

# LEARNING, AND EXPERIENCES FROM MULTIPLE 5G/O-RAN GLOBAL DEPLOYMENTS

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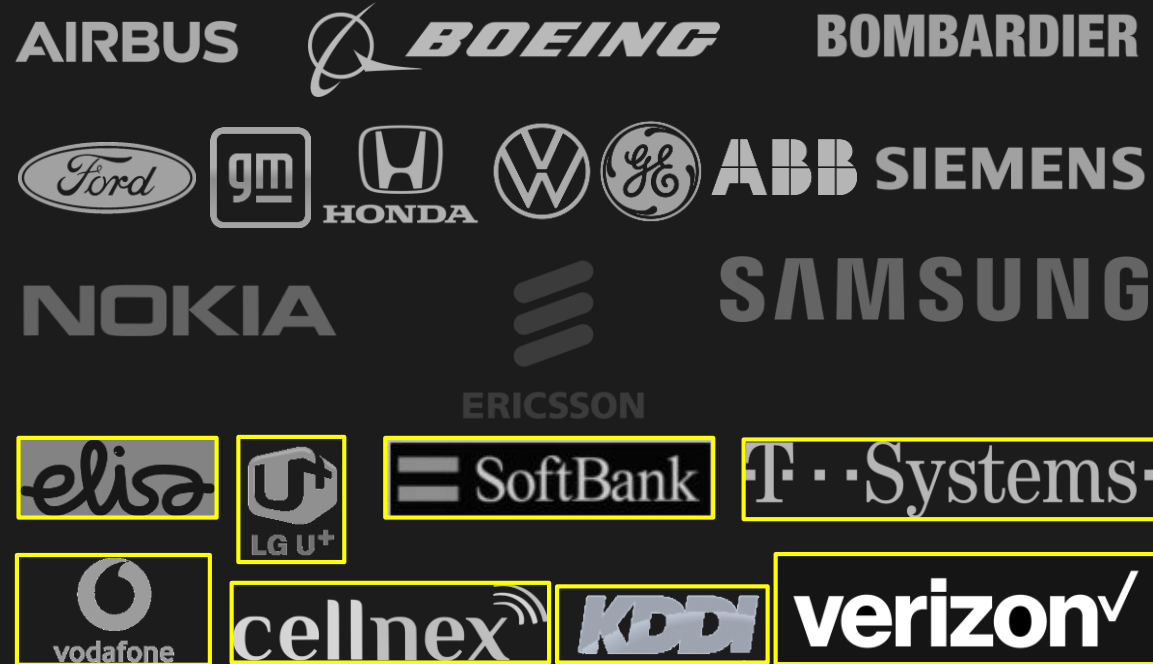
Gil Hellmann

VP. Telco Solutions Engineering & Architecture

WINDRIVER

# WHEN IT CANNOT FAIL, CHOOSE WIND RIVER

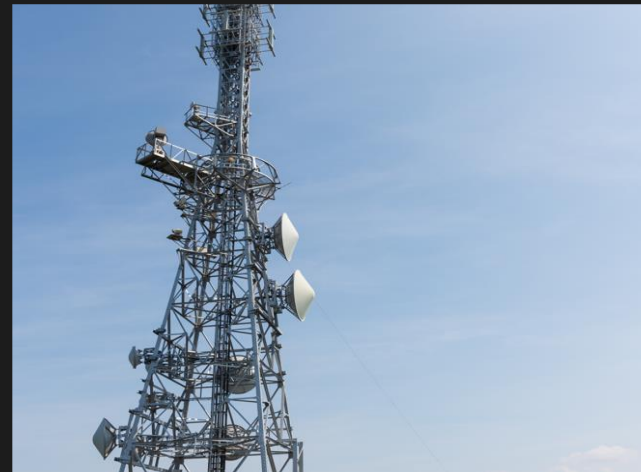
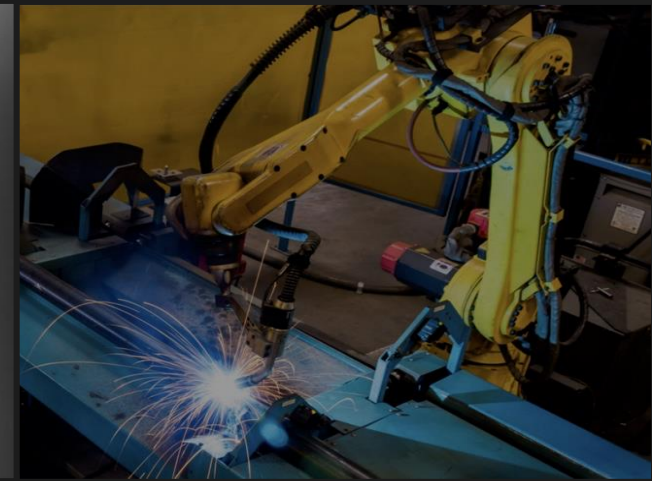
Wind river is unique in building software to the highest standards as required for safety critical applications in avionics, industrial, automotive systems, defense systems, and 6 9's high availability and scalability for next generation cloud infrastructure for telecom networks



