

Technologies for Lowering the TCO for Open RAN and Edge

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Rakuten Symphony

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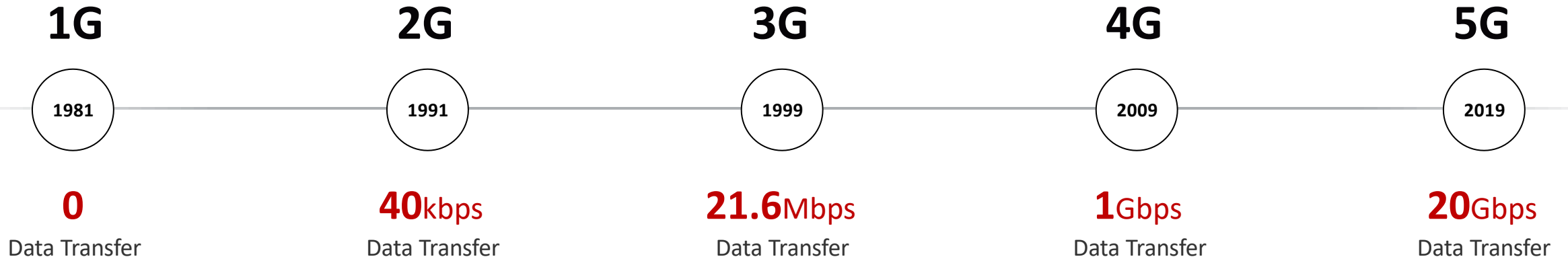
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Introduction

New technologies will change the economics of Open RAN. This webinar explores the hardware and software technologies from Intel and Rakuten Symphony that will significantly reduce Open RAN's total cost of ownership (TCO) by integrating Intel's embedded acceleration with Rakuten's efficient cloud native automation platform.

Cellular Network Evolution



40 Years – 5 Generations

BUT

The fundamental way we build networks
has not changed



Custom-built proprietary HW

- Very limited number of vendors
- BBU as non-accessible 'black box'



Strong HW dependency & long lead times

- No or low elasticity / scalability
- New HW required with every generation driving CAPEX








High operational complexity

Low degree of automation – mostly manual efforts

Here Comes Open Ran

Open RAN is the most crucial component for success, and **it is here to stay!**
Our Network is world's first Open RAN based large scale development

	Traditional RAN			OpenRAN		
Radio		Proprietary	X	Multi-vendor Operability		Open ✓
CPRI		Proprietary	X	Open Interfaces		Open O-RAN LLS ✓
Base band		Proprietary	X	Multi-vendor Operability		Open vDU ✓
Infra		Inefficient	X	COTS HW On Cloud		Kubernetes Efficient ✓

This approach enables us to select any vendor for our network and prevent lock-in

Why Reinvent Telecom?

CHALLENGES TODAY

Hardware-Heavy and labor intensive

Siloed verticals

Narrow domain knowledge

System integration

OPPORTUNITIES

Software-based programmable network

End-to-End horizontal systems

Cloud, software, and AI expertise

Battle-tested Symphony platform

Building Blocks of Next-Gen Mobile Networks

How to challenge the traditional approach of planning, building and operating mobile networks

HW & SW Disaggregation

From monolithic HW-based networks to a SW-defined NW design with standard x86 HW

Openness

Open interfaces for multi-vendor ecosystems and prevention of vendor lock-in

Horizontal Telco Cloud

One single, end-to-end unified cloud from the cell sites up unto the central data centers

Relentless Automation

Minimizing manual efforts to achieve a new level of operational efficiency & reliability

People & Culture

Horizontal Telco Cloud

The world's largest edge cloud deployment with more than 4,600+ edge data centers

