

# OPEN DIALOGUE

Test & Validate – Accelerating Open RAN  
Developments  
i14y Lab in the ecosystem

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# 3 main thrusts in O-RAN ALLIANCE



## O-RAN Specification Effort

O-RAN specifications define all aspects of the O-RAN Architecture and are available to everyone



## O-RAN Software Community

In collaboration with the Linux Foundation, supports the creation of open software for the RAN



## Testing & Integration

O-RAN supports its Members and Contributors in testing and integration of their O-RAN implementations



# Testing and Integration

Normative specifications on key aspects of the O-RAN architecture, e.g., interfaces

Normative test specifications for a single device (conformance), pair of devices (interoperability), and group of devices (end-to-end)

O-RAN ALLIANCE global PlugFests enable efficient progress of the O-RAN ecosystem through well-organized testing and integration

Vendor-independent, open, and collaborative labs approved by O-RAN ALLIANCE for testing and integration, serving the O-RAN ecosystem

O-RAN awards issued by OTICs to signify that the equipment passed the required tests according to O-RAN test specifications



# O-RAN Testing & Integration

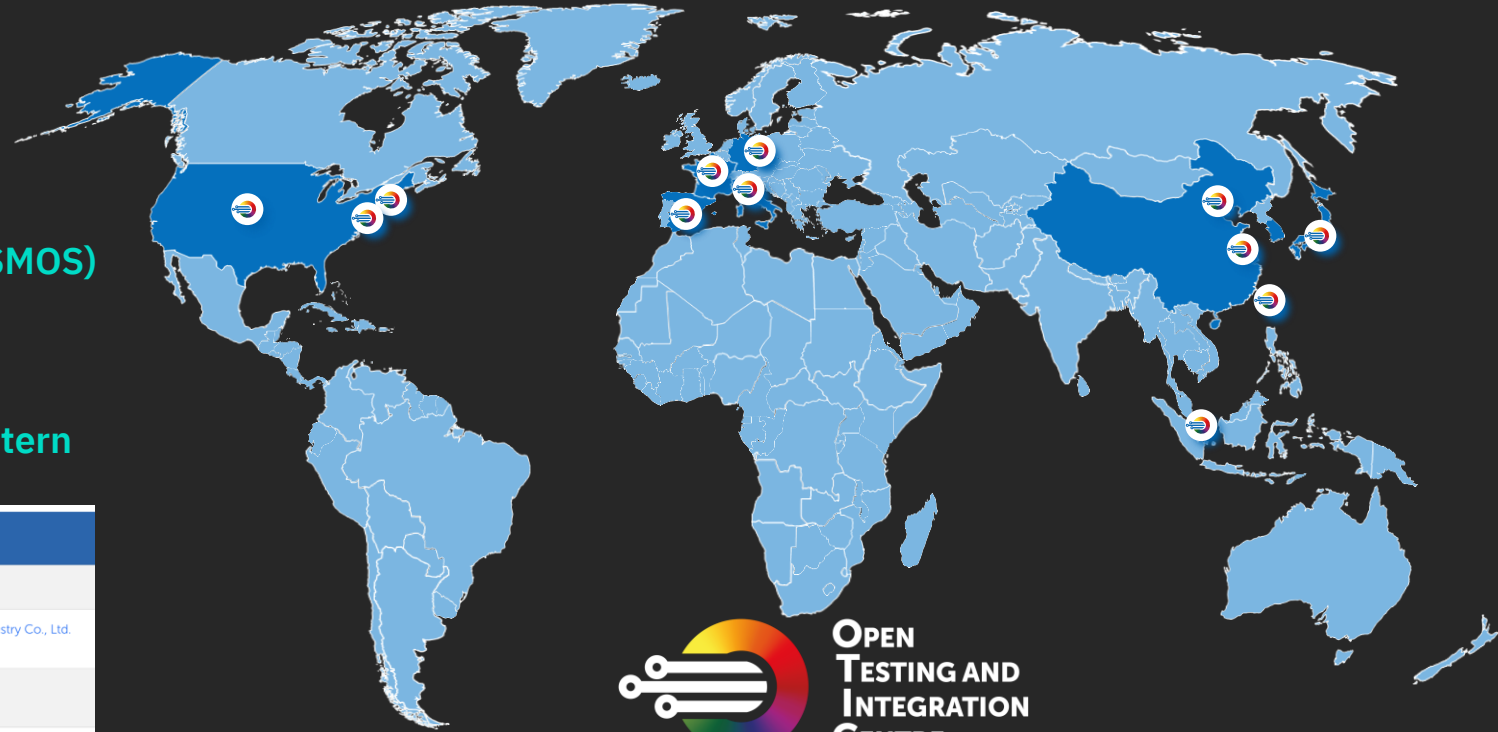
## 12 approved OTICs:

- European OTIC in Berlin
- European OTIC in Torino
- Auray OTIC and Security lab
- European OTIC in Paris
- European OTIC in Madrid
- Asia & Pacific OTIC in PRC
- Kyrio O-RAN Test and Integration Lab
- North American OTIC in NYC Metro Area/East (COSMOS)
- Japan OTIC
- Asia & Pacific OTIC by ritt7layers
- Asia & Pacific OTIC in Singapore
- North American OTIC in the Boston Area (Northeastern University)

## 9 Issued Awards



| Type        | Interface under test | Technology | Product category | Vendor name                                    |
|-------------|----------------------|------------|------------------|--|
| Certificate | OFH                  | 5G SA      | O-RU             | MICAS  |
| Certificate | OFH                  | 5G SA      | O-RU             | Hon Hai Precision Industry Co., Ltd. (Foxconn) |
| Certificate | OFH                  | 5G SA      | O-RU             | Wistron NeWeb Corp.                            |
| E2E Badge   | -                    | 5G SA      | O-DU/O-CU        | Pegatron                                       |
| E2E Badge   | -                    | 5G SA      | O-RU             | Wistron NeWeb Corp.                            |
| Certificate | OFH                  | 5G SA      | O-DU/O-CU        | ArrayComm                                      |
| Certificate | OFH                  | 5G SA      | O-RU             | Compal Electronic, Inc.                        |
| Certificate | OFH                  | 5G SA      | O-RU             | BaicellsTechnologies                           |
| Certificate | OFH                  | 5G SA      | O-RU             | Foxconn(HonHaiPrecisionIndustry)               |





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**CTO Connectivity, Capgemini & Deputy Chair GSMA OPG  
Summit 15<sup>th</sup> June 2023**



# Key Areas for Collaborative Development of O-RAN



Capgemini Research & Innovation Project

## Supply Chain Diversity

Disaggregation and virtualization of RAN with open interfaces allow multi-vendor interoperability

## Innovation in RAN

- Platforms to enable developers to build applications leveraging O-RAN APIs.
- Lower the entry barrier for O-RAN for ISVs
- Test Bench / Sandbox / Simulator environments for application development (not everybody can create RAN environment on their own)

## Long term TCO Reduction

- Sustainable Radio Networks with lower carbon footprint
- Automated Infrastructure and RAN Orchestration
- RAN observability and telemetry data availability for closed loop automation in RAN

## Resilient Deployments

- Standardized test environments and certification process for O-RAN
- End-to-end test automation (RU/DU/CU/O-Cloud/RIC/SMO ....), benchmark data
- CI/CD/CT pipelines for live upgrades
- Digital Twins for remote management



O-RAN Certification and Badging Program



# Key Use Cases for O-RAN Resilient Deployment

Focus area for Capgemini – that requires larger industry participation in collaboration labs

