

**Rakuten** Symphony

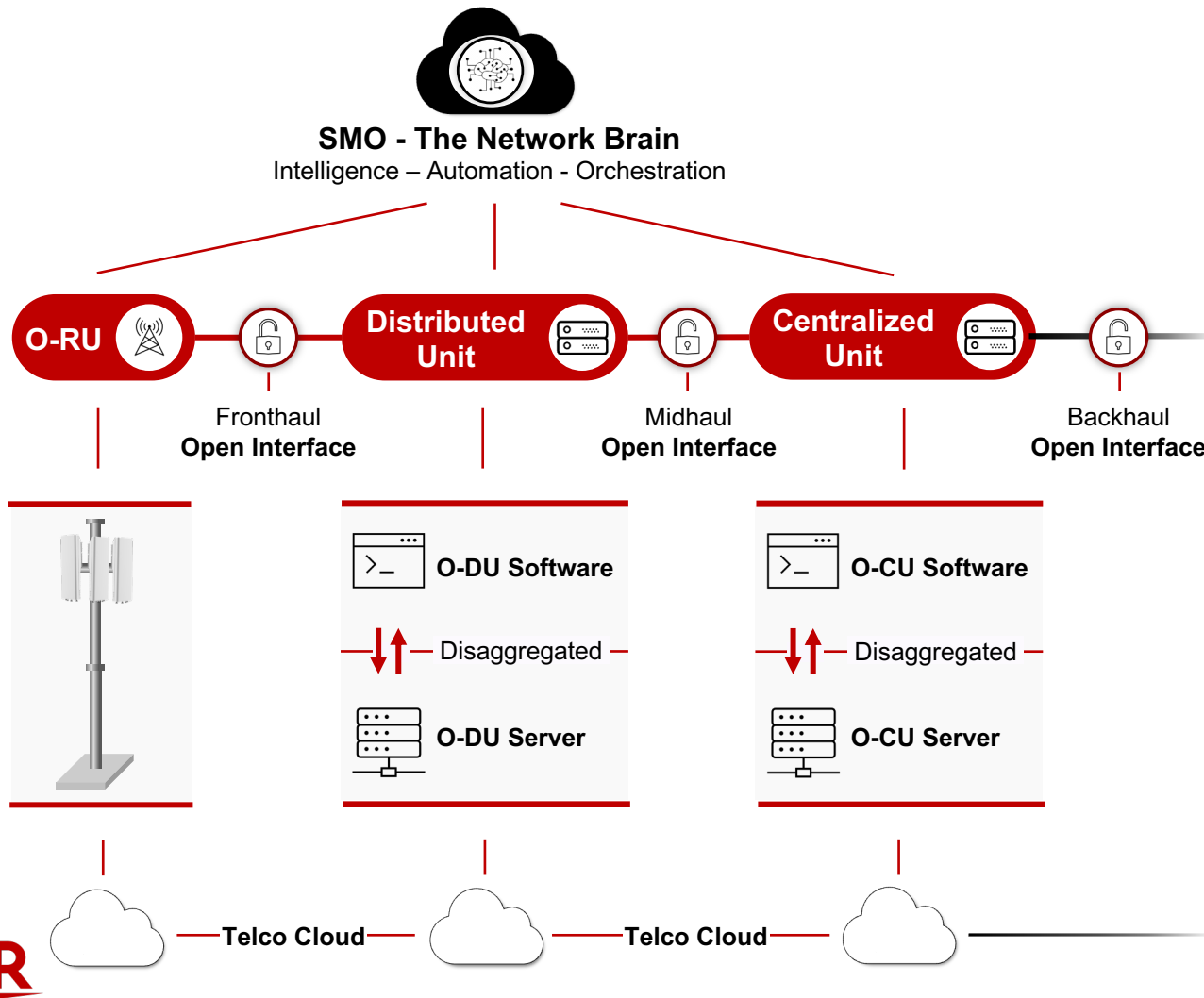
Key to Open RAN success:  
A Solid SMO strategy