One single E2E unified cloud from cell site to central data center

Self-managed, automated data centers with no additional operational staff

4,600+

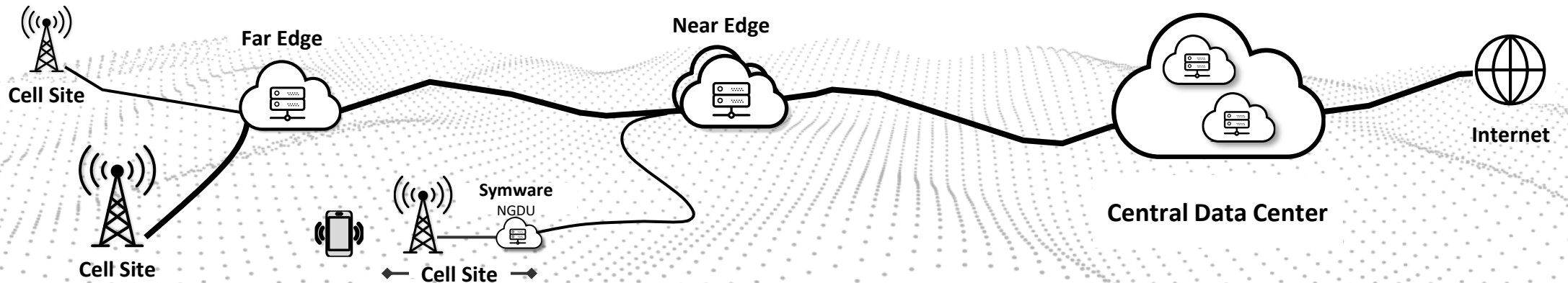
Edge Data Centers

50+

Regional Data Centers

3

Central Data Centers



Factors impacting Open RAN Economics

1. CAPEX cost for large scale deployment

2. OPEX costs for operations and life cycle management

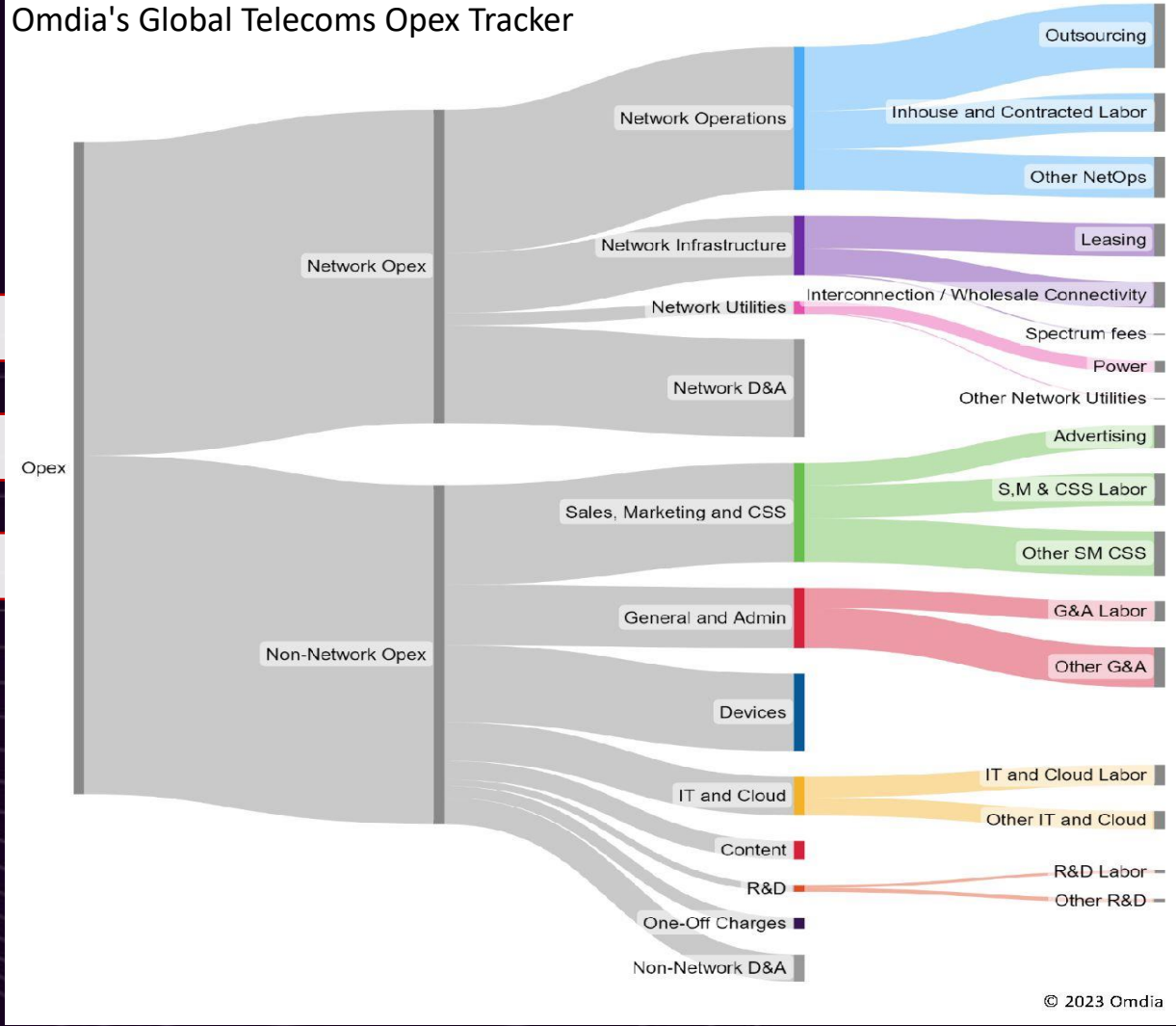
3. Steady or decreasing ARPU and difficulty in expanding new services

