



## XGMF 6G-AI WG

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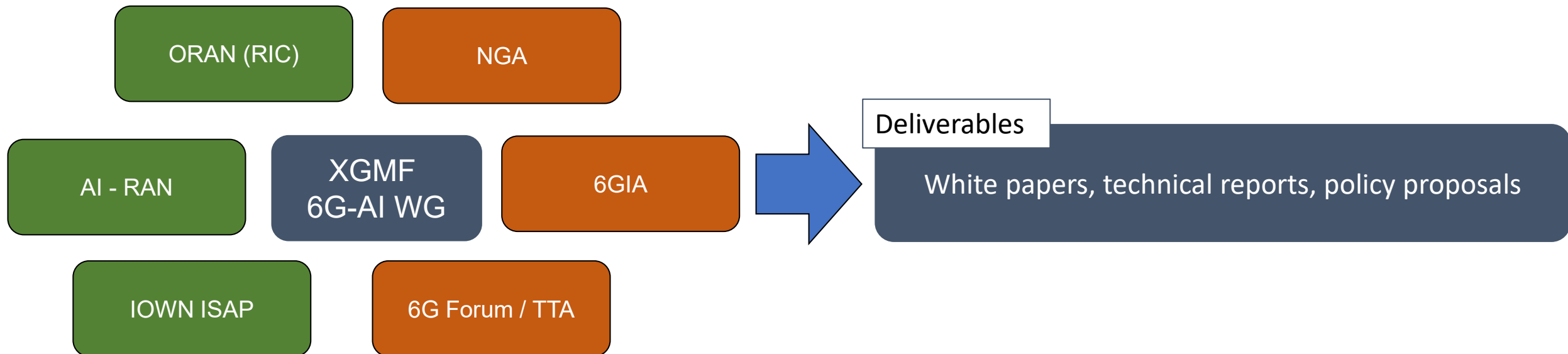
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# XGMF 6G-AI WG : AI × Communications for 6G

- **Organizational Setup:** WG formation across XGMF 6G projects
- **Integration of Inputs:** Aggregation of insights from 6G Wireless & Architecture projects (so far)
- **Key External Alignments:**
  - AI-RAN, O-RAN RIC, IOWN ISAP
  - International: NGA, 6GIA, 6G Forum, TTA
- **Scope Definition:** “AI for Network” and “Network for AI” perspectives
- **Expected Outcomes:** White papers, technical reports, policy proposals



# Building an Industry-Academia Collaboration Framework

- **Background:**

- Increasing complexity in AI-communication integration
- Urgent need for cross-domain knowledge sharing (wireless, architecture, applications)
- Alignment with international standardization trends

- **Objective:**

- Establish a knowledge-sharing ecosystem to support consensus building

- **Activities:**

- Consolidation of foundational technologies: PHY/MAC, edge/cloud AI, data platforms
- Application domains: Smart cities, robotics, mobility, healthcare IoT
- Global alignment for standardization and collaborative research

- **Action Items:**

- **Regular meetings for information sharing**, open participation, WG secretariat setup

- **Member roles:**

- Academia: share research and identify long-term challenges
- Industry: highlight implementation needs and constraints
- Government: provide neutral platforms and resources

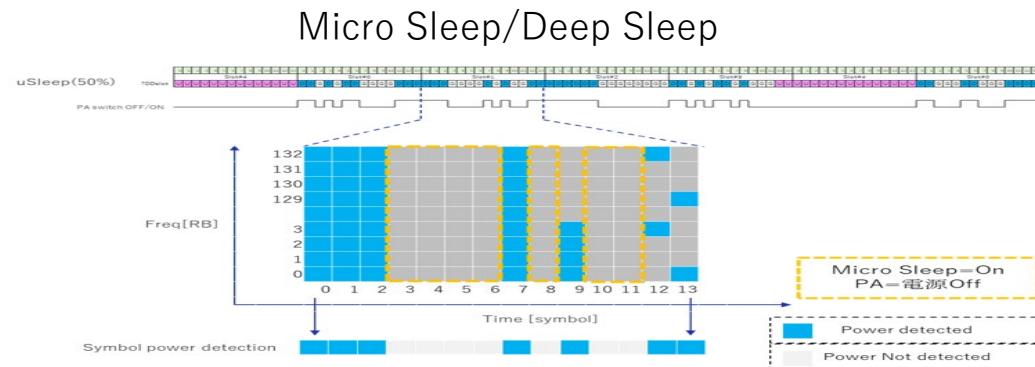
# AI-enabled Telecommunications

## Application of AI to telecommunications

- Fault prediction and fault detection
- Advanced signal processing (highly parallel processing)
- Inter-Cell Coordination (dMIMO)
- AI-Native Air-Interface (30% improvement)
- Fusion of communications and sensing (JCAS)