Anshul Bhatt, Chief Product Officer, OSS Business Unit

Rakuten Symphony

# What is Open RAN?

Radio Access Network reimagined – enabling a smarter and more open network



## Open Interfaces

Open RAN uses open standard interfaces between components enabling interoperability



## Cloud-Native

Open RAN is designed to run in the cloud for greater flexibility, efficiency and scalability



## Hardware-Software Disaggregation

Open RAN separates hardware and software through virtualization of network functions



## Automation & Orchestration

The software-driven approach of Open RAN enables automation and E2E orchestration



# Open RAN Proven at Scale

**300k+**

Radiating Cells  
Globally



Resiliency



**1**  
Global  
Build

**>1 Gbps**

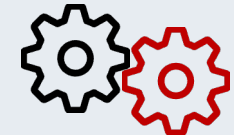
Downlink speed

**30%**

Lower TCO  
Than traditional  
networks



Scaling  
on demand



Relentless  
automation



**ZTP**

Zero touch  
provisioning



Containerized



Open choice

**50+**

new features  
per month



Dense Urban  
Deployments  
with proven performance



Auto Healing

# We Build and Make Open RAN Work

## Largest radio ecosystem

We have integrated the largest number of verified radios through our extensive interoperability testing.

## Highest performing

Rated by OpenSignal as leading in 5G upload / download speeds, live video experience and service quality.

## Automation at scale

Reduce deployment cycle from years/months to weeks/days

## European first

Have now deployed Europe's first fully virtualized 5G network based on Open RAN.

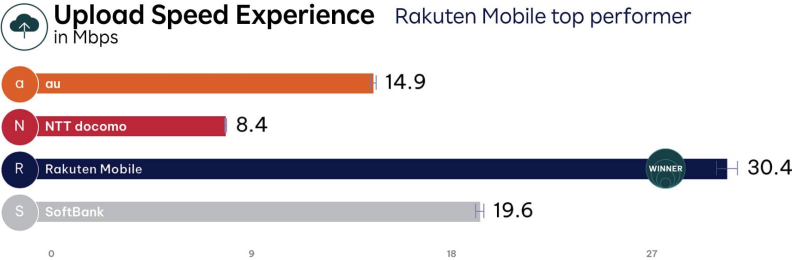
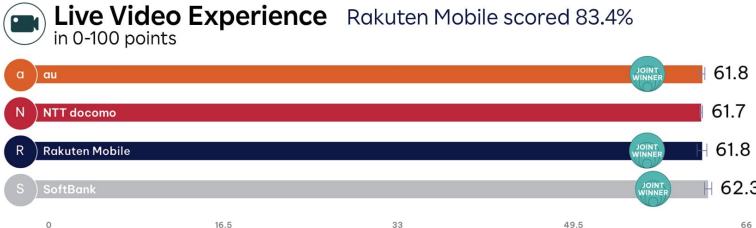
# Highest performing Open RAN

We enable the best performing Open RAN network in the world.

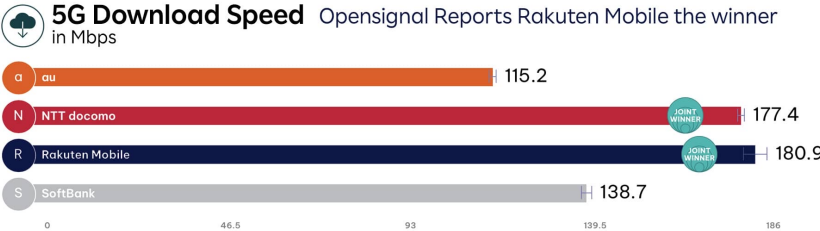
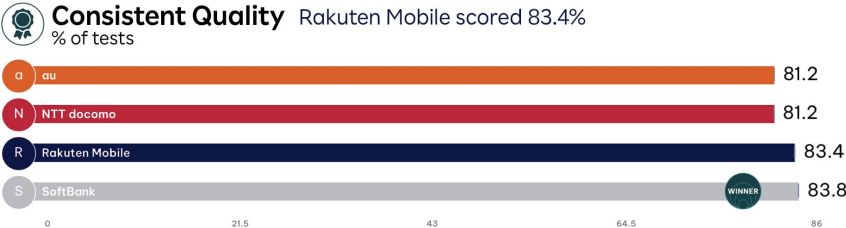
We are now extending these capabilities to customers worldwide, including 1&1 in Germany.