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Key Telco Wins



# Key 5G Deployment Activities

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Narrowband DRAN

*Studio Cloud supporting narrowband 5G vDU deployments*



Narrowband CRAN

*Studio Cloud supporting multiple vDU from one location + MEC*



In Building

*Studio Cloud supporting UWB retail coverage primary*



Dual Band DRAN

*Studio Cloud supporting sub 6GHz narrow+mid*



Dual Band CRAN

*Studio Cloud supporting sub 6GHz narrow+mid, one location*



Private 5G

*Studio Cloud supporting Enterprise deployments, carrier owned*

# Deployed



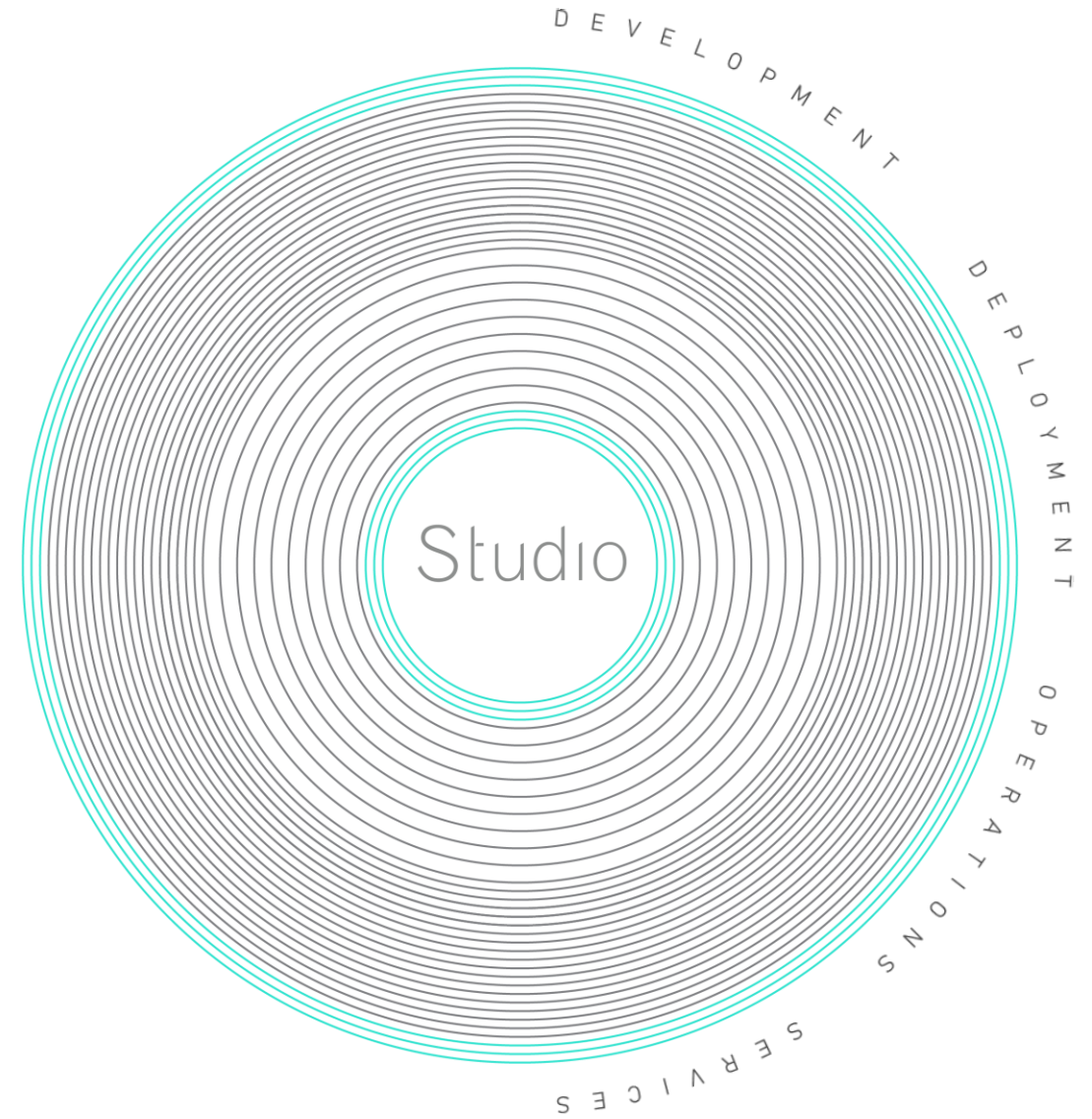
“I stand extremely firmly on the side in that we would not be deploying it if it wasn't as good or better than what we have in place today,”