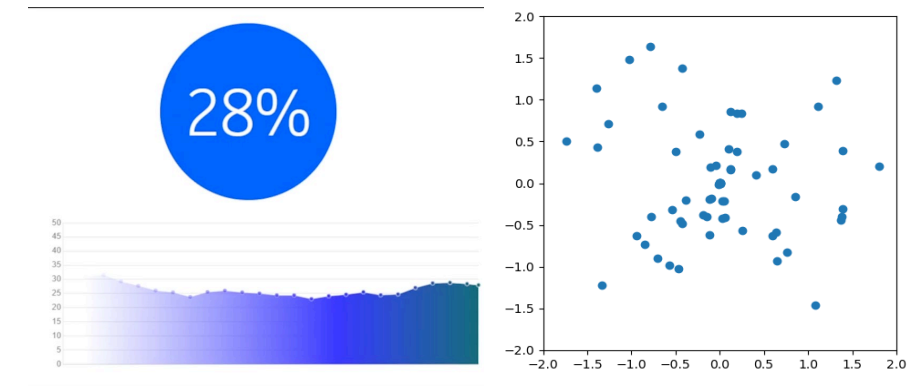
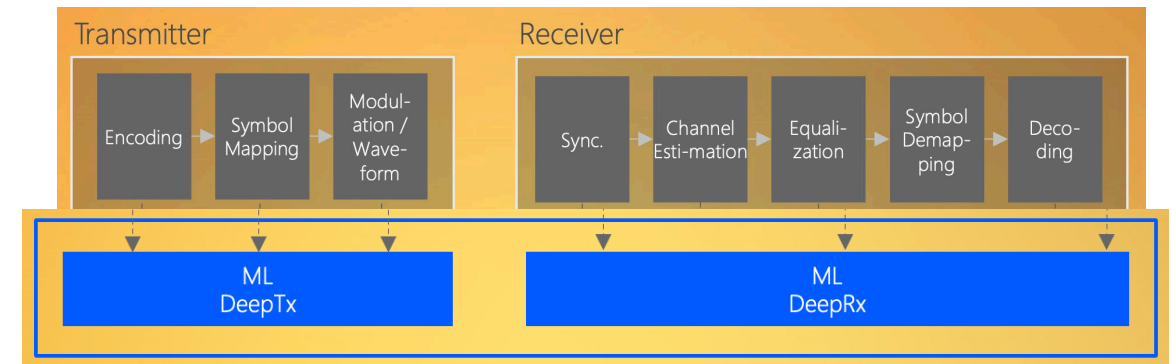
## Low power consumption

- Technology to flexibly turn on/off base station functions according to communication volume, etc.
- Power saving with time-division multiplexing (Micro Sleep)
- Reallocating radio communication resource blocks (Deep Sleep)

