# From National Strategy to Global Leadership: Korea's Hyper-AI Network Initiative in the AI-RAN Era


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EuCNC workshop "International Cooperation for AI-Native RAN for 6G," 2026.

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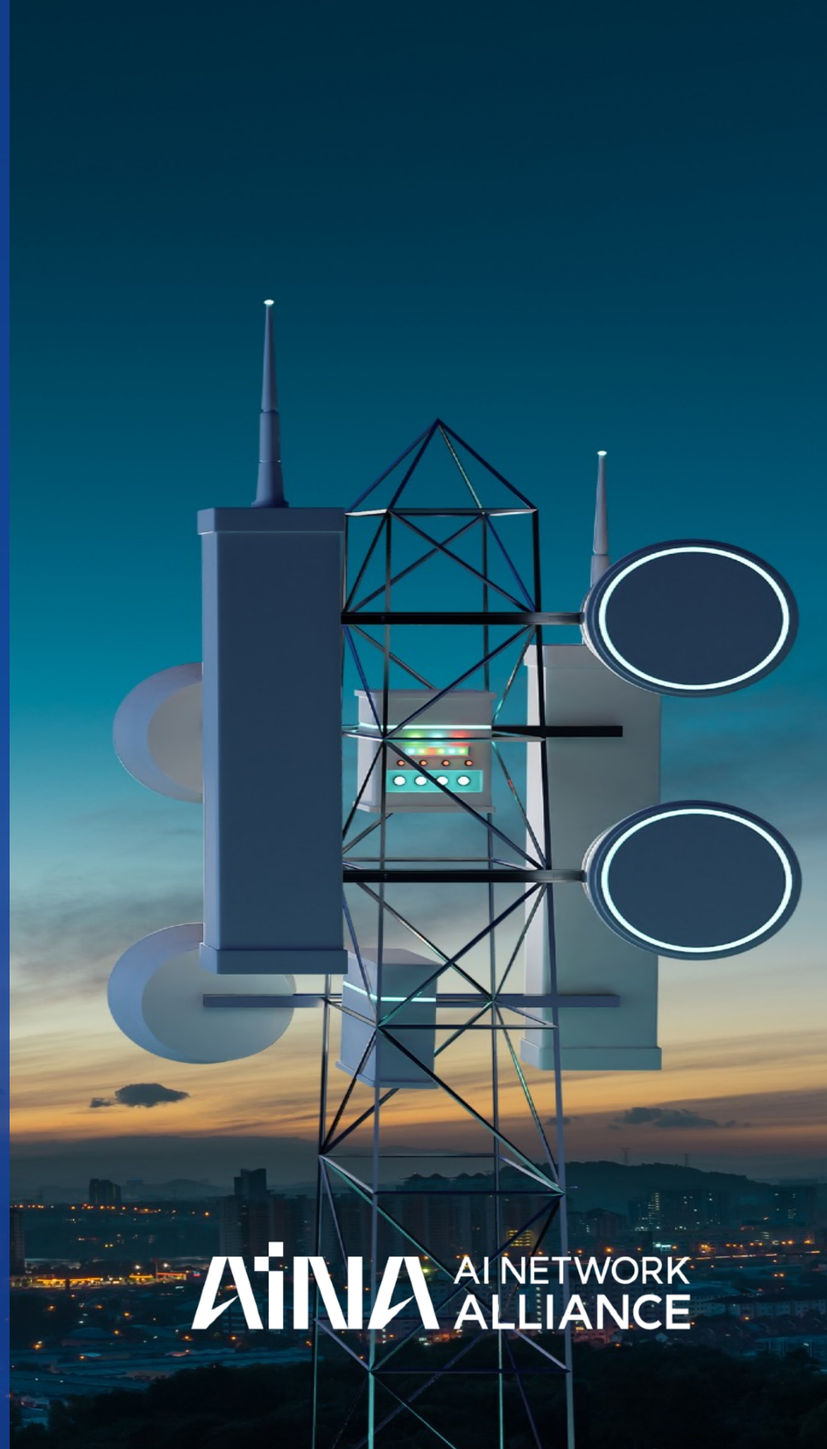
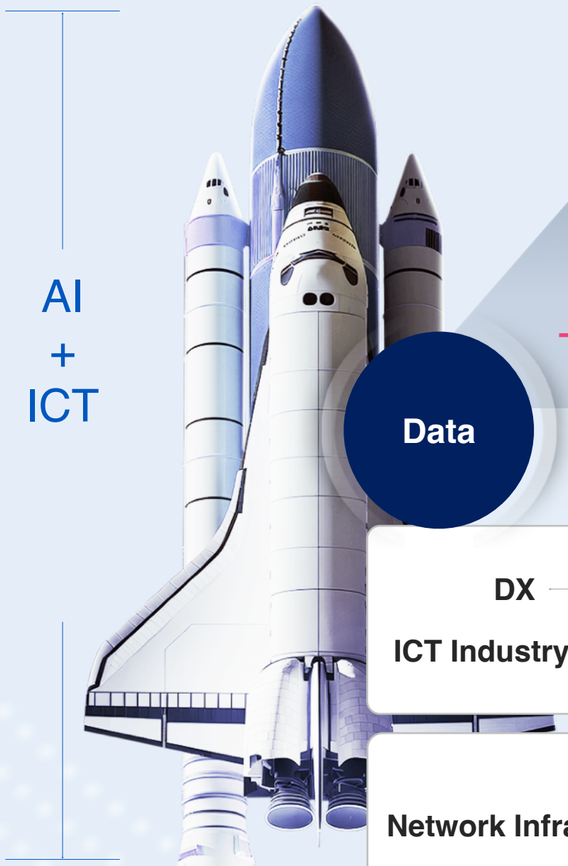
CHAPTER I