OPEX Control is a bigger problem than CAPEX

OPEX, which constitutes a substantial 52% of total telecom industry spending, dwarfs CAPEX by 4 to 5 times

OPEX to revenue ratio increased from 67% in 2019 to 69% in 2022

Omdia's Global Telecoms Opex Tracker



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#1 Reducing ORAN Infrastructure Cost

Best of Breed, Diversity, Open Supply Chain, Better Economics

RU Partners

NEC

PROSE
a Rosenberger Company



QUCELL
NETWORKS

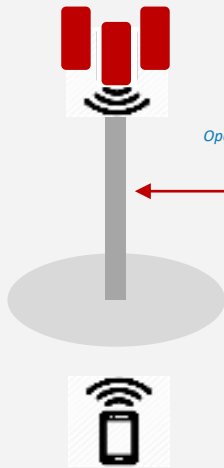
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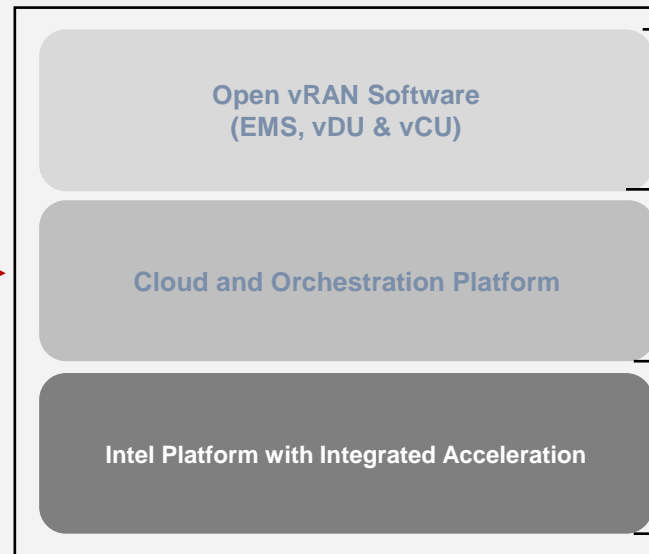
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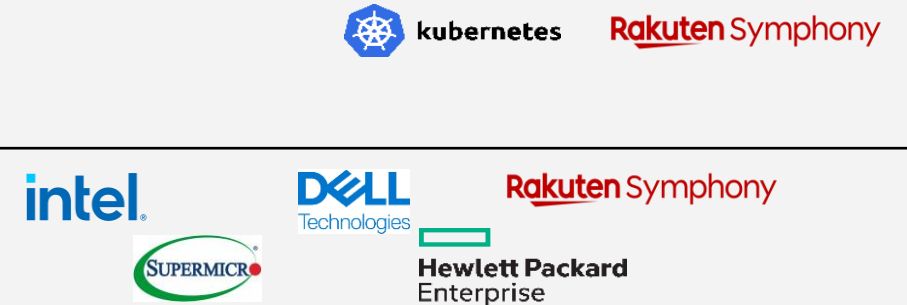
RADIOS
(RU/AAS)