Bill Stone, Verizon VP of Technology Development and Planning



“Our team has been working tirelessly to take OpenRAN technology from a theory in our lab to our customers in the real world – it's remarkable how much has been achieved in such a short period of time”

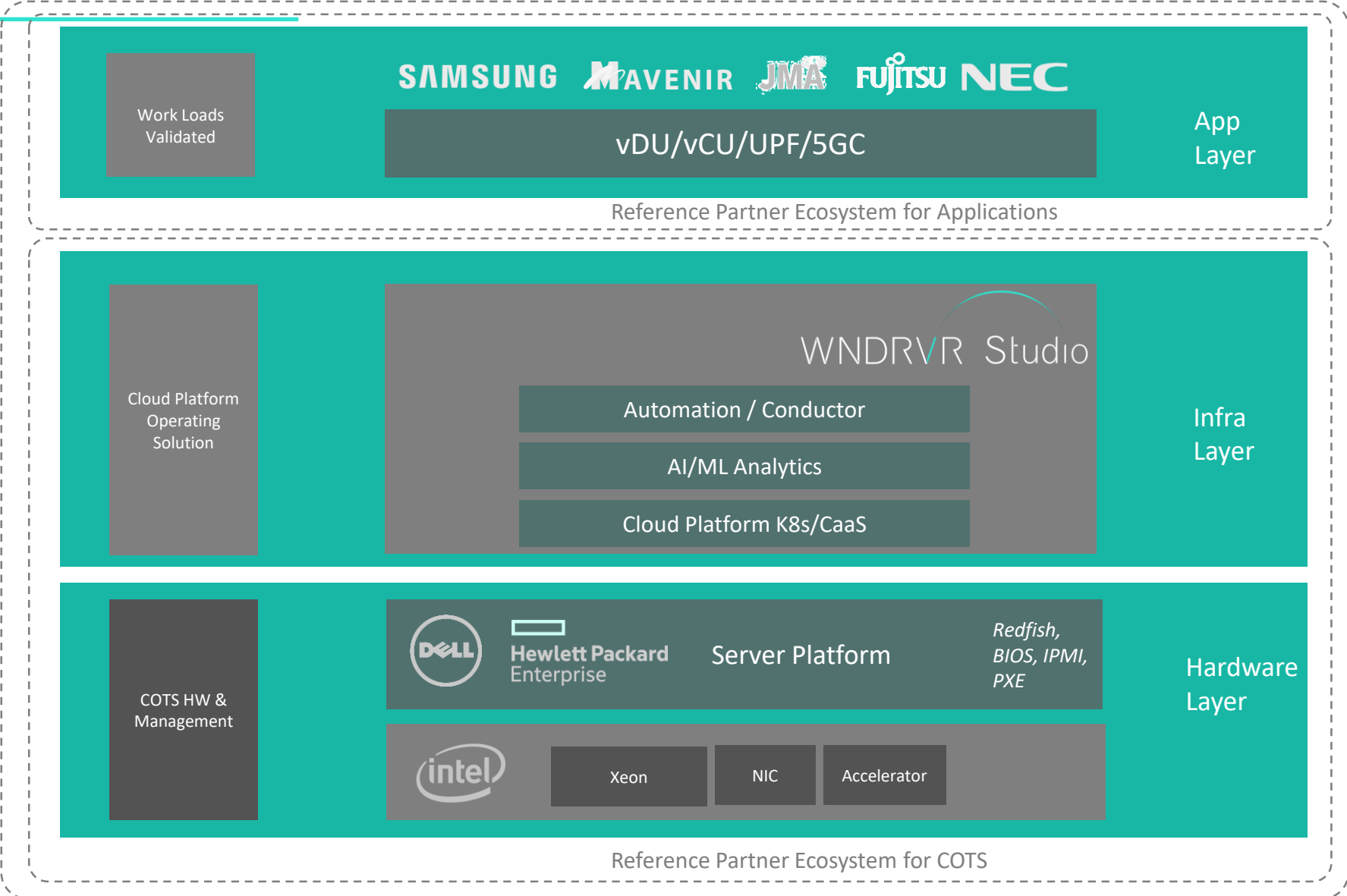
Andrea Dona, Vodafone Chief Network Officer