# Hyper AI Network Strategy - *with a focus on AI-RAN*



# AI Korea's National Vision

## Becoming a True AI G3 Powerhouse



AI + ICT

**Models**

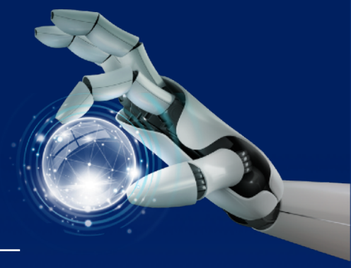
AI for All, National AX Transformation

**Data**

**Computing Infra**

DX
ICT Industry
Digital Ecosystem
SW

Network Infra
Network
Services

## AI Highway

**Key Action Plans**

- Data Centers, AI Infra
- **Building up AI Network Infrastructure**
- Data, Platform Build
- National AI Governance

Building #1 AI Utilizing Nation

Securing AI Leading Talent

AI Basic Society Realization

# How the strategy supports for the ecosystem to implement and manage AI-RAN

## Reform Regulatory Reforms to Drive AI-RAN Success

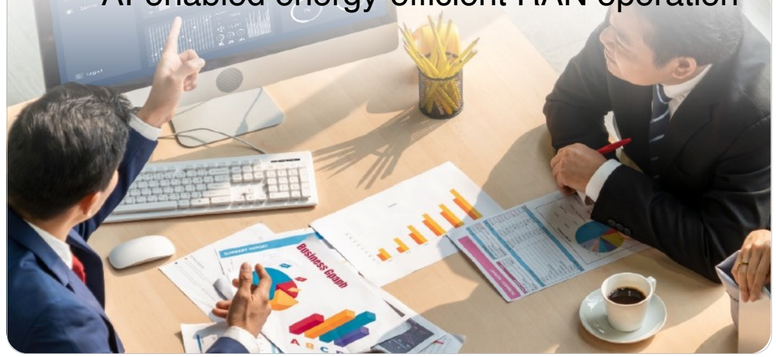
**NW Investment Policy Package covers equipment;**

### Tax Benefits

- **Identify AI-RAN (BS IT equipment etc.) as strategic tech. to be eligible to get tax benefits**

### Regulatory Reform

- **Mandatory SA transition, Annual Net assessment introduce user experience-speed, and 5G-SA evaluation metric, promote AI-RAN**
- **Green BS certification (new)** to promote AI-enabled energy-efficient RAN operation

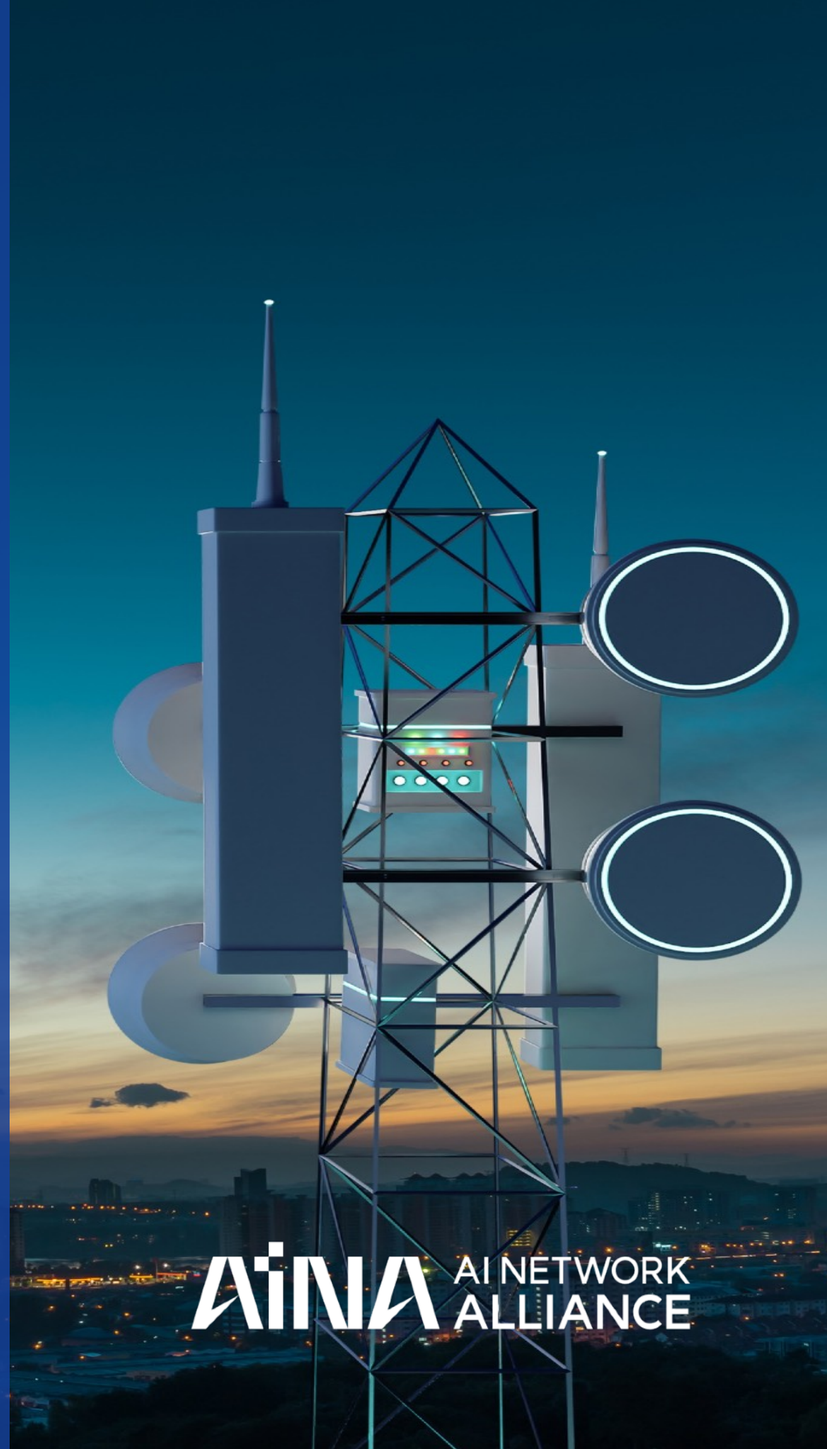


### Spectrum

- **Spectrum reallocation policy, 5G/6G new spectrum ('26~'29)**
- **6G Spectrum Strategy by '28, all of which will trigger AI-RAN adoption**

