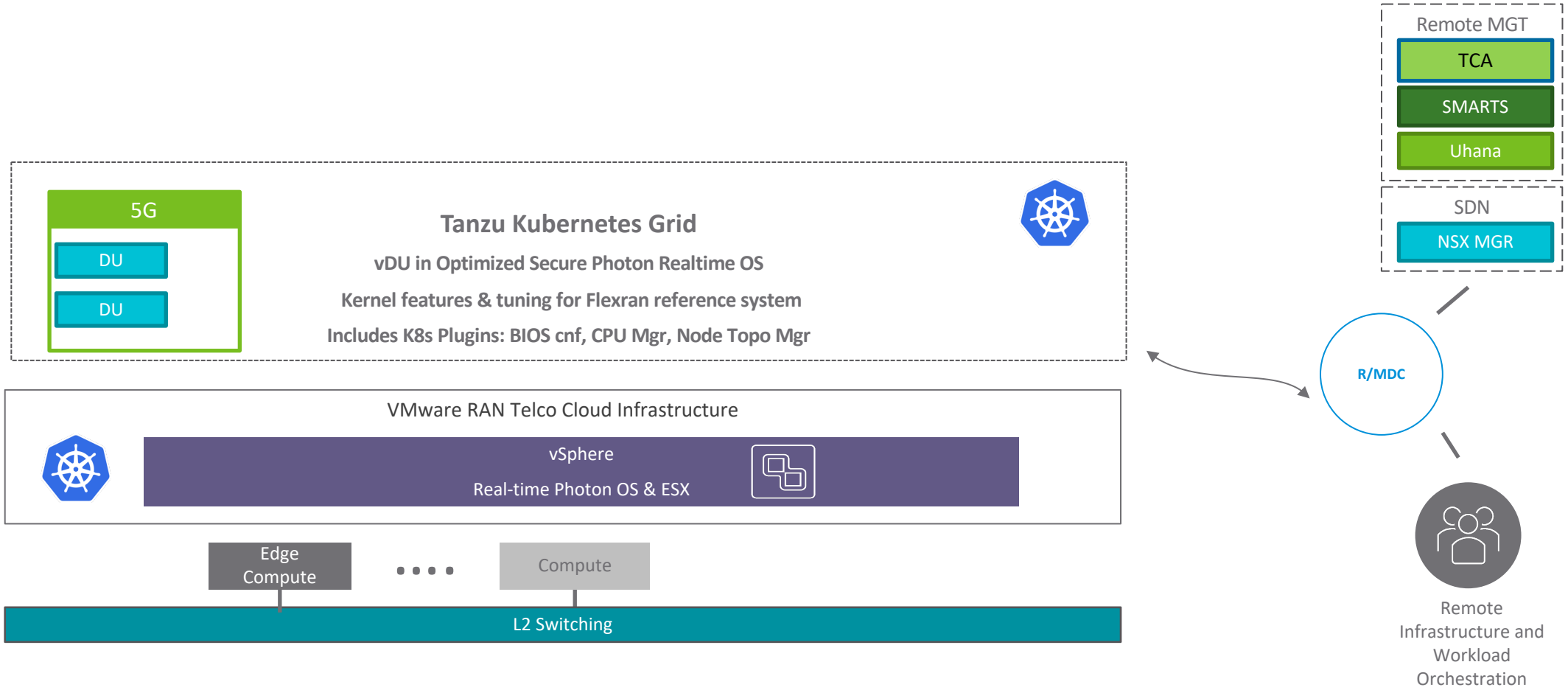


VMware RAN Platform



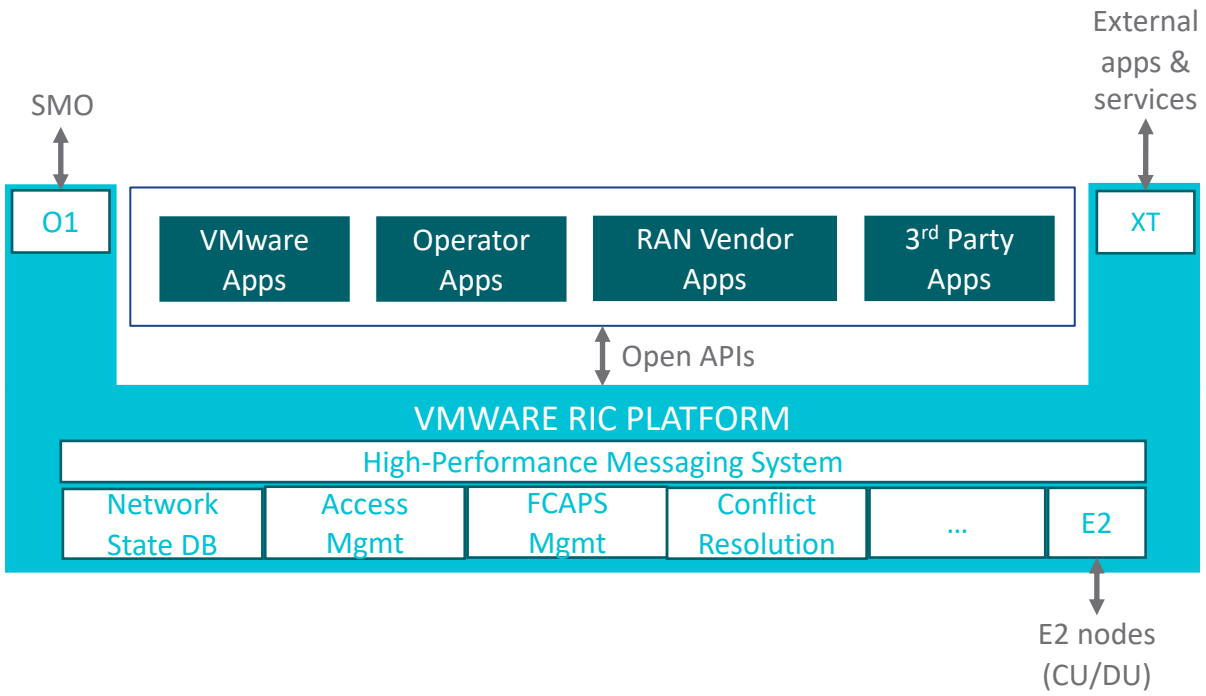
- Provide the vendor-neutral horizontal platform for RAN user, management & control planes
- Abstract HW platforms across Intel, Nvidia and Qualcomm
- Create a rich, innovative, multi-vendor “app store” for each plane

VMware RAN Telco Cloud Platform



VMware RIC platform for agile innovation & optimization in RAN

Architecture and Key Components



XT (External) Interface is VMware feature to enable **edge intelligence** beyond RAN (i.e., to provide capabilities for RAN insights & optimizations to external services and applications)

VMware RIC Platform

- Supports both non-RT (> 1 sec) and near-RT (10 msec – 1 sec) use cases
- Provides services to simplify app design & deployment