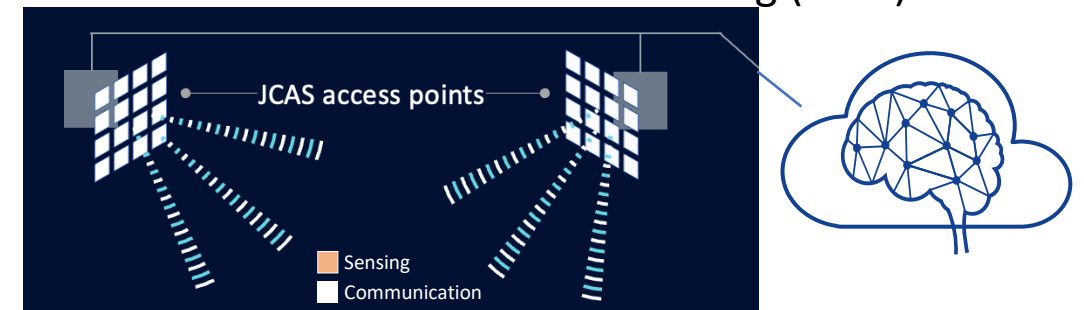


Source: Rakuten O-RAN RIC 2024

## AI-Native Air-Interface (30% improvement)

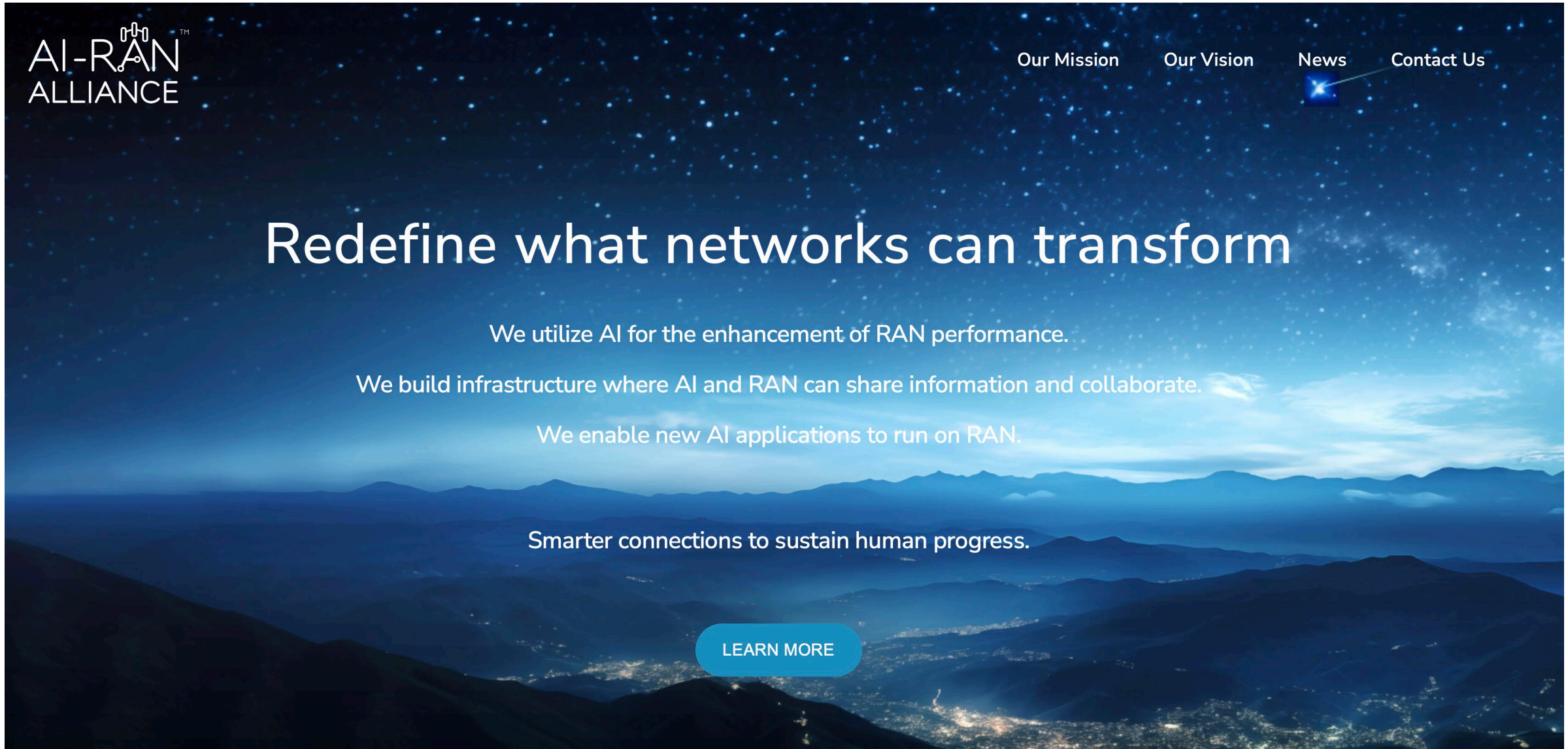


## Joint Communication And Sensing (JCAS)



Source : Peter Vetter, NOKIA, B5G International Conference 2024

# AI-RAN Alliance



[Our Mission](#)

[Our Vision](#)

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## Redefine what networks can transform

We utilize AI for the enhancement of RAN performance.

We build infrastructure where AI and RAN can share information and collaborate.

We enable new AI applications to run on RAN.

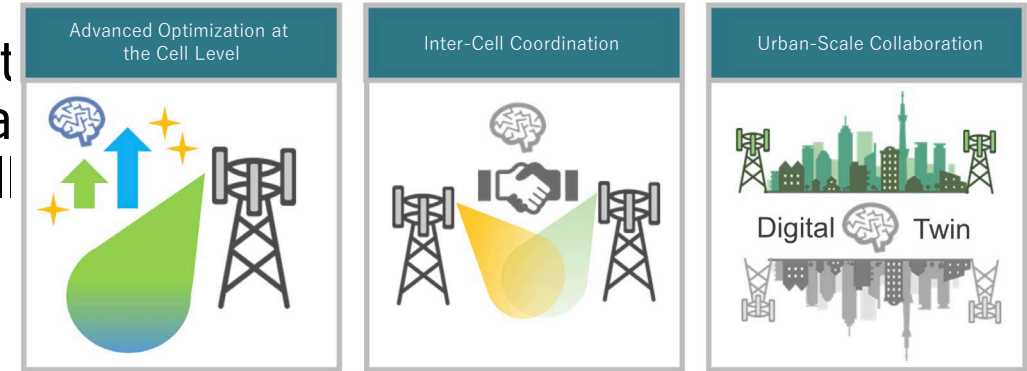
Smarter connections to sustain human progress.

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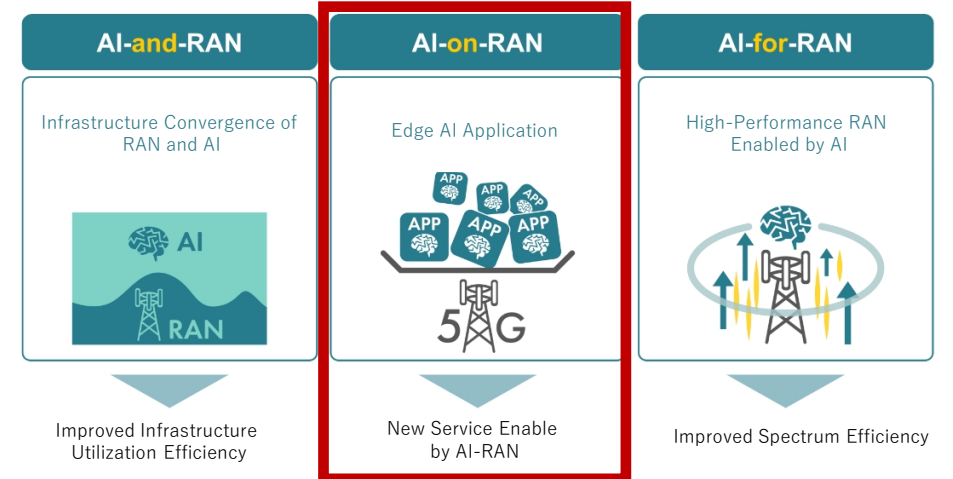