CHAPTER II

# AINA: Driving Korea’s Hyper-AI Network Strategy



# Driving Korea’s Hyper-AI Network Strategy

- *Founded (Nov. 2025) — Officially launched by MSIT (Ministry of Science and ICT) as Korea's Public-Private Partnership platform to deliver the Hyper-AI Network National Strategy.*
- *Roots & Global Debut— Evolved from ORIA (Open RAN Industry Alliance) into a broader AI-native network alliance; introduced to the global stage with the Korean Government at MWC 2026.*


# AI Network Alliance Role & Roadmap

## Hyper-AI Net R&D Acceleration: R&D Demand Discovery and Planning Support Global Collaboration


**Market Scaling:**
**Hyper-AI Net Trials and Validation Support, with Industry and Public Sectors, discovering New Services**

**Ecosystem Building:**
**Policy Support, Talent Development, Global Event, Partnership**

**2025**
Supporting to plan the Hyper-AI Network Strategy

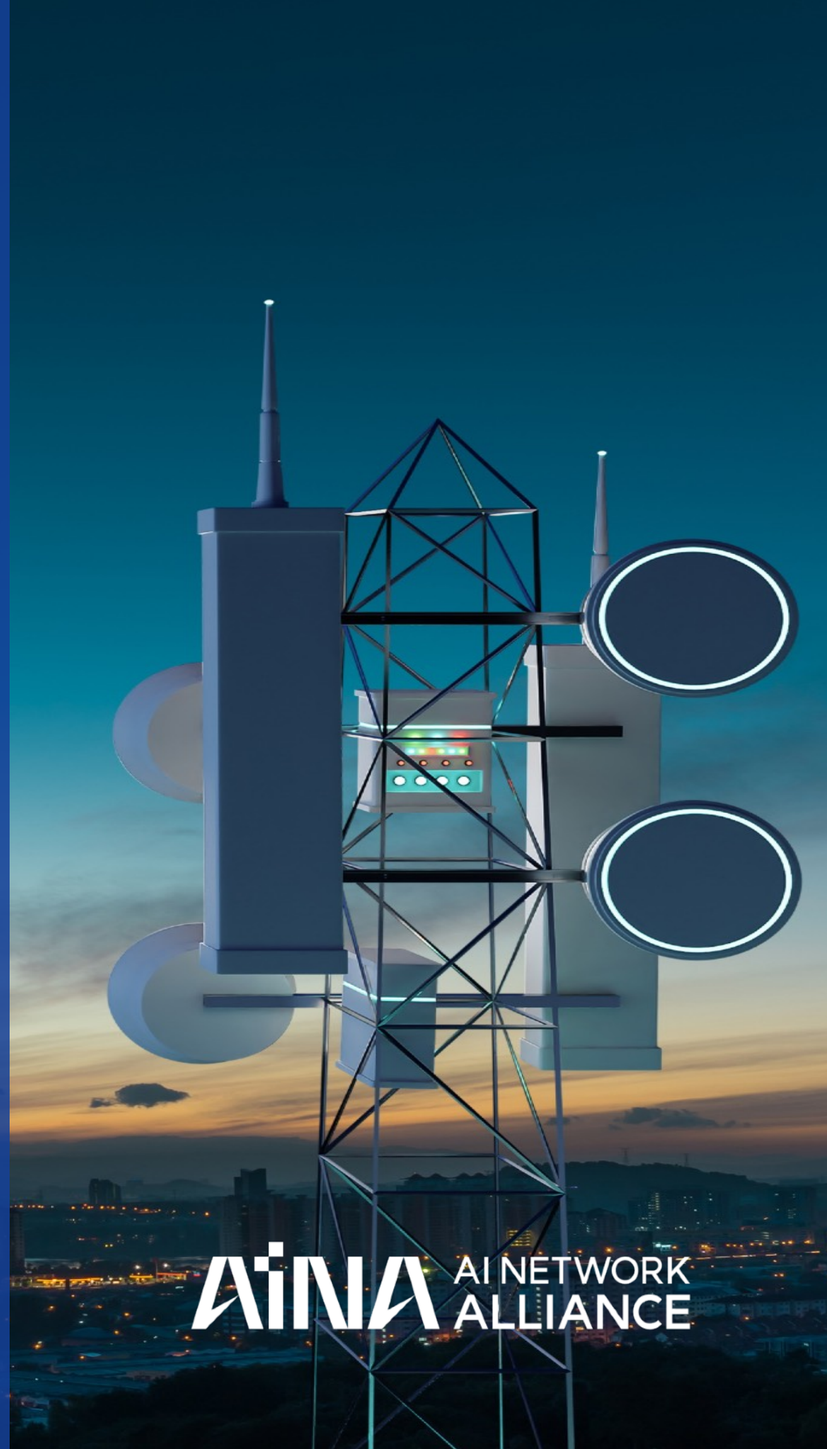
**2026~2027**
Support AI Network Trials on Live Network, support AI-on-RAN R&D, AI-RAN PoC