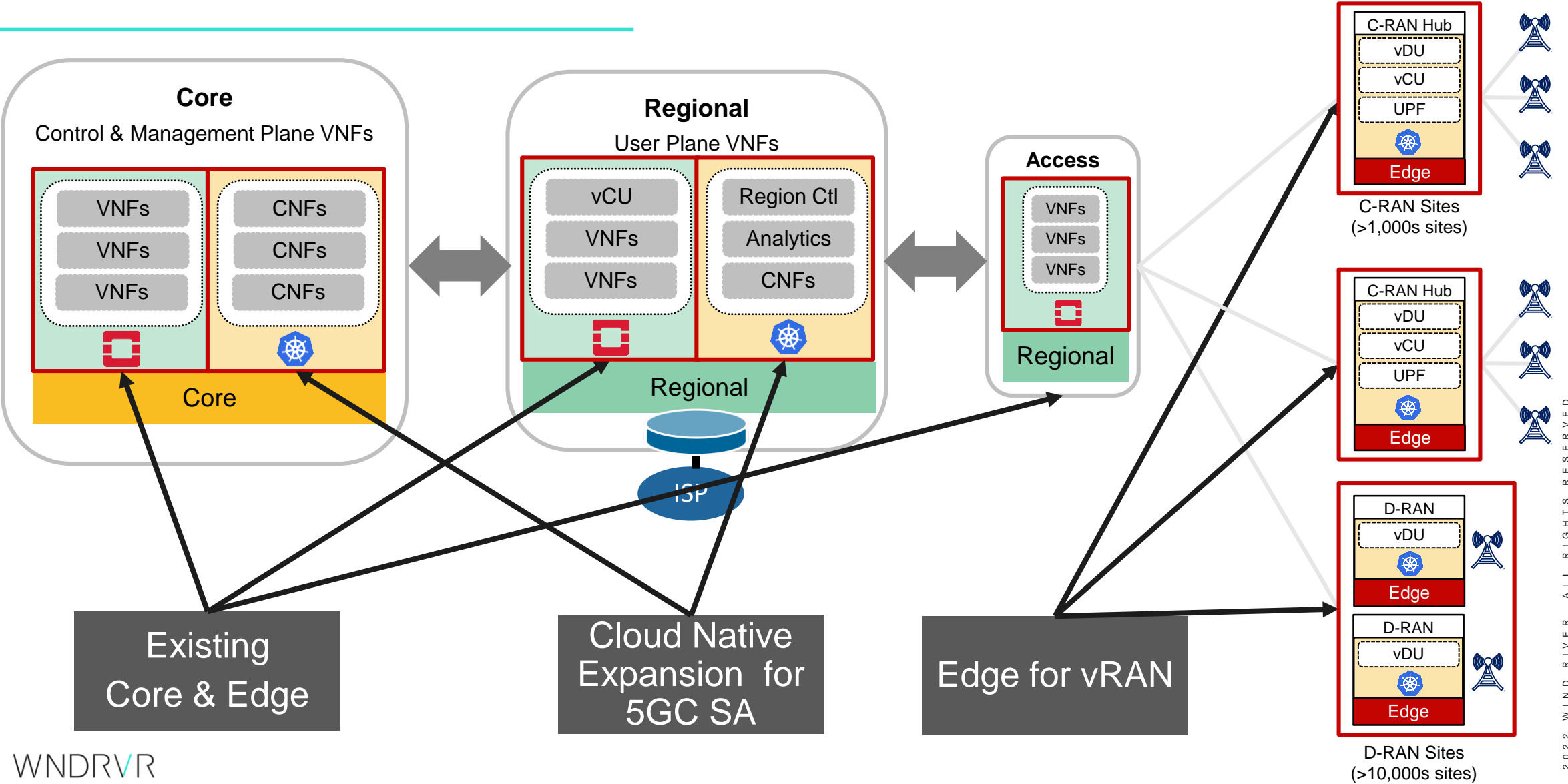
# Commercial Deployment of Disaggregated O-RAN