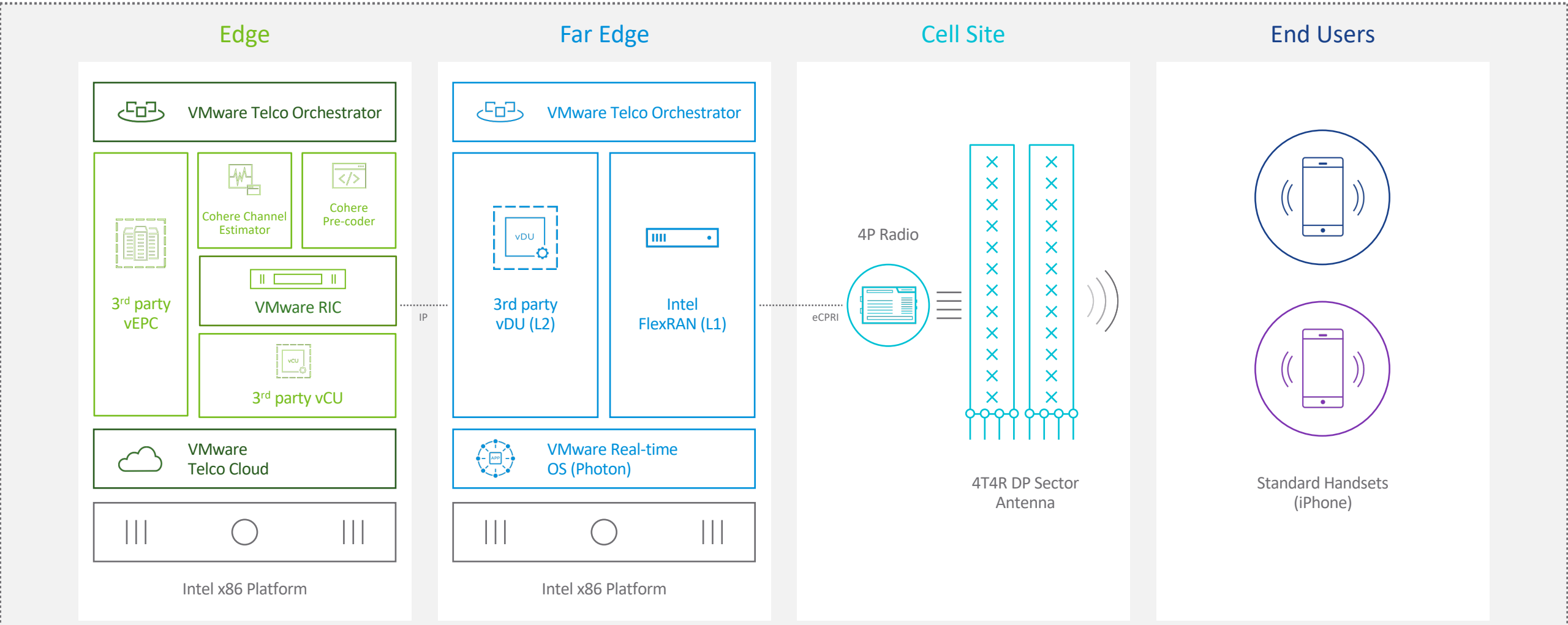
Open APIs

- Easy-to-use framework to encourage rich innovative ecosystem of intelligent applications

Apps Ecosystem ("Appstore")