**2028~2029**
Support AI Phase-2 Network Trials on Live Network

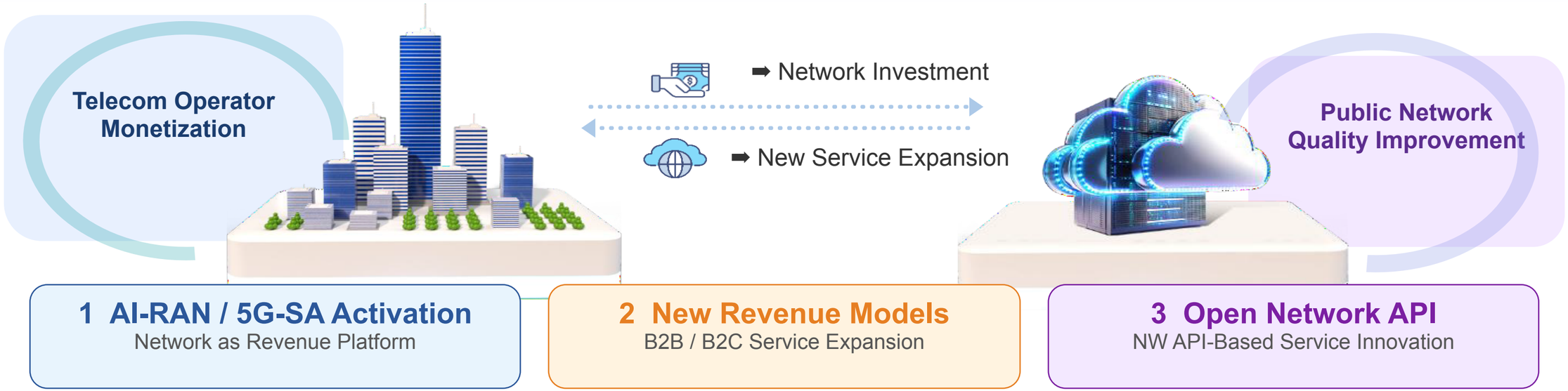
**2030~**
Support Achieving AI Top 3 Global Powerhouse

CHAPTER III

# NIA-Led Hyper AI Network Trials on Live MNOs' Network - with focused on AI-RAN



# Hyper AI Network Trials on Live MNO's Networks




| | |
|---|---|
| **Project** | **Hyper-AI Network Trial on Live MNOs' Network** |
| **Duration** | '26.5 ~ '27.12 * Continuation and budget determined via year-end evaluation |
| **Budget** | KRW 8B total ('26) * Gov't : Operator = 5:5 matching; up to KRW 4B per consortium ('26) |
| **Projects** | 2 consortia (open call) * Telcos, NW equipment makers, AI/SW firms eligible |

# Hyper AI Network Trials on Live MNO's Networks

**Call for Proposals**

## Build Hyper AI Network

- **Lead network rollout**: 5G-SA slicing, AI-RAN, optical, NTN ('27)
- **Commercial AI-RAN + multi-vendor testbed** (CPU/GPU, GPU-RAN)
- **Phased autonomous network** driven by live AI control

## AI Service Trials

- **Physical & Agentic AI trials**: humanoid, AR glasses (Pre-6G)
  *'26: 1 service  '27: +2 new + 1 upgrade*
- **Device–Edge–Cloud orchestration** across the AI workload
- **Open Network API** + AI-QoS benchmarking

## AI Network Ecosystem Buildup

- **Council-led ecosystem activation** — AINA joins via two consortiums

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# AI vRAN Research @Yonsei University


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# Yonsei at a Glance



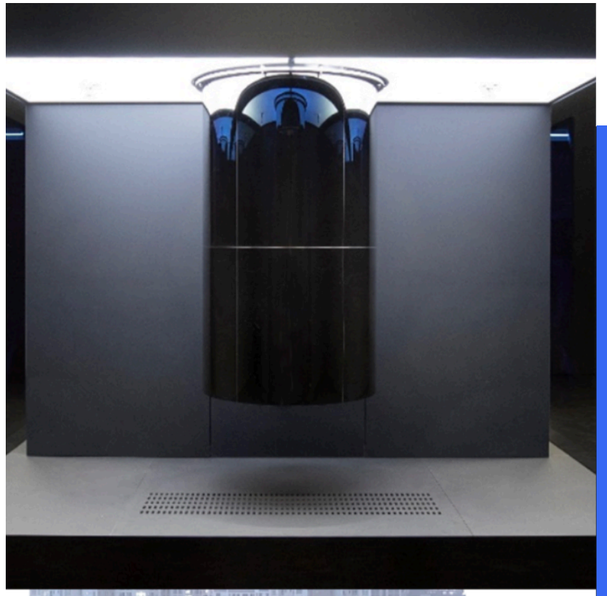
**Sinchon Campus**
**(Seoul)**

**International Campus**
**(Songdo Int'l City, Incheon)**

**Mirae Campus**
**(Wonju, Gangwon)**

**Yonsei University Health System**

~30,000 students, ~1700 faculty members



# Yonsei-IBM
# Quantum Computing Center

### 5th in the world to operate a Quantum Computer

- Specs: IBM 127-Qubit (Eagle Processor) Quantum System 1
- Official startup as of Nov. 20, 2024
- Location: International Campus at Songdo(Incheon)