OPEN vRAN CLOUD STACK



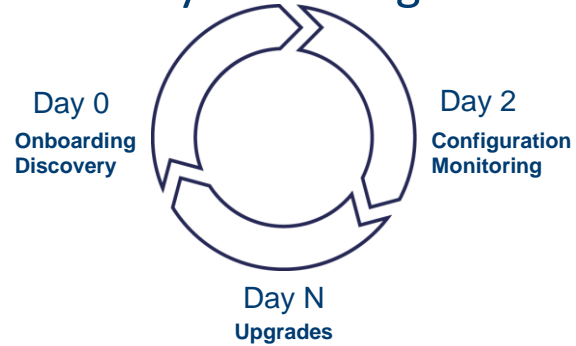
Ecosystem Partners



2 Reduce Service Delivery Operations Cost and Complexity

Hyper-automation lowering operations cost

Life cycle management



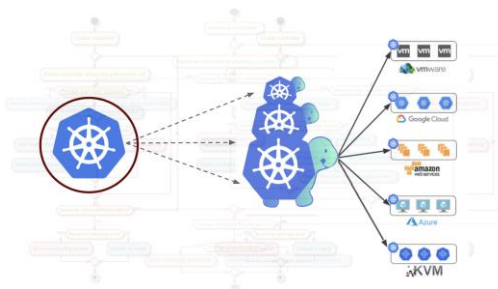
Zero Touch Provisioning



End-to-End Telemetry



Multi-cluster Management



Energy Management



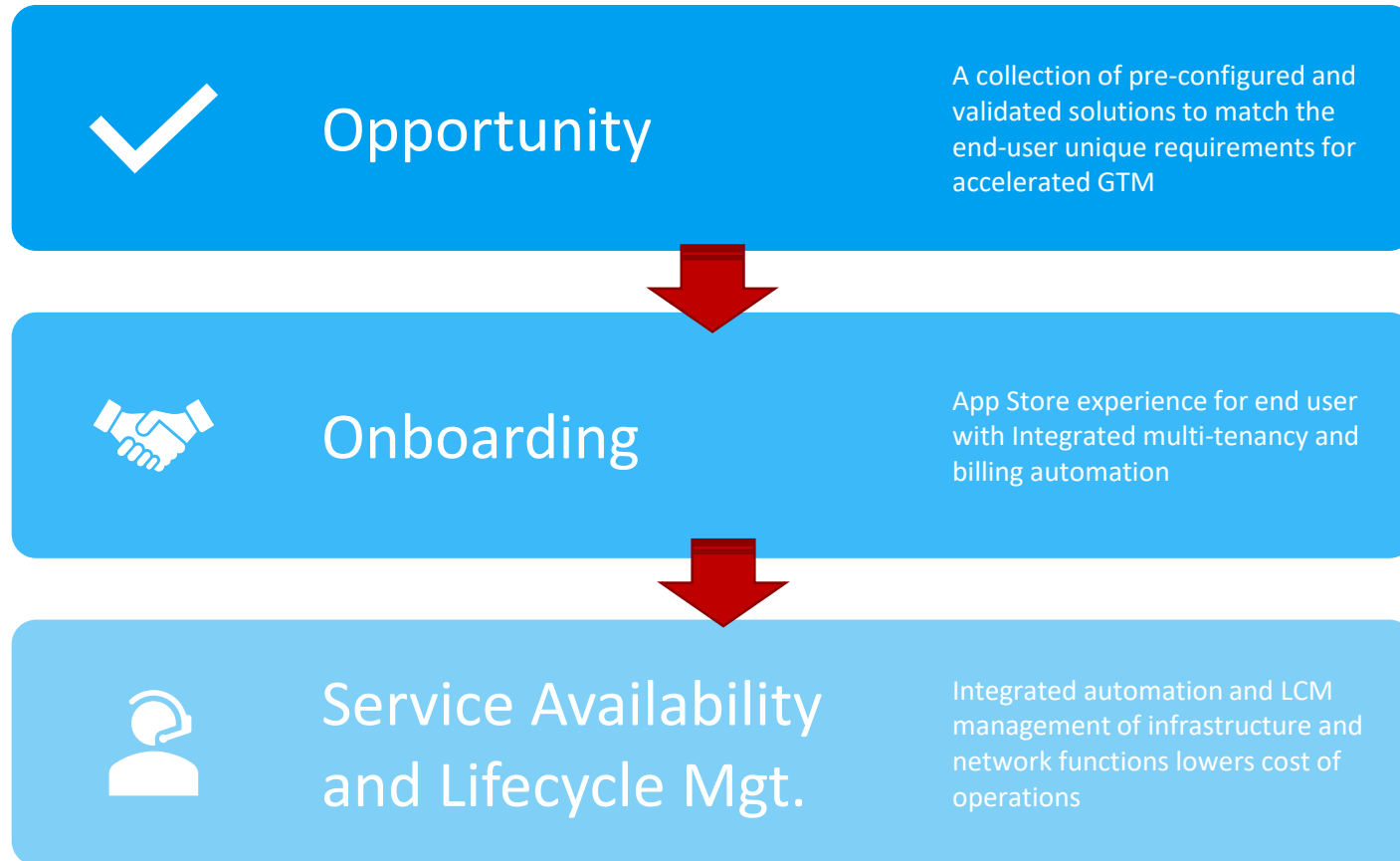
Inventory Management



3 Accelerate new offering TTM

As a Service, Ready solutions supporting high-value use cases

Build value add services



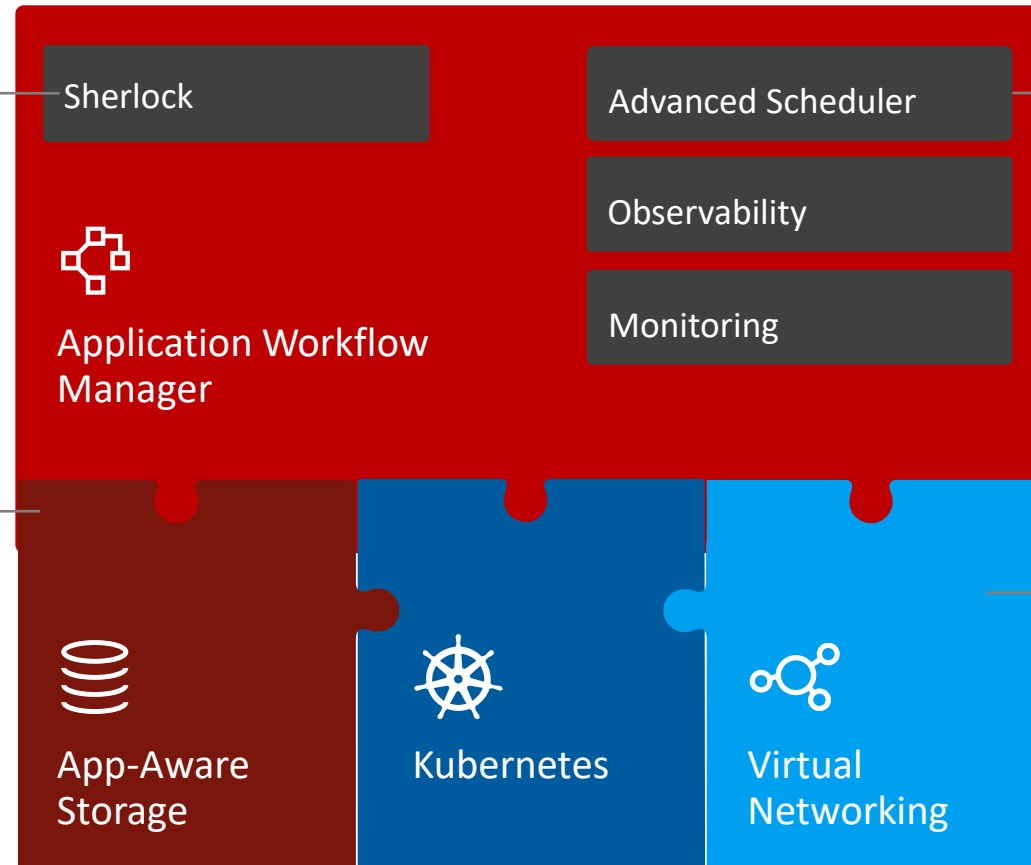
Horizontal Cloud

Advanced Visibility & Diagnostics

- Resource dependency analysis
- Multi-domain failure analysis
- Impacts of cluster, networking, server, storage etc.

Fast, Application-Aware Storage

- Automates all major lifecycle events
- Industry leading app awareness



Advanced Workloads

- Policy-based modeling with no hardcoding
- Highly granular NUMA-awareness with networking and much more
- Intuitive, easy to use GUI (low-code) approach

Enhanced Networking

- Persistent IPs & Multiple IPs
- Overlays/underlays: Calico, OVS, VLAN, SR-IOV, DPDK
- Multiple NICs
- Dual-stack IPv4/IPv6
- Network policies