# AI for RAN : Enhancing RAN with AI

- AI-RAN as a Core Enabler of 6G
  - AI is applied directly to wireless processing t
  - As AI chips evolve, wireless efficiency also a
  - AI-RAN represents a new paradigm for intel
- Network Optimization through AI
  - Advanced optimization at the cell level
  - Inter-cell coordination
  - Urban-scale integration and cooperation
- AI-RAN ALLIANCE
  - Achieving high performance through AI-RA
  - Creating new revenue opportunities
  - Building a sustainable AI-RAN ecosystem
  - Continuous performance enhancement thrc R&D activities

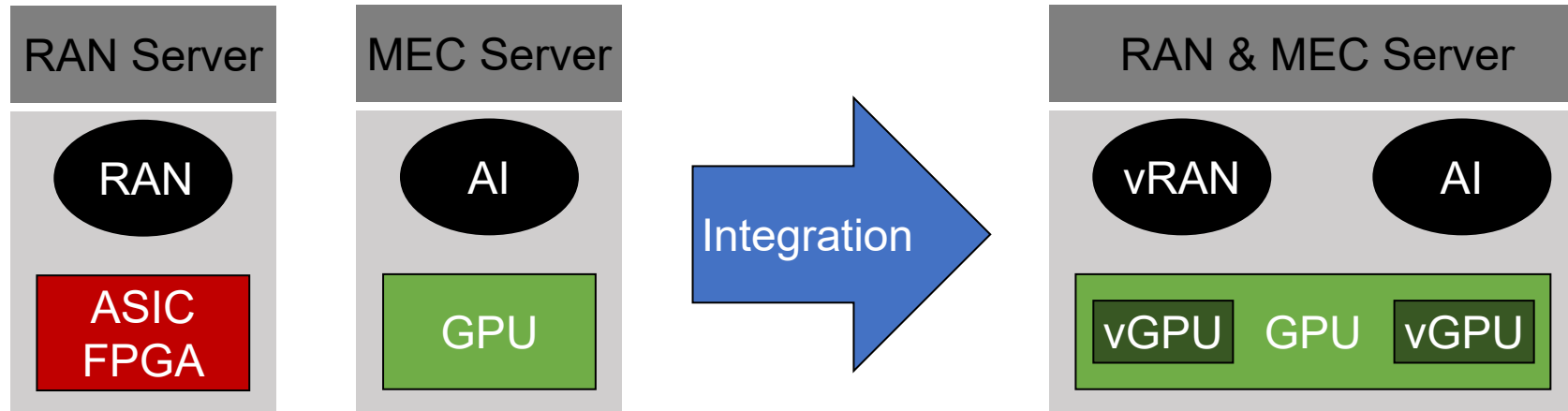


## Priority Research Areas



# AI and RAN: RAN Coexists on the AI Infrastructure

- Integrating RAN into the AI Infrastructure

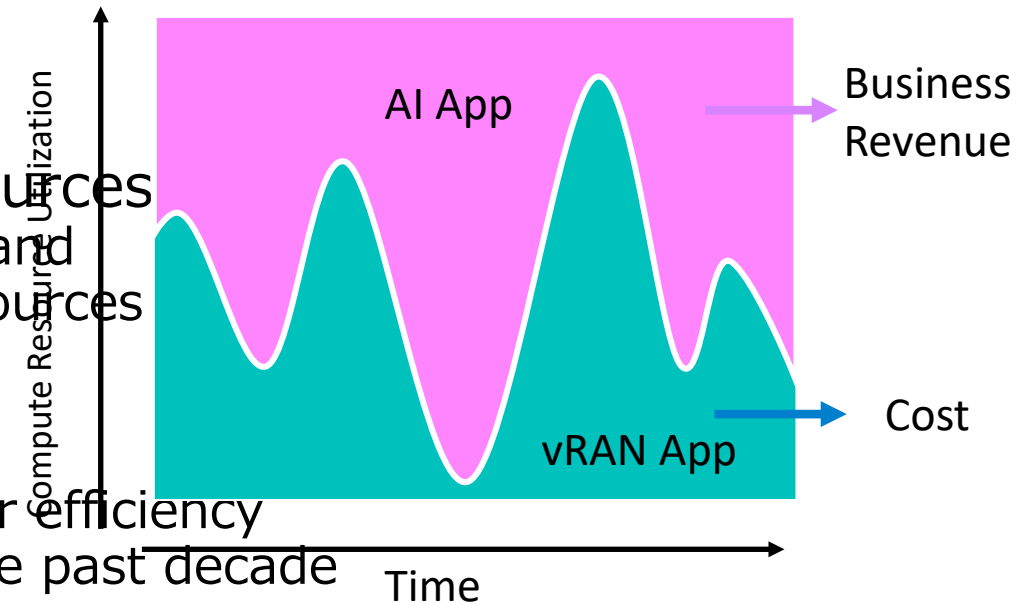


- Coexistence of RAN and AI (Shared Compute Resources)