### Construction of a Quantum Computing Complex

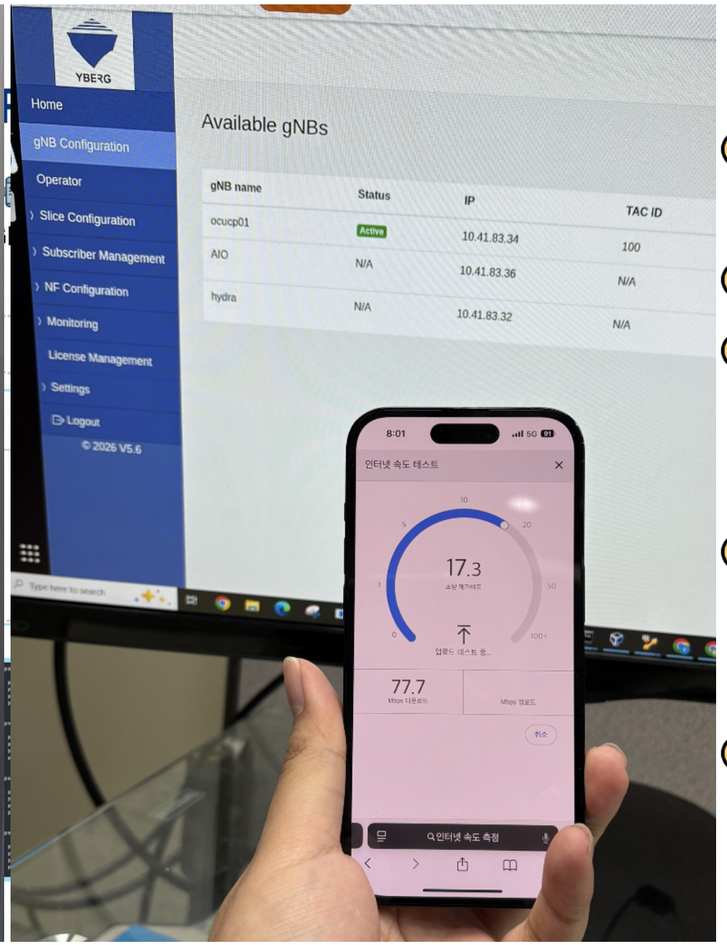
- Quantum Computing Center (installing quantum computers)
- Quantum Research Building

### Open Yonsei's Quantum Computer to Our Partners

- Research and solve "Challenging Problems" using Quantum Computers
- Open free to Yonsei's strategic partners for collaborations