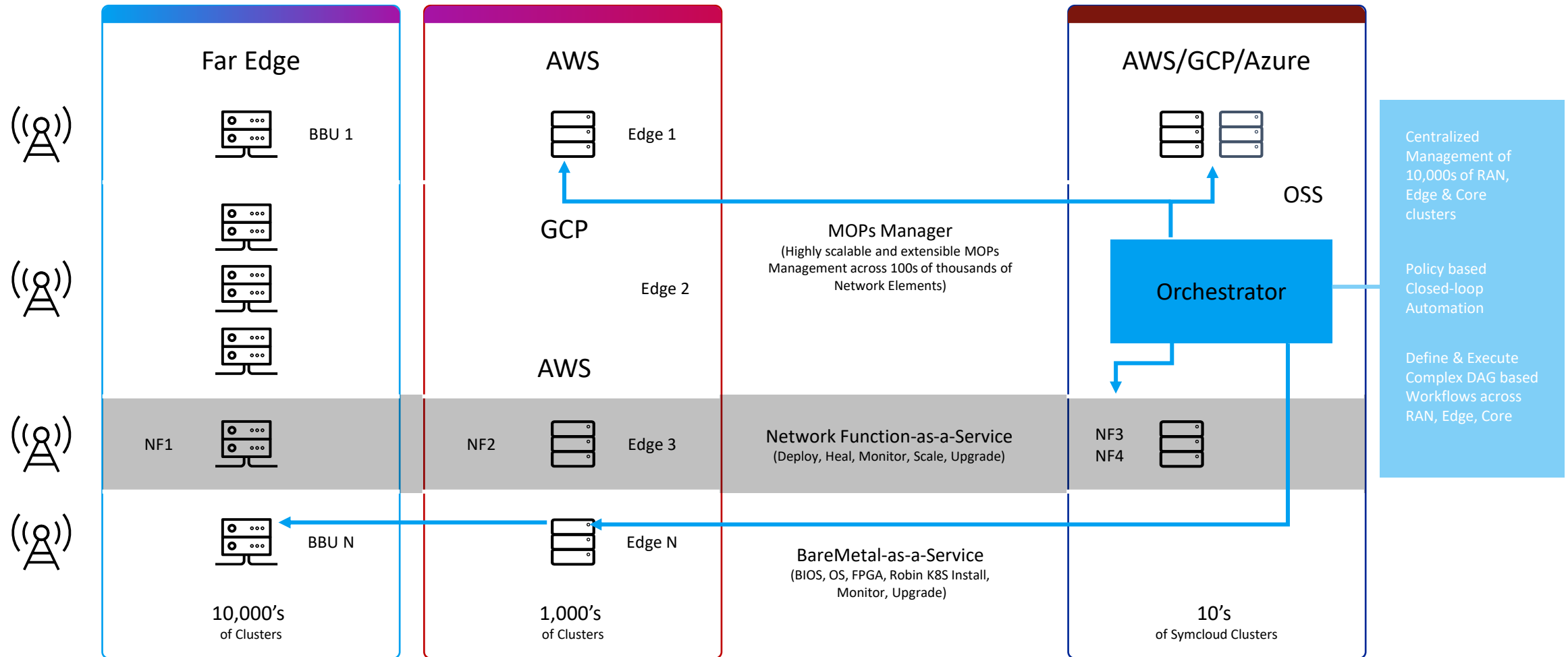


BARE METAL, VM



WORKS ANY WHERE

Rakuten Cloud Native Orchestrator



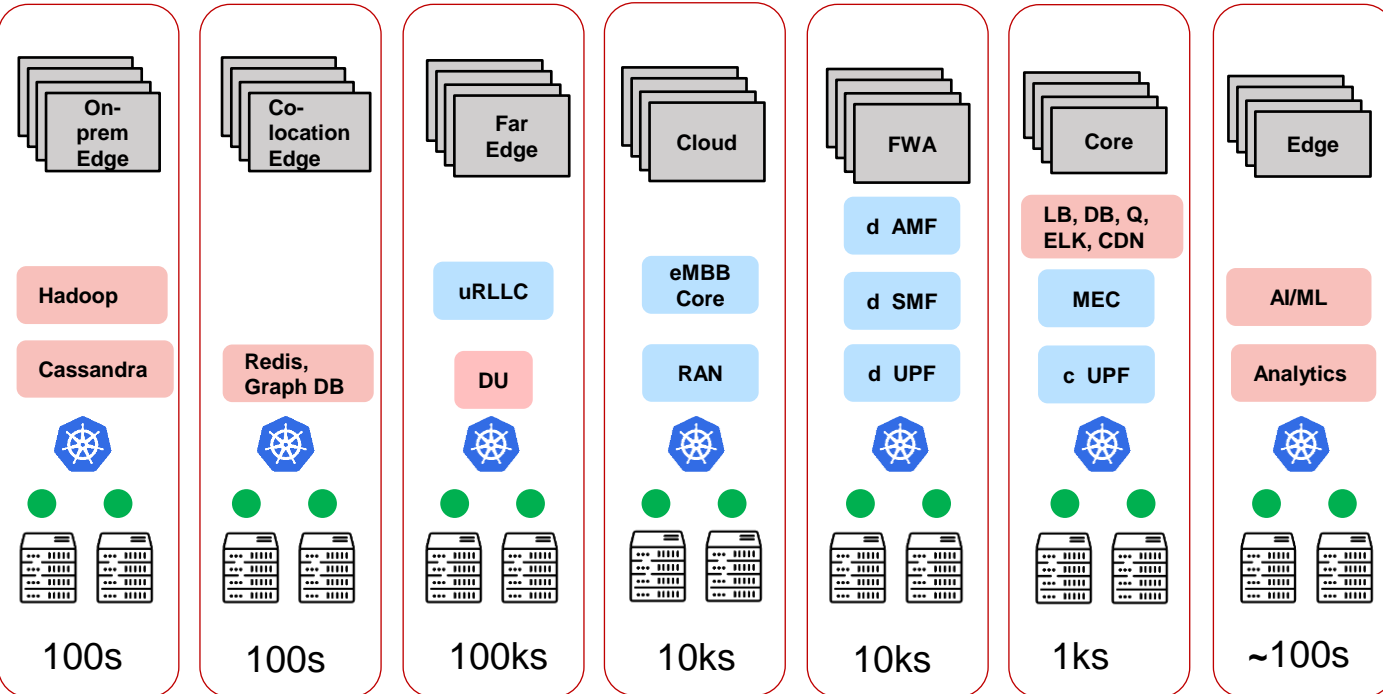
Metal to Service Orchestration @Scale



OSS/BSS

Rakuten Cloud Native Orchestrator

INVENTORY



Bare metal Life cycle management

- BIOS, BMC configurations
- NIC, SSD, FPGA, NVMe, RAID firmware upgrades
- OS installation, Drivers, Services and Software Packages
- Upgrades – BIOS, Firmware, Drivers and OS
- Prep for observability
- Multiple Server Vendors, SKUs and Profiles

Cluster Life Cycle Management

- Choice of Clouds and cluster – Anthos, OpenShift, k8s, Robin, Rancher
- Design clusters and profiles
- Cluster instantiations, scaling, healing and termination
- Upgrades
- Prep for observability

Network Function Life Cycle Management

- Helm charts, Operators, YAML, Custom
- Instantiation, Healing, Scaling, Upgrades
- Prep for observability

Network Service Life Cycle Management

- Design Network Service across clusters
- Instantiation, Healing, Scaling, Upgrades

Application Life Cycle Management

- Instantiation, Healing, Scaling, Upgrades