- Dynamic allocation and placement based on RAN demand
- Enables efficient use of shared GPU/AI accelerator resources

- Evolution of AI Chips

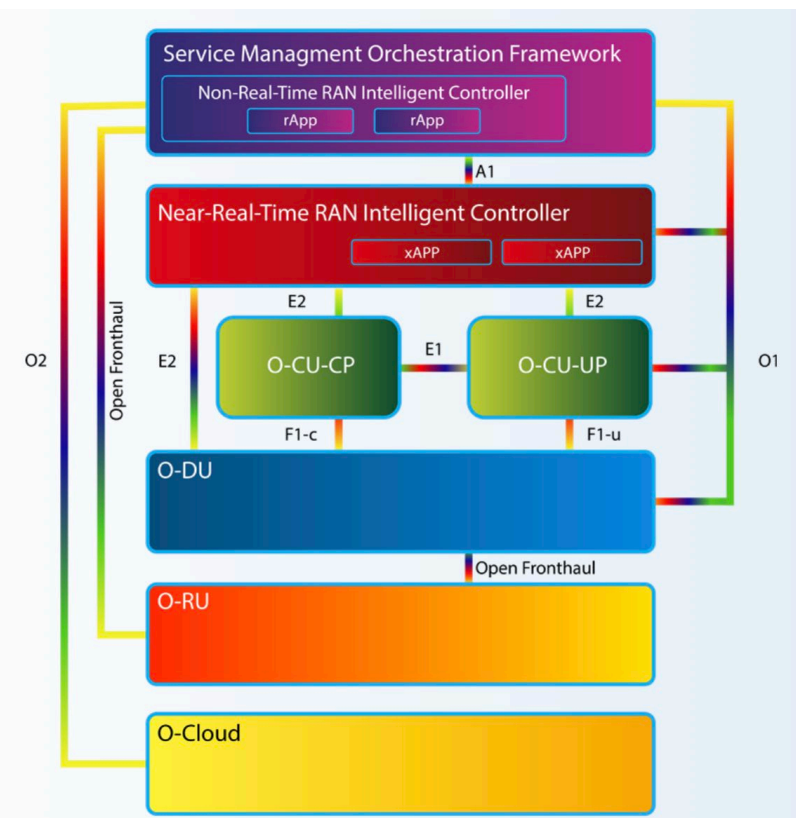
- Significant advances in processing capability and power efficiency
- Single-chip performance has improved 1,000× over the past decade



**Reference:** Communication and AI WG, Information Sharing Document (May 8, 2025)



## O-RAN Architecture



## O-RAN ALLIANCE Mission



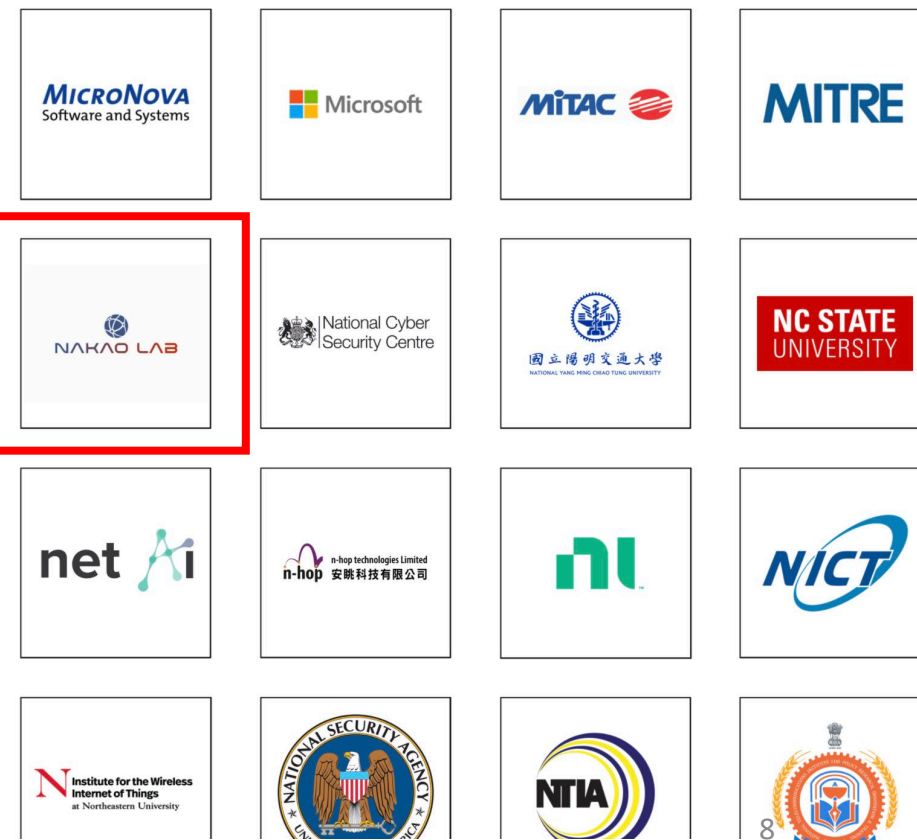
The O-RAN ALLIANCE is a world-wide community of more than 300 mobile operators, vendors, and research & academic institutions operating in the Radio Access Network (RAN) industry. As the RAN is an essential part of any mobile network, the O-RAN ALLIANCE's mission is to re-shape the industry towards more intelligent, open, virtualized and fully interoperable mobile networks. The new O-RAN specifications enable a more competitive and vibrant RAN supplier ecosystem with faster innovation to improve user experience. O-RAN based mobile networks at the same time improve the efficiency of RAN deployments as well as operations by mobile operators. To achieve this, the O-RAN ALLIANCE publishes new RAN specifications, releases open software for the RAN, and supports its members in integration and testing of their implementations.