## Predictive Maintenance

Prevent Complex Faults & Performance Issues

## NoC Automation

Root Cause Analytics & Guided Diagnostics

## Energy Optimization

Radio Energy Efficiency Improvement

## User Experience

Prevent QoE degradation due to network issues

## Network Slicing

Intent Based Dynamic Network Slicing

## Intelligent Service Rollout

Radio Network Planning & Digital Twins for Operations

# Developer Experience and RIC Monetization

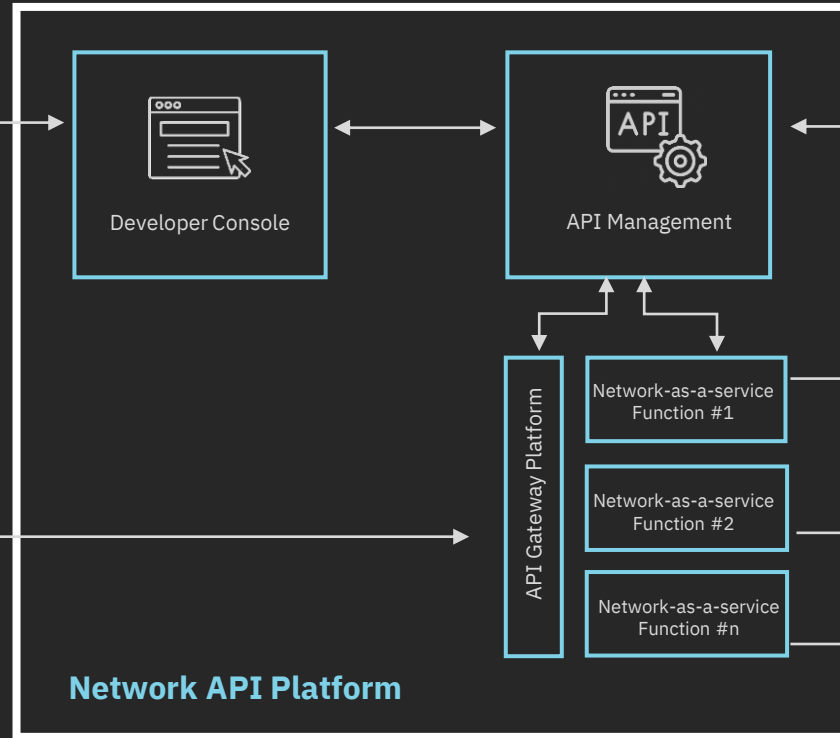
## Accelerate Network API Development and RIC Integration through Network API Platform

Enable Application developers to seamless access and build Applications on RIC platforms & Mobile Network APIs

Discover APIs  
Trainings  
Try  
Get Authorisation  
Pay

Application Provider  
(Enterprises, ISVs,  
Developers)

Application  
</>  
Any Cloud, Edge, Device



## Key Principles

- Monetize Network Capability through APIs
- Abstract Network APIs to Service APIs for Applications (QoS, slicing, location etc.)
- Enable Multi-Operator Collaboration for seamless customer experience across operators
- Ensure application portability across operators
- Interoperability of applications (API Roaming)
- Access agnostic, can be extended for fixed networks
- Satisfy data privacy & regulations