- Data Management – Snapshot, Clone, Backup, Restore, Import
- Migrate to other clusters

Inventory Management

- Discovery, Health, Liveness and Readiness probes
- Network Service to hardware component visibility
- Version control
- Metrics and dashboards for MDCAP and its elements
- Realtime Alerts/events management

MOPS Manager

- Execute 100k repeatable robust workflows, realtime or scheduled across different domains, infra, appliances and platforms

Observability from Bare Metal to Service

Multi-site Visibility

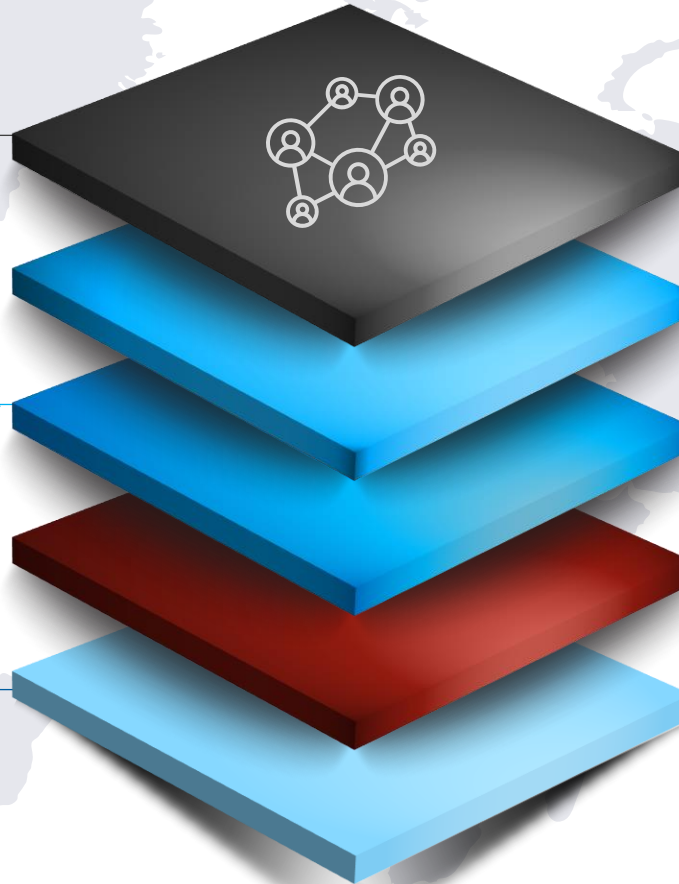
- Push mechanism from Vmetrics to OSS/Kafka
- Intuitive drill up/down
- Debugging tools
- MOPs view

Network Functions & Apps

- App level resource view compute/storage/net/K8s
- Performance and Degradation events
- Migration, clone, snapshot, backup events
- Linked to chargeback

Bare Metal

- Readiness reports
- Configuration
- System health
- Usage reports
- BMC, BIOS, drivers
- NIC, SSD, FPGA, NVMe, RAID
- Firmware, OS software package updates
- Full Redfish integration – easy to add vendors
- Validated: Dell, SuperMicro, Quanta & more