Per Opensignal, Rakuten Mobile 5G ranked among the top operators in Japan in following:

- Download speed
- Upload speeds
- Live video experience
- Quality experience



**OPENSIGNAL**  
Mobile Network Experience Report, October 2023 © Opensignal Limited



**OPENSIGNAL**  
Mobile Network Experience Report, October 2023 © Opensignal Limited

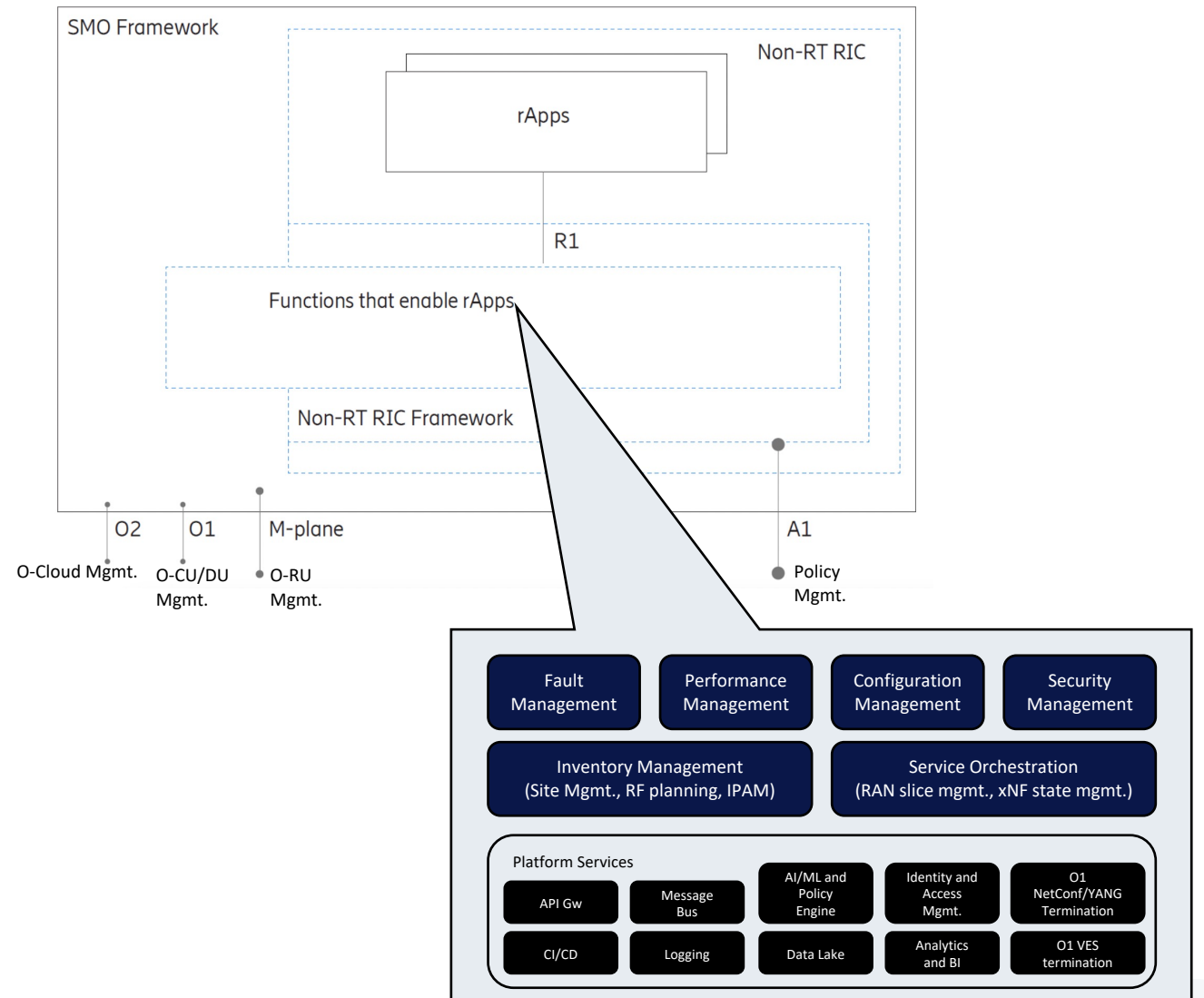


Operation Efficiency



# Why SMO?

- SMO enables the following, that traditional OSS/NMS cannot...
  - Standard components that are open, loosely-coupled /highly-aligned
  - Innovation powered by rApps (AI/ML, automation)
  - Agile development with cloud native microservice architecture
  - Reusability of common components to reduce costs
- ... to improve operational efficiency, generate new revenue streams (marketplace), expedite innovation cycles, avoid vendor lock-ins, and make the networks future-ready.



# ORAN SMO Use Cases

## Zero-Touch-Provisioning

xHaul, cloud and CNF provisioned via an automated process triggered by powering the device

## Digital RAN Planning

RF, naming, IP, configuration planning and designing done digitally end-to-end

## Auto ATP

Perform field acceptance result analysis and report generation automatically

## Auto Backup and Restore

Multi-domain system configuration data stored centrally to (automatically) restore in emergency or disaster recovery

## vCU/vDU Auto Healing

Self healing of vCU/vDU services by following cloud native principles and Kubernetes native services

## CI/CD – Software LCM

Using CI/CD to perform upgrades, downgrades, updates etc. for all ORAN domain elements (RU, DU/CU, cloud)

## Real-Time Telemetry

Streaming real-time telemetry data to create full observability for all ORAN domain elements

## Day 2 Ops Automation

Automating day 2 operational tasks such as, but not limited to, Root-Cause-Analysis and troubleshooting

## Smart Analytics

AI/ML driven analytics and insights on ORAN domain for energy consumption, sleeping cell patterns, KPI anomalies, etc.