## O-RAN Ecosystem with Over 300 Participants

Since its foundation, O-RAN ALLIANCE has become a world-wide community of mobile network operators, vendors, and research & academic institutions operating in the Radio Access Network (RAN) industry.



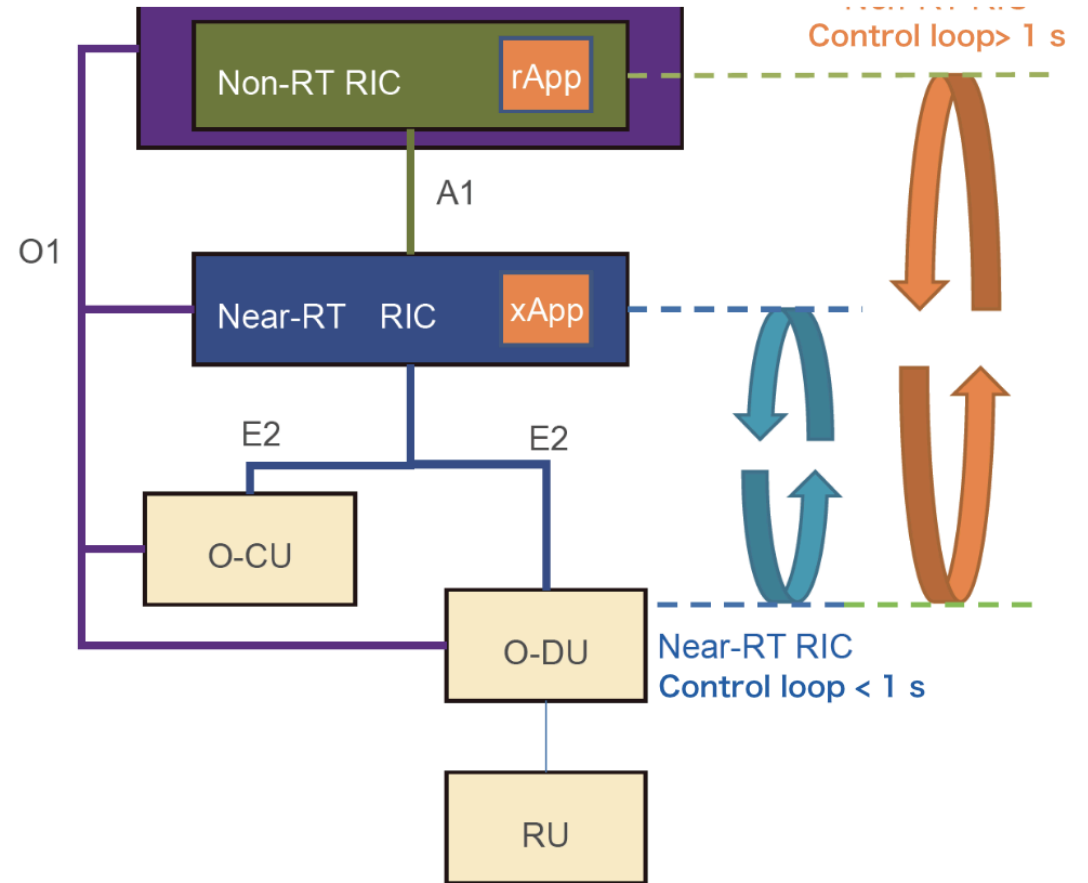
WHO WE ARE WHAT WE DO O-RAN ECO!





# Possible Applications of RIC(RAN Intelligent Controller) AI/ML Integration

- Traffic Steering
  - Radio Resource Management (RRM)
  - Application Traffic Provisioning
- Power Management
  - UE Resource Usage Prediction
- Resilience
  - Anomaly Detection
  - Disruption Prediction
  - Congestion Mitigation
- Dynamic Spectrum Sharing