Services

- Service level resource view compute/storage/net/K8s
- Performance and Degradation events
- Migration, clone, snapshot, backup events
- Linked to chargeback

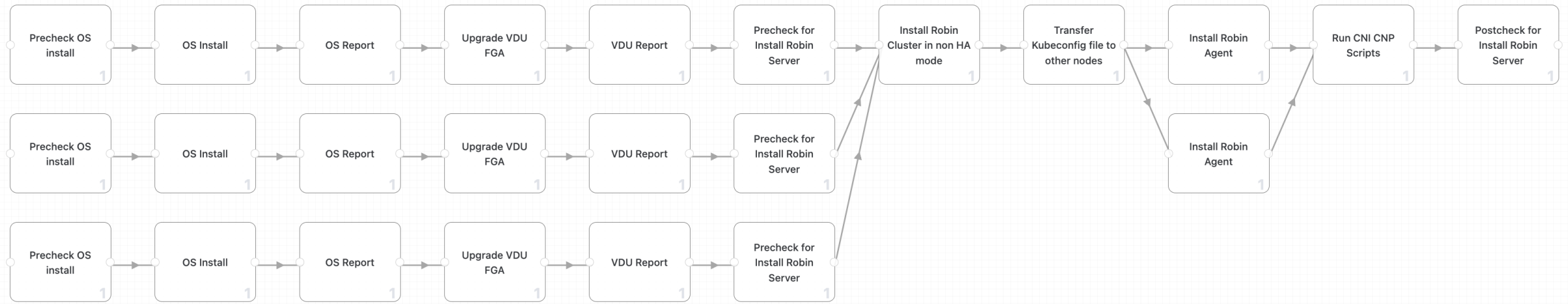
K8s Cluster

- Resource pool capacity and node capacity
- Pod level statistics, cluster health, performance and resource utilization, events, pod relocates, instantiations, terminations
- Persistent volumes created, volume relocations, disk rebuilds, volume rebuilds, users active,
- kubelet daemons, node exporter (exposed via Prometheus), docker daemons, containerd,
- Master status changes and many more

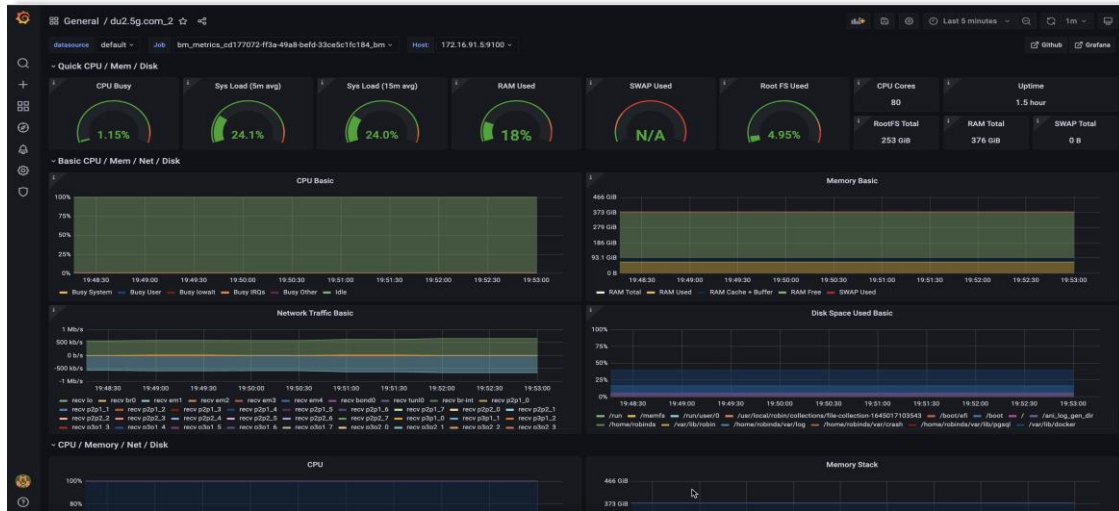
Hyper-automation with extensible workflows

os-fpga-robin-nonha-install [🔗](#)
Element Type: VM

Debug



Built-in, Real-time Visualization and single pane of Glass



Top 10 Benefits of Open RAN

1 Cost savings and enhanced resiliency

2 Scalability through disaggregation and cloud-native operations

3 Interoperability

4 Faster Innovation

5 Industrialized network management and automation

6 Enhanced security through cross-industry learning and open interfaces

7 AI and data science for network understanding

8 Streamlined hardware supply chain with common platforms

9 Energy efficiency through system-level optimization

10 Easier deployment of new services

Rakuten Symphony