# Yonsei vRAN Lab#1 (vRAN), Lab#2 (Digital Twin)

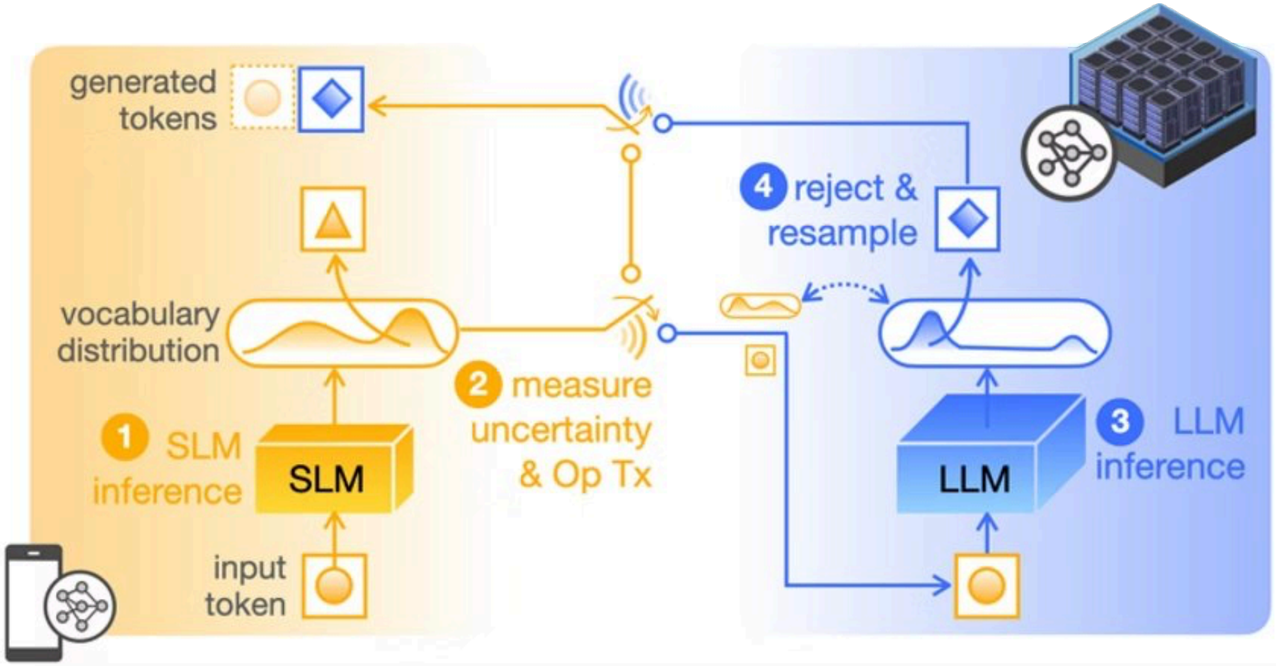
# Yonsei vRAN Lab#1

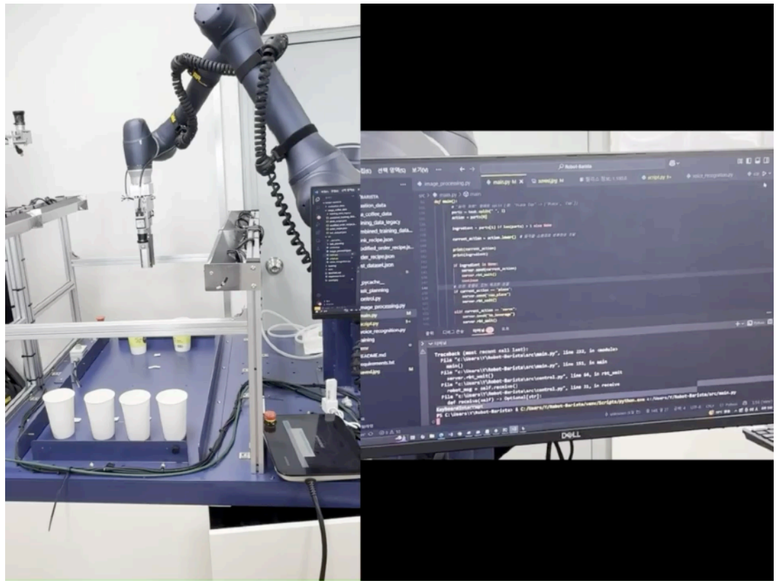




- 5G standalone virtualized RAN based on OpenAirInterface (n79) **+ OCUDU**
- Full-scale 5G Core
- High-speed fronthaul data transmission between DU and RU via DPDK
- GPS-based precision time synchronization for network-wide timing alignment
- GPU-accelerated PHY layer using NVIDIA Aerial SDK

# SLM+LLM and RAN

(AI-and-RAN: Design-Implement-Showcase)

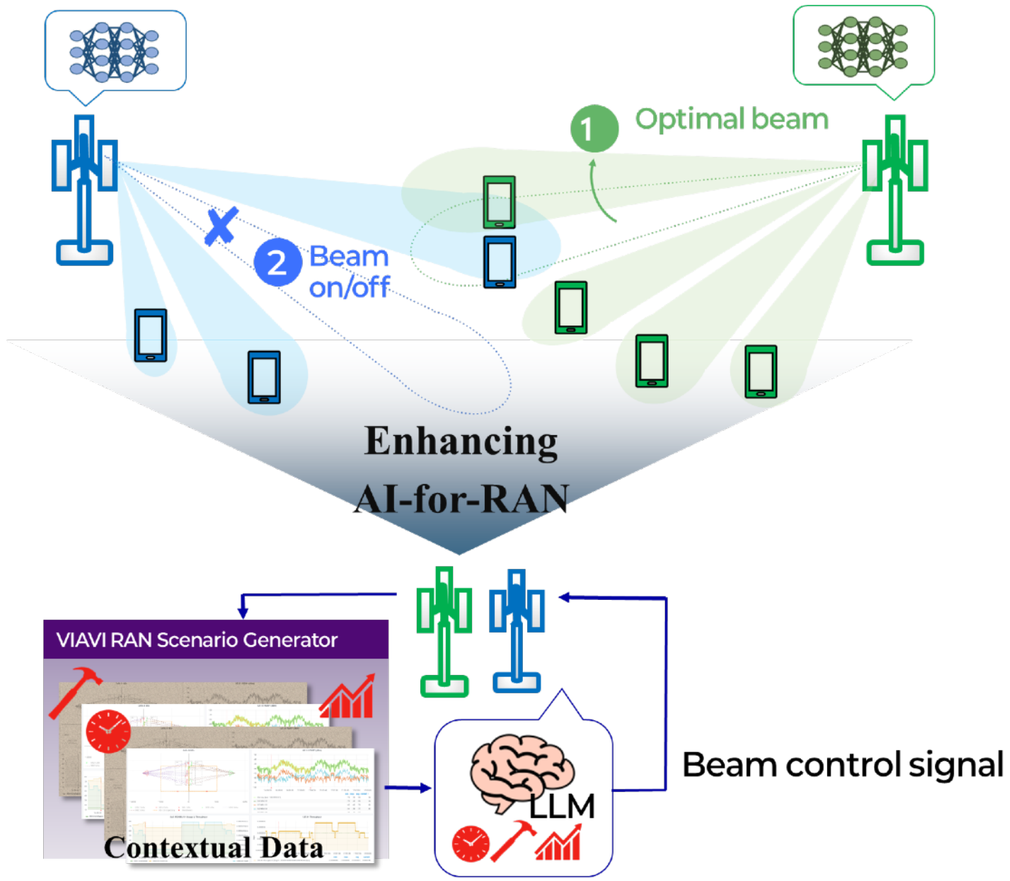


J. Park, Y. Lim, S. Oh, J. Park, J. Choi, and S. -L. Kim, “Uncertainty-Aware Opportunistic Hybrid Language Model in Wireless Robotic Systems,” in Machine Learning for Wireless Communication and Networks (ML4Wireless) Workshop, in Proc. of the *International Conference on Machine Learning (ICML)*, July, 2025.

S. Oh, J. Kim, J. Park, S.-W. Ko, T. Q.S. Quek, and S.-L. Kim, "Uncertainty-Aware Hybrid Inference with On-Device Small and Remote Large Language Models," Proc. of the *IEEE International Conference on Machine Learning for Communication and Networking (ICMLCN)*, June, 2025, Extended version accepted by *IEEE Transactions on Communications*, 2026