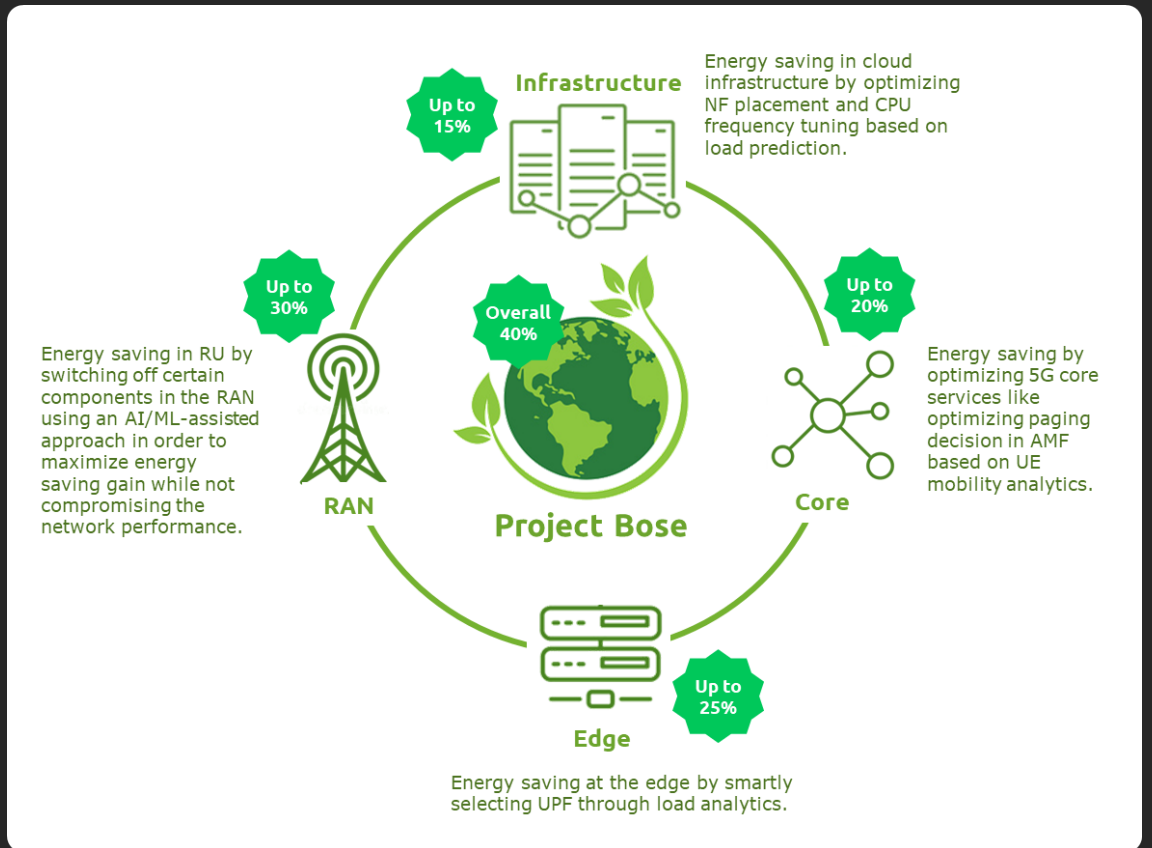
# Project Bose

Energy cost is typically 23% of the network OPEX. Out of this RAN takes approximately 73% of mobile network energy. RU/RRH consumes a large portion of the energy within the RAN.