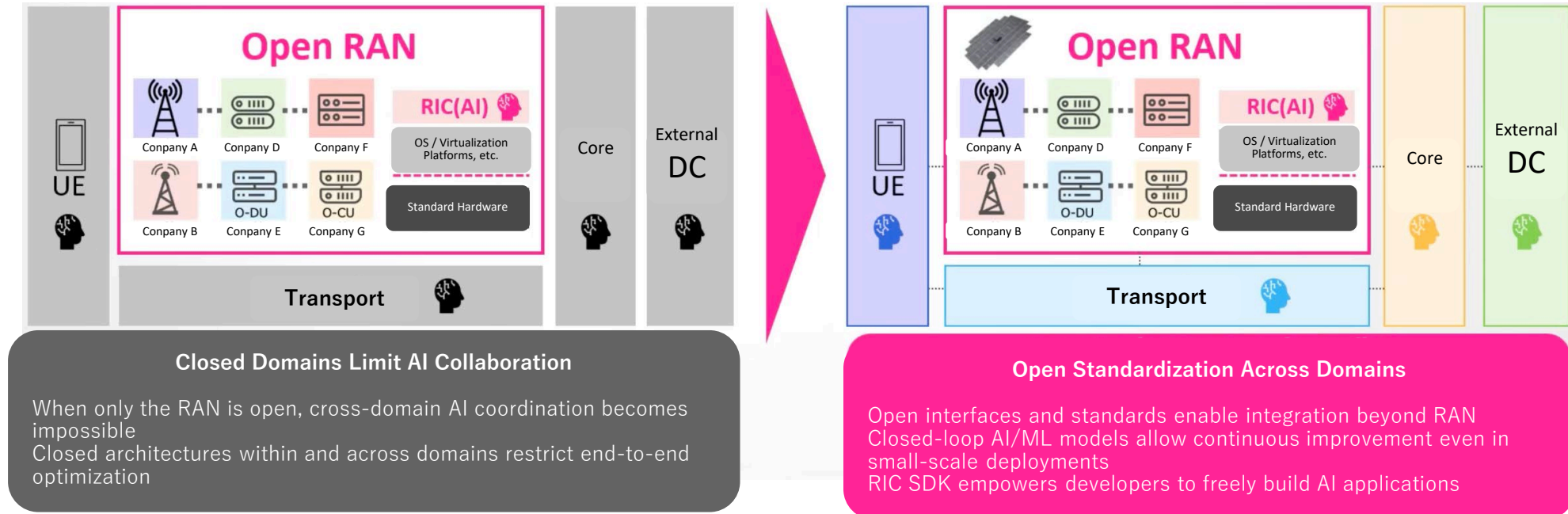
# AI Readiness for End-to-End Network Optimization

- **Toward Full-Stack AI-Enabled Network Control**

- Establishing a standard platform for AI control applications using the O-RAN Alliance RIC
- Developing AI-based rApps and xApps not only for TN (Terrestrial Networks) but also for NTN
- Building testbeds to enable pre-deployment validation of AI behavior and performance, accelerating real-world implementation

- **Fully Open AI Networks**

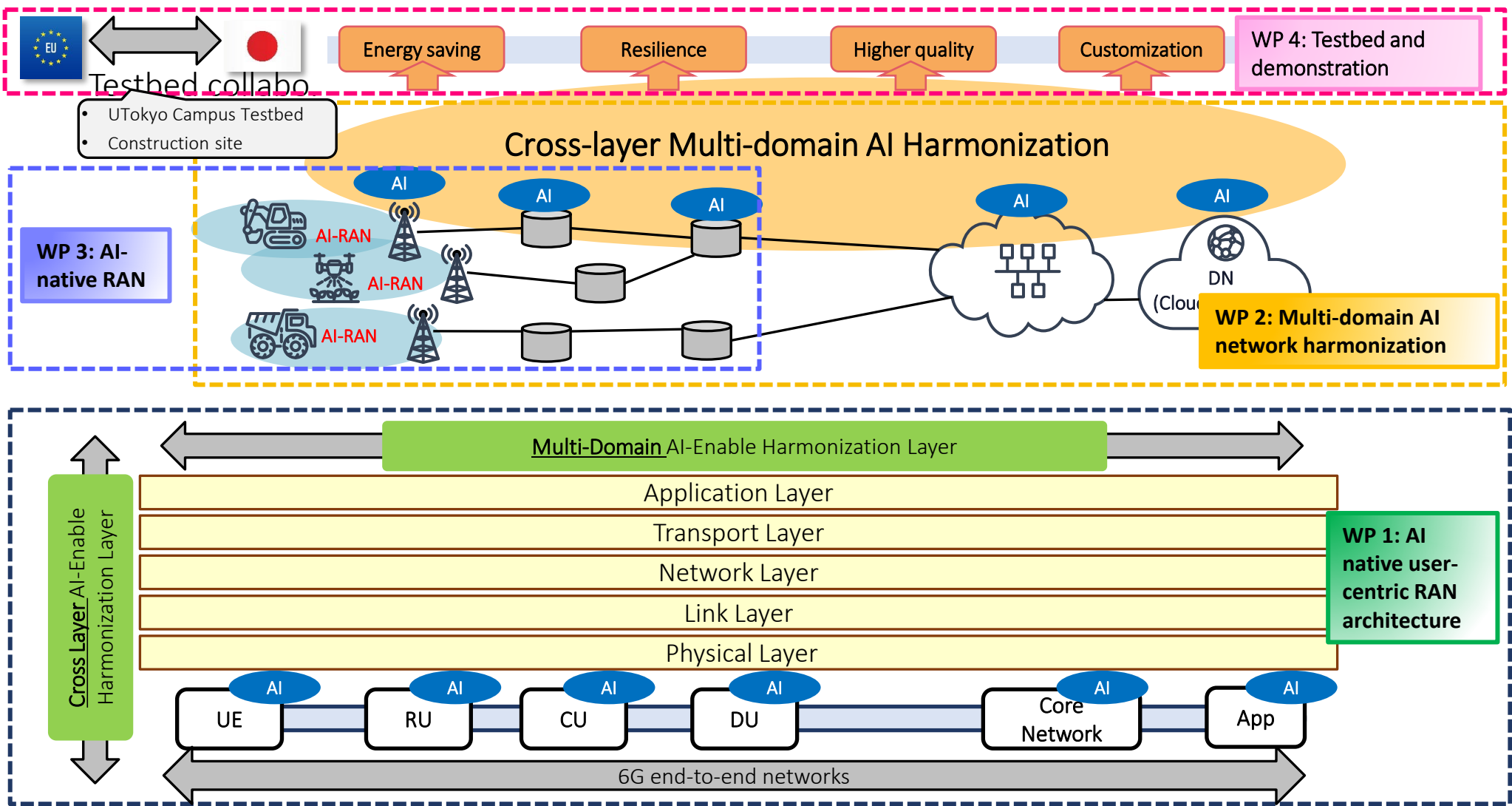
- All network domains opened to enable integrated AI-driven control
- Extending beyond RAN to encompass mobile core and NTN
- Moving toward an era where anyone can develop AI applications to control mobile networks