# LLM-driven AI-RIC for Context-Aware Beamforming




**Problem: Limited environmental awareness**

· Irregular data arrival & time-sync errors

· Malfunctions or corrupted measurements

→ Conventional AI models get performance degrade

**Goal :** Developing a context-aware **AI-RIC**

· Understanding contextual information

· Handling the imperfect data

**Simulator for AI making context data**

VIAVI Solutions

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

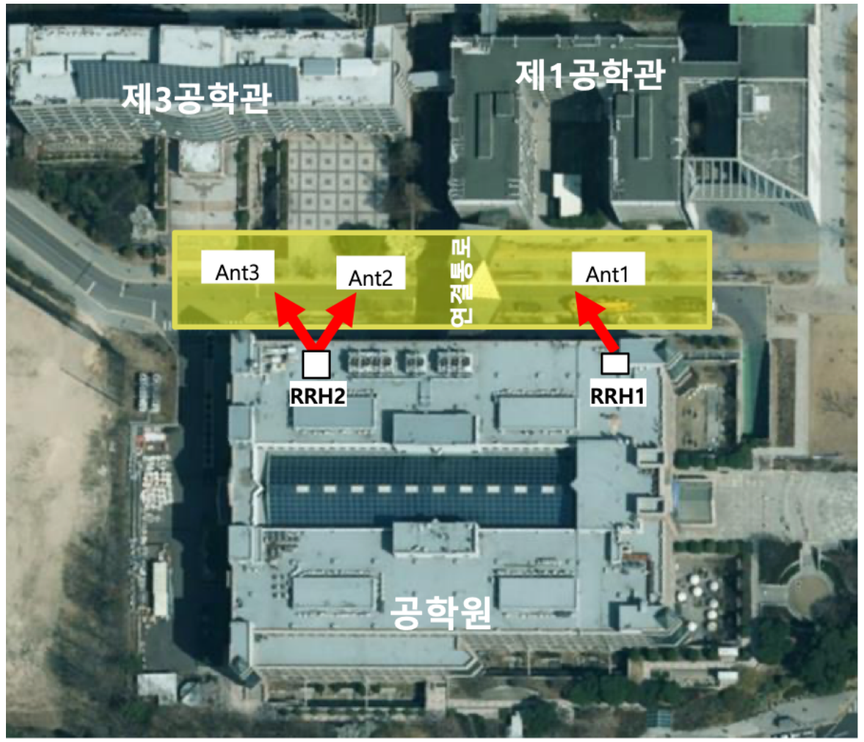
AI-RAN ALLIANCE

MWC26

# 6GARROW

https://6garrow.com

6GARROW



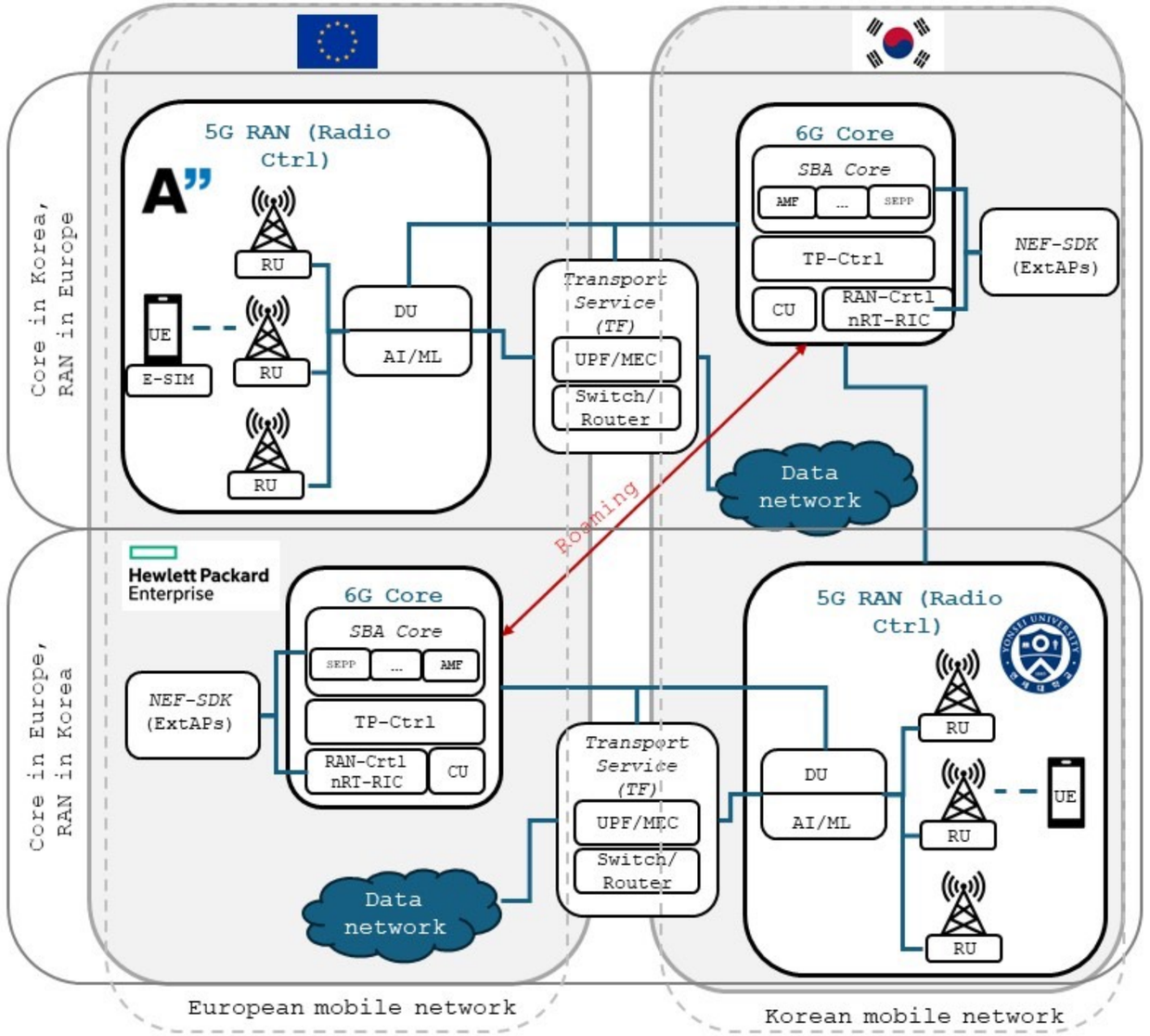

LG U+ Fraunhofer HHI Aalto University Hewlett Packard Enterprise UNIVERSITY OF OULU cea