# Key numbers from Rakuten Open RAN deployments



O-RAN Compliant  
and secure



Network Slicing Manager

**< 18 min**

for NF onboarding with  
provisioning

**1500+**

Data center Auto Provisioned

**120k+**

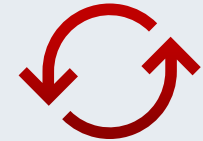
Site Auto  
Provisioned



Unified Service  
Orchestration

**ZTP**

Plan, Build, Operate



Auto Healing



Carrier Grade  
Proven

Multi Cloud  
Multi Domain



Auto Provisioning

Device Discovery & Notification

**> 10Mn**

events per day



# Key benefits from Rakuten Open RAN deployments



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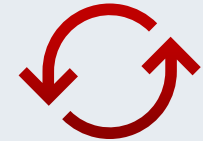
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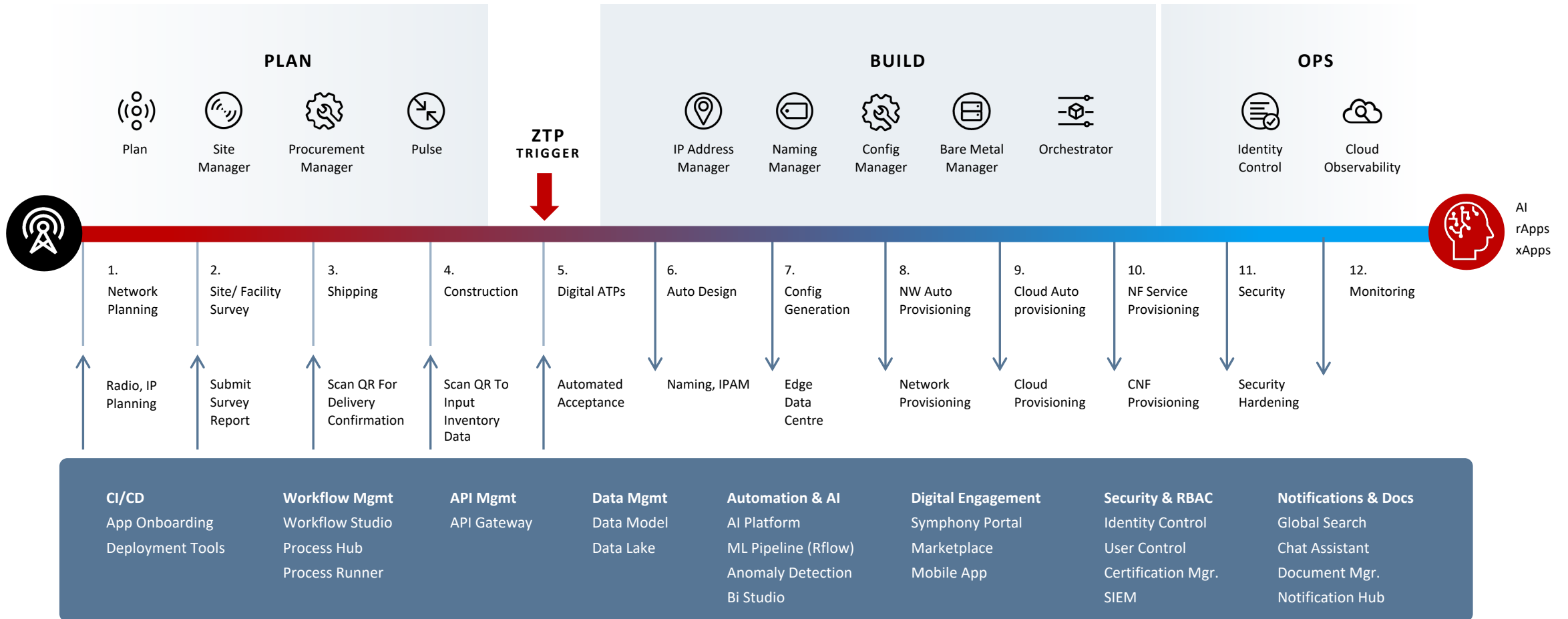
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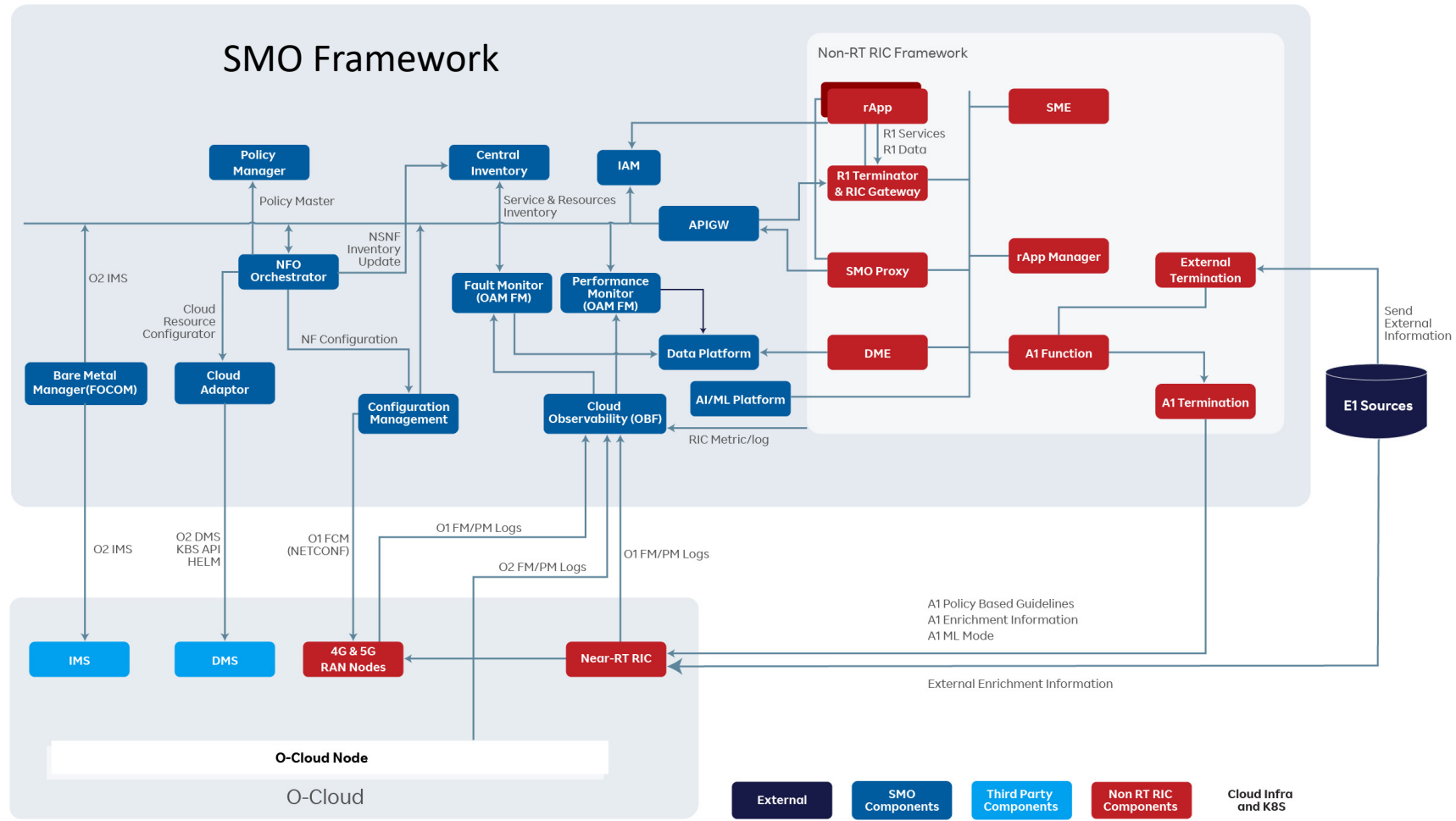
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# Usecase : Zero Touch Provisioning in Open RAN