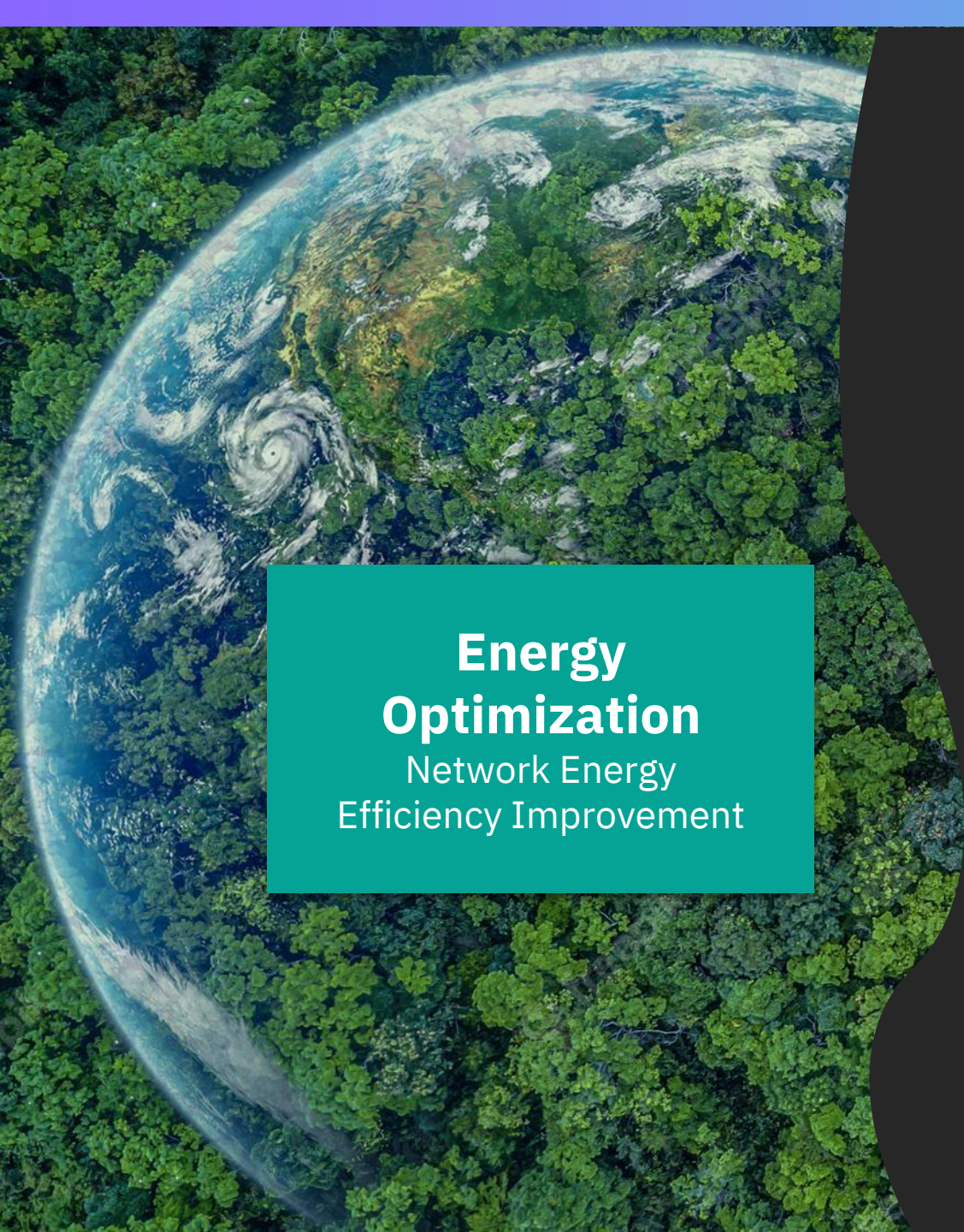
## Project Overview

**Project Bose** provides end-to-end energy-saving solution across RAN, edge, core and infrastructure to realize a sustainable 5G network and beyond using a data-driven-approach and at the same time ensures there is no negative impact on user's QoE.

- Project-Bose's RAN energy saving levers are implemented on top of Capgemini's ORAN RIC Framework.
- Core and edge energy saving levers are implemented on top of Capgemini's Network Data Analytics framework.
- They are cloud-native 5G network AI frameworks that use advanced machine learning (ML) technique to correlate various metrics and provide real-time and predictive operational intelligence.
- The underlying closed loop automation framework ensures that the solution self-learns to continuously improve the energy saving in the network.
- Intel's observability framework provides advanced infrastructure level metrics



Collaborative Innovation project to research & integrate energy savings solutions / applications with Telcos, Network Equipment Providers & Cloud platform providers



**Energy Optimization**  
Network Energy Efficiency Improvement

# Project Bose

## AI Enabled Energy Savings for Open RAN

Developed an “AI Enabled Energy Savings” use case, as an ORAN rApp to reduce the energy consumption of RAN, by introducing intelligent energy saving mechanisms in O-RU.

### CONTEXT

The RAN is responsible for a major part of the energy consumption of a mobile network, and the O-RU for the largest part of the RAN consumption.

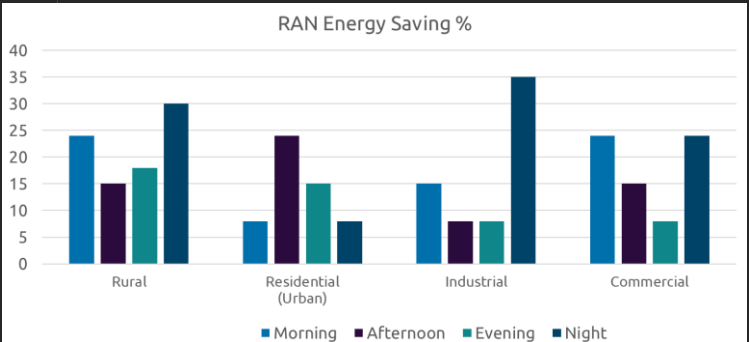
### GOAL

Introduce energy savings mechanisms in O-RU using AI prediction, in order to improve the energy efficiency of the RAN.

### METHOD

The rApp triggers intelligent energy saving measures (e.g.: cell and carrier switch off/on) by predicting the future load on RAN nodes. It uses closed loop automation to learn and improve further decision-making.

### OUTCOMES



**16% energy savings.**  
Significant cost-savings.

**13% CO2 emissions reduction**  
No compromise on quality of experience



Know more about Capgemini in O-RAN

# Thanks

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