# Joint testbed for evaluation of AI/ML concepts

**Objective 4**
**Proof-of-Concepts (PoC)**

Objective 5
Fostering of collaboration between EU and ROK

Joint testbed system for the experimental evaluation of the key AI/ML concepts

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Aalto University

Fraunhofer HHI

Hewlett Packard Enterprise

# ‘Nature Review’ Article on AI-RAN

nature reviews electrical engineering

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Viewpoint | Published: 06 October 2025

## AI network-related research and education at Yonsei University

Chan-Byoung Chae, JeongGil Ko, Kwang Soon Kim & Seong-Lyun Kim

Nature Reviews Electrical Engineering (2025) | Cite this article

56 Accesses | Metrics

**In this Viewpoint, four professors at Yonsei University discuss next-generation communications and networking at the university through world-class faculty, cutting-edge research infrastructure and strong global partnerships. By integrating computing, communications and artificial intelligence (AI), Yonsei University fosters pioneering research, real-world prototyping, and active student engagement, shaping the future of AI-native 6G networks in Korea and worldwide.**

Viewpoint

https://doi.org/10.1038/s44287-025-00219-w

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**What are some of the most exciting projects happening right now in research related to electrical engineering at Yonsei University, and how can students get involved?**

**Chan-Byoung Chae:** In 2024, the Korean government launched national talent development programmes on 6G Cloud Networks and Open Radio Access Networks (Open RANs), with Yonsei University as the lead institution. The initiative reflects a clear recognition that the transition from 5G to 6G will be driven not only by communications technology but also by its convergence with computing and artificial intelligence (AI).

Within this programme, Yonsei students are provided with structured opportunities to participate in global research. Selected students spend at least 6 months as an exchange researcher on advanced wireless and AI integration at one of more than 20 partner universities worldwide, including Massachusetts Institute of Technology, Stanford, the University of Texas at Austin, the University of California at San Diego, University College London, EURECOM and Technische Universität Dresden. The programme also connects students with industry leaders from multinational corporations such as NVIDIA and Viavi to innovative start-ups such as SensorView, ensuring their research has immediate impact. Students gain first-hand experience across the full innovation cycle, from inception to prototype, presenting their work at major exhibitions as well as top IEEE conferences. For Yonsei University students, this initiative offers a rare opportunity to be immersed in real-world 6G development, to work side by side with world-class researchers and to showcase their ideas on the global stage.

**Seong-Lyun Kim:** One of the most ambitious projects at Yonsei University today is the development of campus-wide mobile communication testbeds. These platforms enable us to explore, under realistic conditions, how future wireless systems can be transformed by software and AI. Our focus is on AI-native RANs and hybrid edge–cloud integration, where functions traditionally embedded in hardware are reimagined as software modules or replaced by AI algorithms, such as large language models. Using open-source tools, we have begun constructing a virtualized RAN that combines research flexibility with deployment authenticity. This environment allows students to bridge the gap between theory and practice: they are not only writing code or simulations but also deploying real systems, validating performance and identifying new challenges in real-world implementation. Such experiences are invaluable for preparing them to become future leaders in academia and industry. These efforts are supported by two major multi-year initiatives: the Korean government’s ‘5G virtualized RAN Platform’ and the EU–Korea collaborative project ‘6G AI-Native Integrated RAN-Core Networks (6G ARROW)’, funded under Horizon Europe. Together, these programmes provide Yonsei students with unique opportunities to contribute directly to technologies that are likely to define 6G by the end of this decade.

**Kwang Soon Kim:** Also in 2024, the Korean government launched a US $320 million R&D initiative to accelerate the development of next-generation 6G network technologies. The programme targets upper mid-band RANs, coverage enhancement, network softwarization, energy-efficient RANs and the development of critical components for base stations, smartphones and optical communications. Among its flagship projects is the development of AI-sensing integrated extreme massive multiple-input multiple-output (MIMO) technology. Yonsei University, leading a consortium of universities, plays a central role in this effort in close collaboration with the government research Electronics and Telecommunications Research Institute (ETRI). Together, they are advancing foundational 6G RAN technologies while developing a 6G RAN Digital Twin to generate AI training data and validate model performance. Graduate students engaged in this project receive structured training in wireless communication theory and Third-Generation Partnership Project and Open RAN standards while conducting research in close partnership with both industry and the ETRI. The team is also building a globally competitive RAN Digital Twin platform based on open-source tools. Through these initiatives, Yonsei University provides its students with an unparalleled opportunity to gain a deep understanding of both theoretical principles and international standards while actively working at the forefront of AI-driven communications research.

**Given the rapid advances in electrical engineering, how does the department stay current, particularly in your research area?**

**JeongGil Ko:** Given the complexity of today’s societal challenges, developing technologies that address real-world needs can no longer be confined to a single discipline. The School of Integrated Technology responds with a research-oriented curriculum that bridges electrical engineering, computer science, quantum engineering, materials engineering and mechanical engineering. From the first year, students engage in research-focused coursework alongside foundational training, enabling them to adapt quickly to new fields and pursue interests beyond traditional boundaries. The school also actively recruits faculty who push the frontiers of engineering and supports them in translating insights into solutions for real-world problems.

nature reviews electrical engineering

# The NVIDIA-Selected University & Strong Support by the Korean Government

## MoU on AI-RAN with NVIDIA, Samsung, SKT, KT, LGUPlus, ETRI


# AI-RAN Summit 2026 & AI-RAN Alliance F2F Meeting @Yonsei University, November, 2026


# 감사합니다!


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