Wind River Reference Ecosystem

*The globally deployed, continuously integrated hardened solution for Cloud Distributed 5G RAN*



# 5G NR O-RAN (7.2 Split) – Deployment Architecture



# Initial Deployment Journey

## Lab Readiness

- LLD / HLD design /approval
- Automation design
- Acceptance test design / approval
- CaaS performance validation

## FOA / Initial Deployment

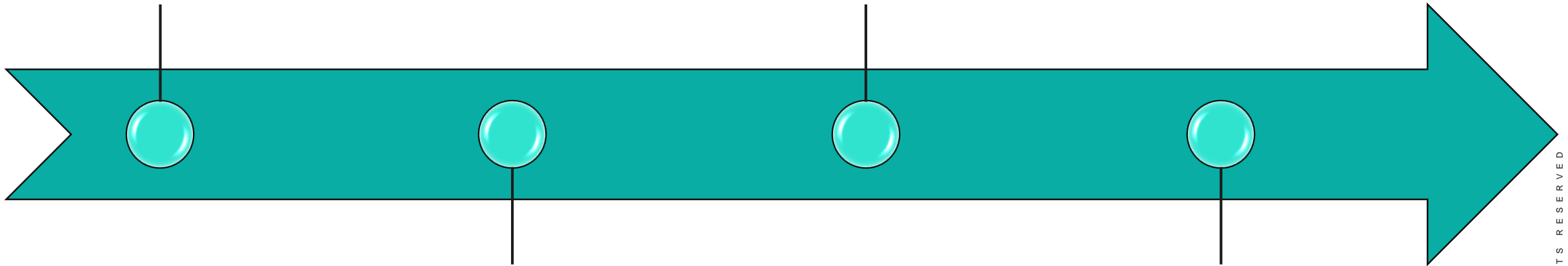
- Pre-stage and install systems
- Production LLD / HLD review
- Install of CaaS on < 1000 sites
- Install of RAN workload
- FOA test validation complete

## Lab Validation

- LLD/HLD validation
- Automation validation
- Test acceptance validation
- RAN application onboarding
- RAN application validation

## Full Deployment at scale

- Pre-stage and install systems
- Full scale deployment
- Go-Live launch



# Learnings: Deploy & Test

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- Release cadence requires alignment with more than one partner
  - Updates provided for Firmware, CaaS, Application need to be validated
  - Alignment is required as to the order of updates. CaaS needs to test with firmware -> Application needs to test with CaaS and Firmware
- Streamlining test and validation requirements are important
  - CI/CD integration across multiple partners to guarantee reliable delivery
  - Waiting for years to upgrade causes major issues with stability
  - Labs and test cases need to be aligned in multiple labs across multiple partners
  - Improves velocity of deploying new features and minimizes risk
- Creating Automation that handles large scale installations and updates is required
  - Must be done without manual intervention to guarantee faster validation and deployment
  - Automation Includes:
    - Test automation, Deployment automation, Update/Upgrade automation
    - Continuous automation is important



# Learnings: Manage at Scale

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- Large deployments require improved visibility
  - Need to monitor and react to new alarms
  - Need to monitor and react to outdated systems
  - Close loop automation required without user intervention
- Deployed systems require updates that new systems already have
  - Firmware, CaaS updates, Application updates
  - Ability to validate & roll out updates & upgrades at a much faster pace than traditional systems
- CaaS management network QOS
  - Management network typically is prioritized below data traffic
  - Loss of connectivity
  - Instability when update / upgrading
- Installation configuration management
  - Handling configuration requirements for different HW, Application versions, deployment scenarios

# Learnings – General

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- This is new!
  - Staff knowledge of Cloud and K8s
  - New to managing multiple partners
  - Edge scale requirements don't directly map to data center
  - Automation requirements for edge scale
- Using cloud native capabilities to solve problems or better manage systems is an advantage
  - Allows for better scaling
  - Using developed practices in cloud to scale
  - Quicker time to resolutions
- Rules of engagement needs to be defined
  - Roles and responsibilities / knowing who and how to engage the experts