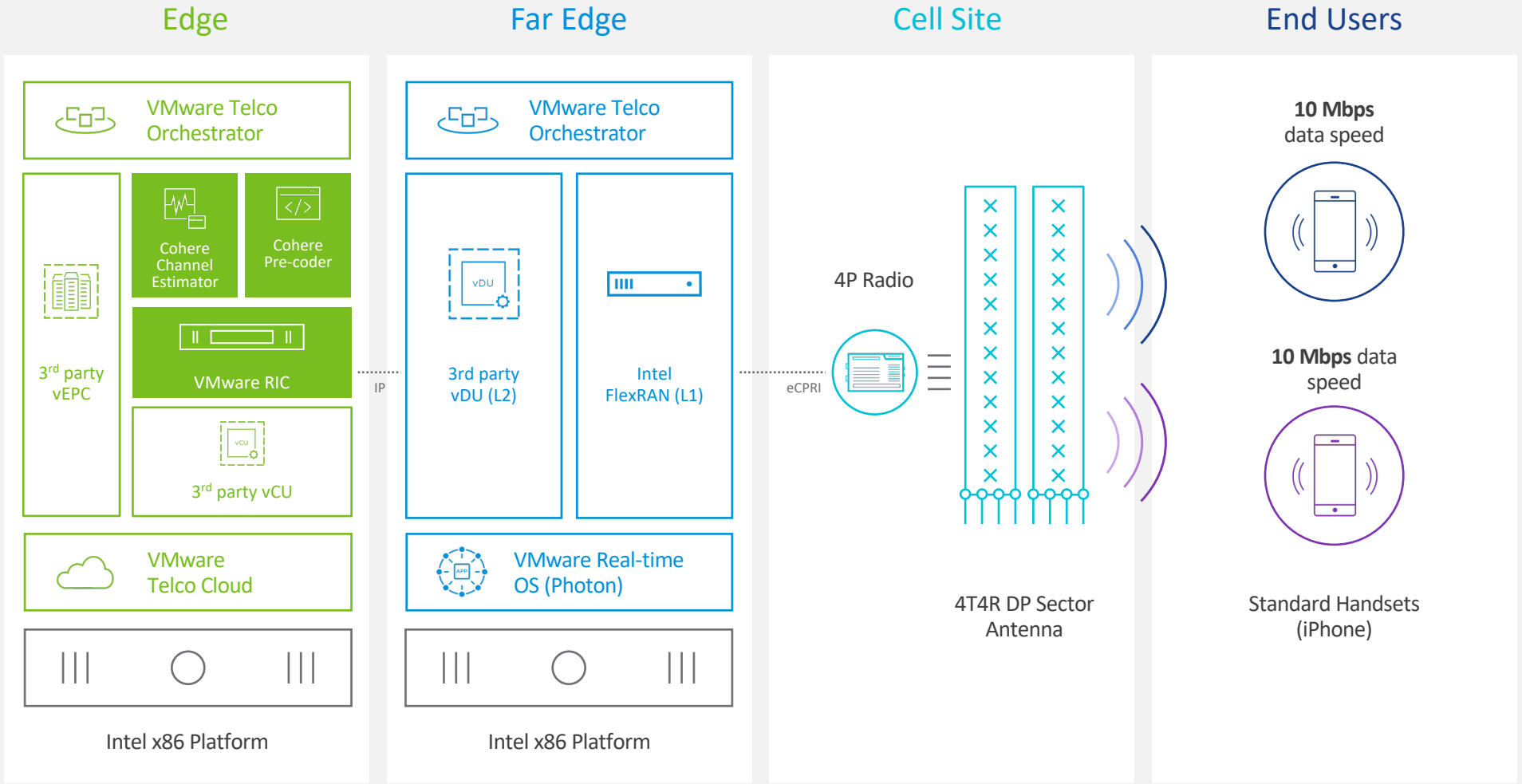
- Apps can be provided by operator, RAN vendor, VMware or 3rd parties
- Enables RAN automation and monetization

VMware O-RAN Demo at Deutsche Telekom



Spectral Efficiency is Greatly Improved with VMware RIC, Cohere xApp & Intel

VMware RIC and Cohere VNFs enabled



VMware Radio Intelligent Controller (RIC) and Cohere channel estimator and pre-coder are enabled

Cellular streams do not overlap and there is no interference

Data throughput from the cellular tower increases

Data speed for the end users increases

Summary: Disaggregating & Virtualizing the RAN

Disaggregated & Programmable RAN

- Modularity **reduces barrier to entry** for smaller vendors; can provide smaller specialized functions instead of a giant monolithic stack
- Multi-vendor ecosystem leads to **increased competition**; telcos can choose between multiple vendors, and select best-in-class network functions from different vendors
- More competition leads to more and faster **innovation**; open RAN is expected to introduce new service capabilities like network slicing, 4G/5G spectrum sharing, tactile internet and massive IoT

Virtualized RAN

- Decoupling software and hardware enables **software-defined** and **cloudified** RAN
- Cloud-RAN leads to **better utilization of compute & spectrum** resources; **lowers CAPEX**
- Software-defined RAN leads to **easier/better orchestration and operations**; **more agility**