**Reference:** Communication and AI WG, Information Sharing Document (May 8, 2025)

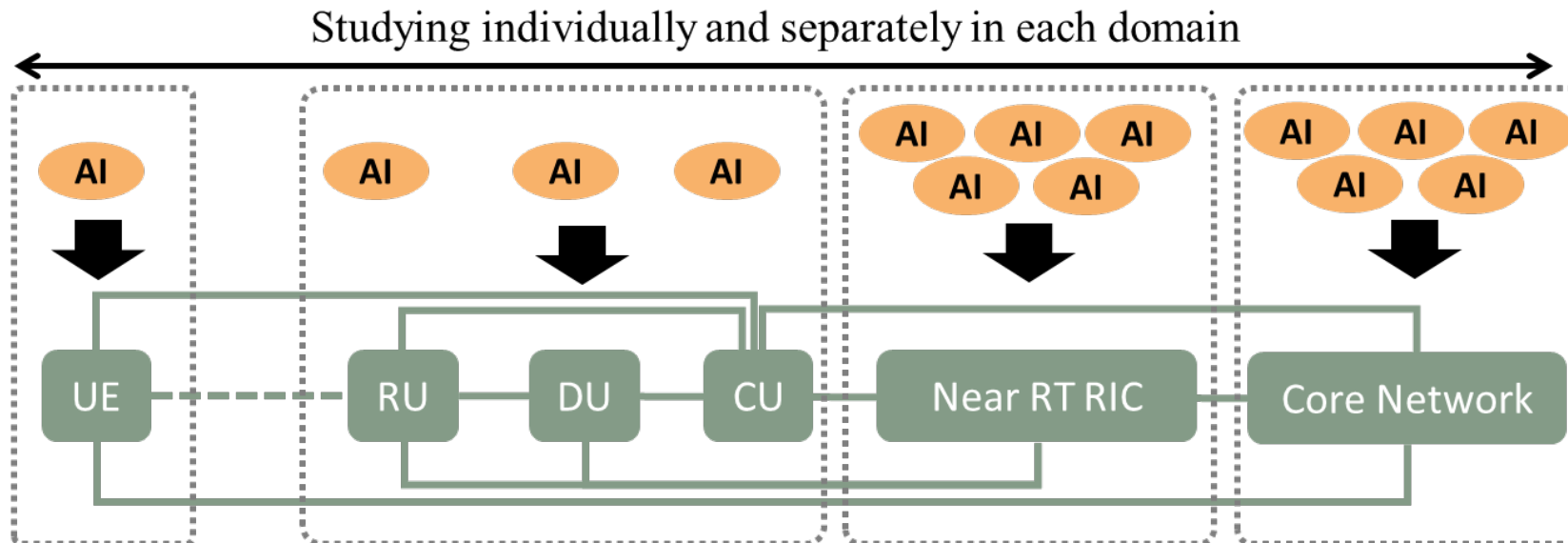
# EU-Japan Project : 6G MIRAI-HARMONY

Cross-layer Multi-domain AI Harmonization for AI-native 6G mobile system



# Research Problems

- There is **no concrete approach** how to coordinating each AI deployed in multi-domains, such as UEs, RANs, and Cores
  - Currently developed AIs are specialized in **optimizing individual problems**
  - In the 6G era, many AI functions are expected to be used for network optimization
- RAN and Core studies have been conducted separately **without considering End-to-End quality optimization**
  - Higher bandwidth and lower latency of **RANs will increase the impact of core networks** relative to end-to-end quality



# Our proposal

- Conduct Research and Development on **AI Harmonization** to integrate **both vertical (cross-layer) and horizontal (end-to-end network)** AI coordination to promote AI natives at all layers
  - **Convergence of RAN and Core** is more important, so optimization is considered not only within each domain but also across domains
  - It is mandatory to **utilize the layer specific information across layer** rather than limiting its use to within a layer