# Rakuten Symphony SMO - RIC Architecture



# RIC Apps - Overview

Rakuten Symphony plans to host a variety of rApps (longer time granularity control, in order of minutes) and xApps (shorter time granularity control, in order of ms and seconds). These will be developed in-house and in partnership with third-party vendors.

## Non-RT-RIC rApp Flow:

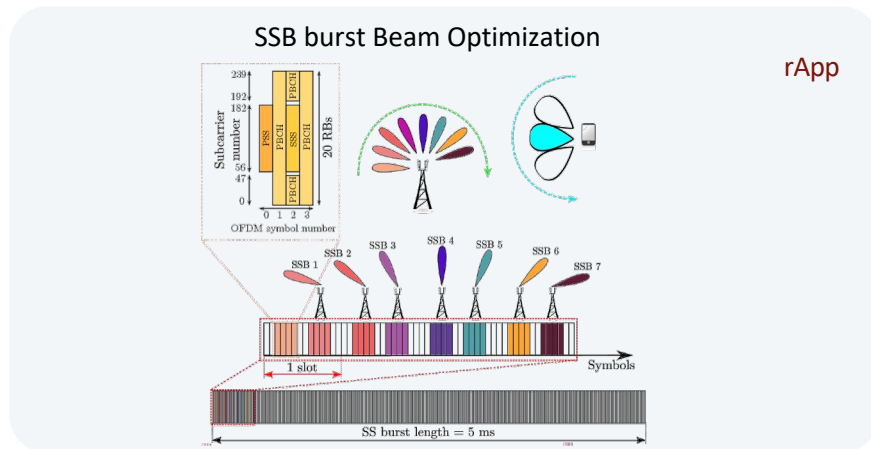
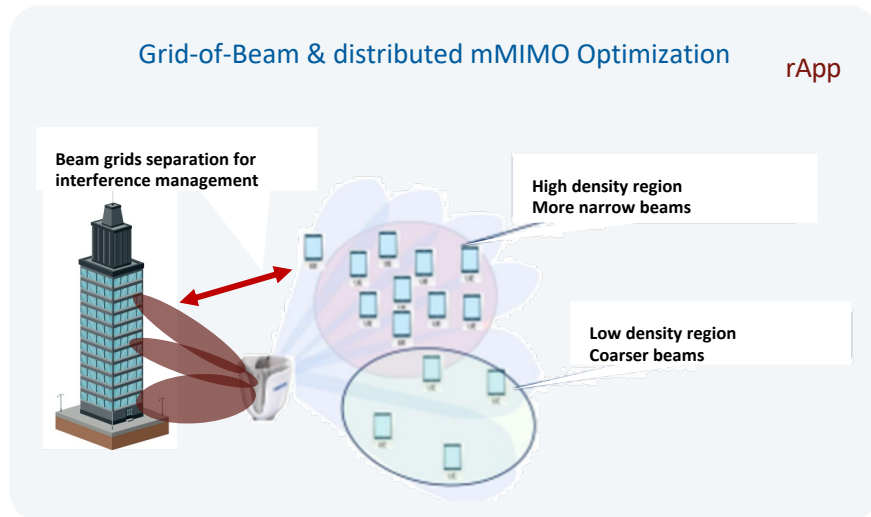
- rApp will get data from various SMO components, like OBF/PM and the Configuration Manager
- Using data from multiple cells, rApp can make certain optimization decisions
- These are communicated to the RAN nodes typically as changes in config parameters