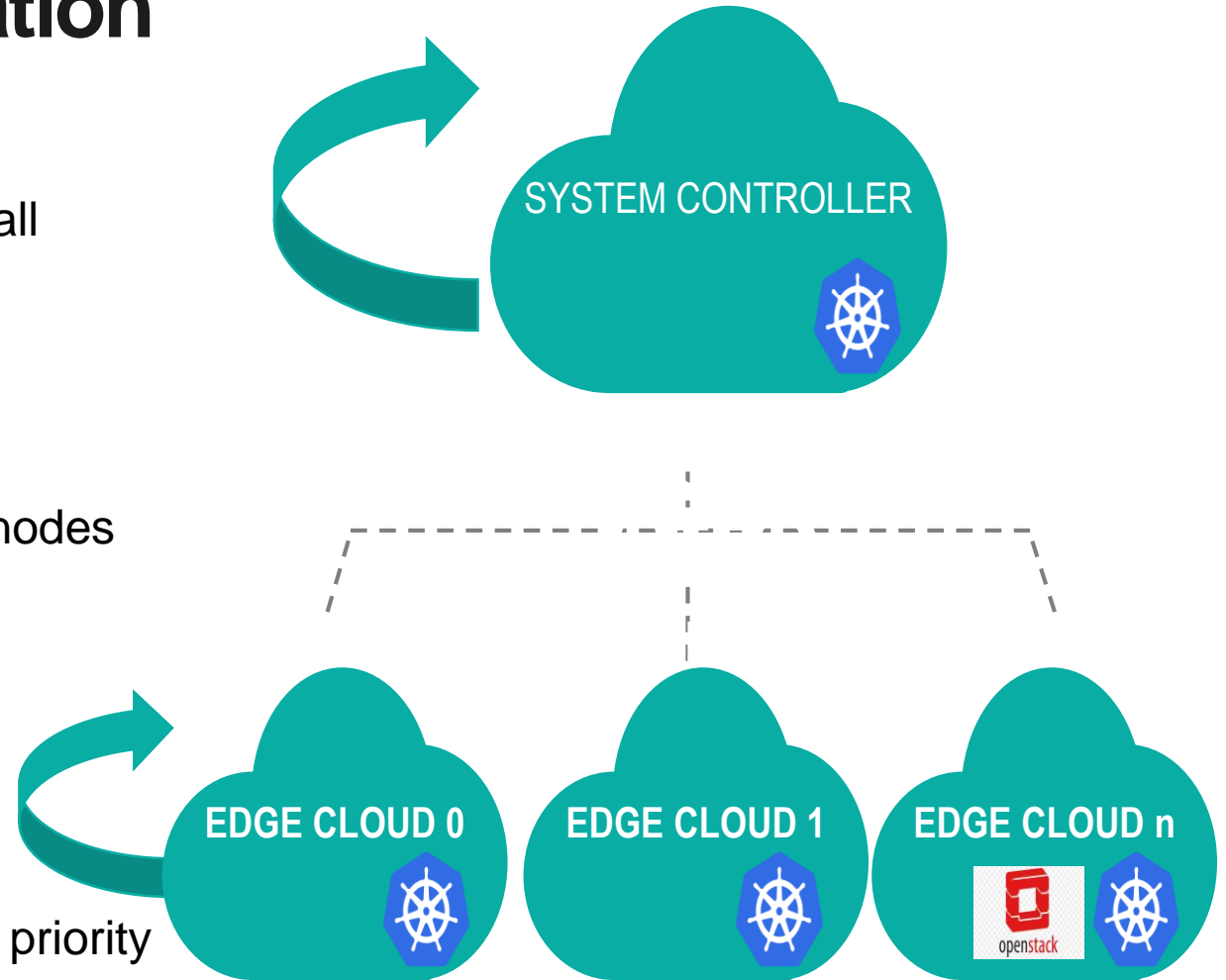
# How Wind River Helps Solve These Challenges

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- Local Staging of Updates & Upgrades
  - Provides mechanism to do this outside of maintenance window
  - Validation of integrity of the update done prior to installing
  - Reduces or eliminates downtime
  - Greater reliability for systems with poor network connectivity
- Automation is Distributed Across the Solution
  - Local systems to perform updates/upgrades independently of the rest of the system
  - Minimize remote network utilization during activities
  - Scales to larger deployment options
  - Maximizes parallelism
- Automation and Analytics Integrated
  - Machine Learning
  - Closed Loop automation
  - Automation of tasks without operator intervention

# Upgrade & Update Orchestration

- 1) System Controller initiates orchestration across all systems
- 2) Each Edge Cloud orchestrates upgrades of the nodes
- 3) Simultaneous Edge Cloud updates supported
- 4) Edge Clouds can be grouped based on upgrade priority



# How Wind River Helps Solve These Challenges

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- Standardizing and templating configuration components
- Automatic configuration using existing customer systems
  - Integration with BSS / OSS around CIQ system

**Thank You!**

WNRDRV/R