## Near-RT-RIC xApp Flow:

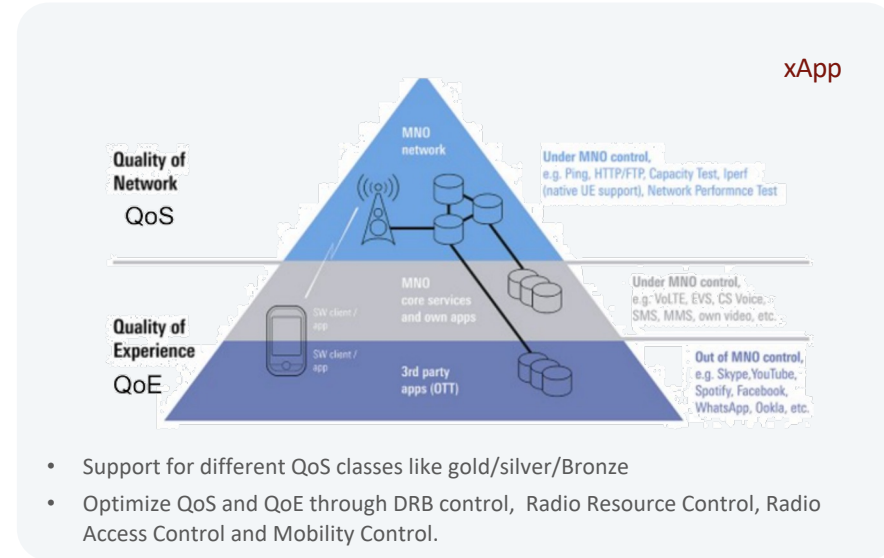
- xApp will get data directly from the DU/CU nodes over the E2 interface
- Cell level and UE level optimization is possible with xApps
- Policies are downloaded from Non-RT RIC and control of RAN nodes is implemented over E2 interface

# RIC Enabled Use Cases

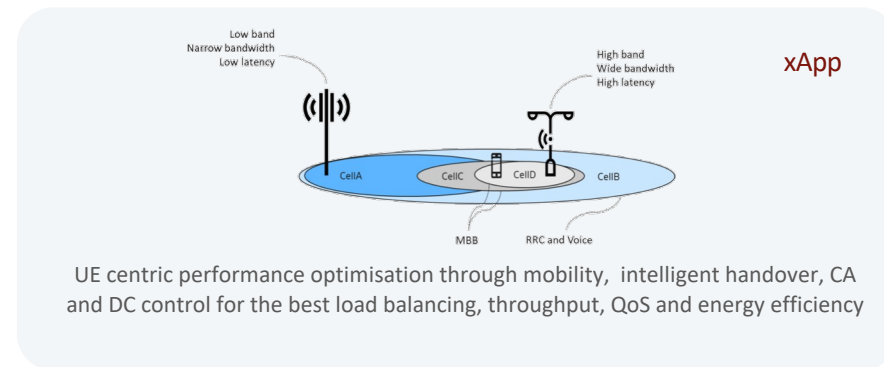
## MIMO Optimization



## QoS/QoE Optimization



## Traffic Steering



# Network Energy Saving with AI/ML

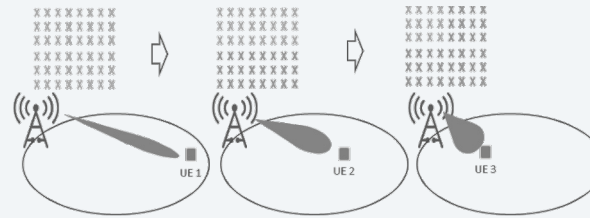
## RU Cell/carrier switch on/off



Intelligent power management through shutting down capacity cells & carriers during low traffic load.

**Expected Saving: ~15%**

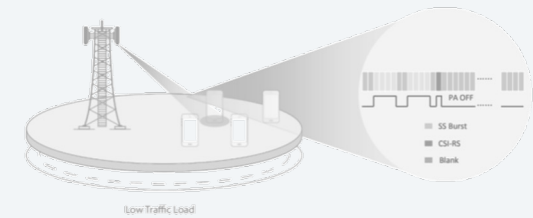
## RU RF channel switch on/off



Intelligent power management through shutting down RF channels of MIMO antenna arrays.

**Expected Saving: ~15%**

## RU Advanced Sleep Mode



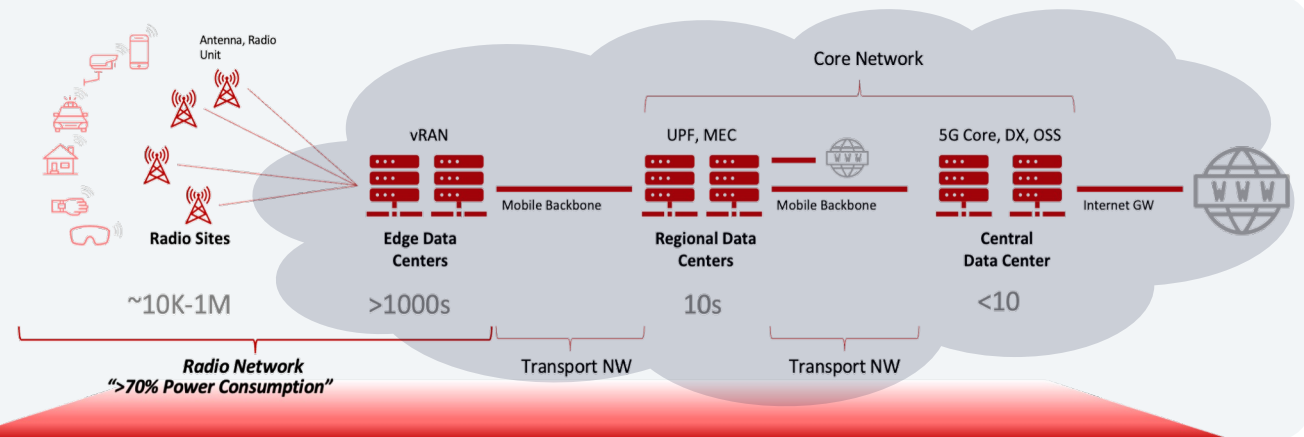
Traffic Shaping to maximise sleep periods of cells for deactivation of Radio Unit components.

**Expected Saving: ~20%**

## CU/DU O-Cloud resource optimization

- Optimize energy usage in the cloud by shutting down unused server nodes, CPU cores, lowering CPU frequency and adjusting CPU C state and P state.
- Lowering energy consumption of cooling systems.

**Expected Saving: ~10%**



# Rakuten Symphony

