

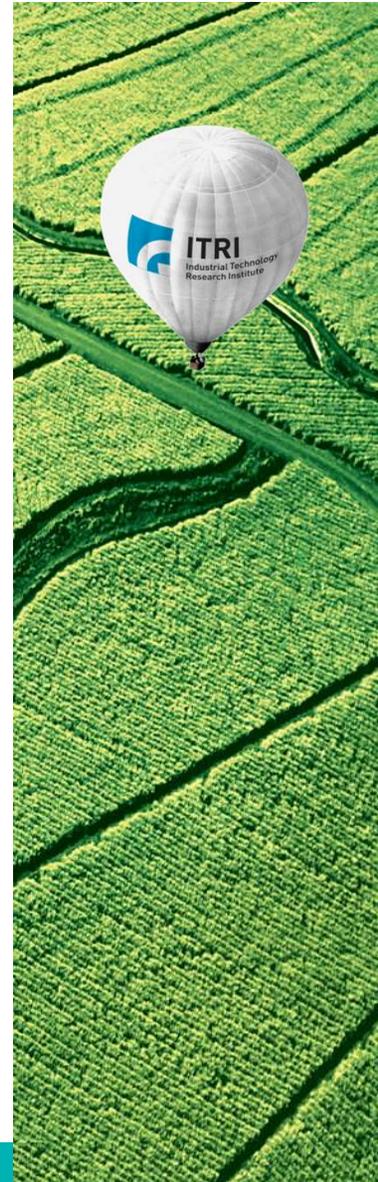
工業技術研究院

Industrial Technology
Research Institute

6G Update from Taiwan - Technologies and Researches

Dr. Mitch Tseng, Research Consultant
Industrial Technology Research Institute (ITRI)

February 2025

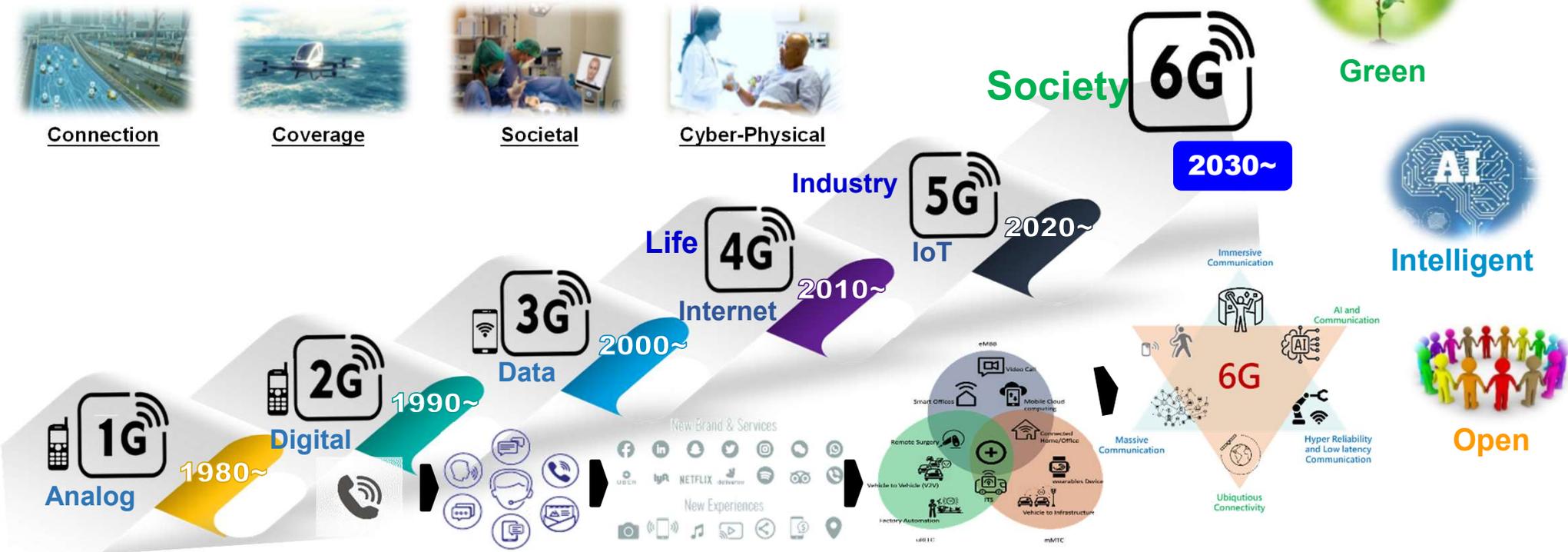


Outline

- What's 6G? ITRI's View
- From 5G to 6G, What's the "Major" Difference?
- Project Timeline and Key Results
 - 6G AI-RAN
 - AI for SMO
 - 6G Technology Prototyping
- Key Researches from Universities (NSTC)
- 6G Trial Network
- International Collaboration Opportunities

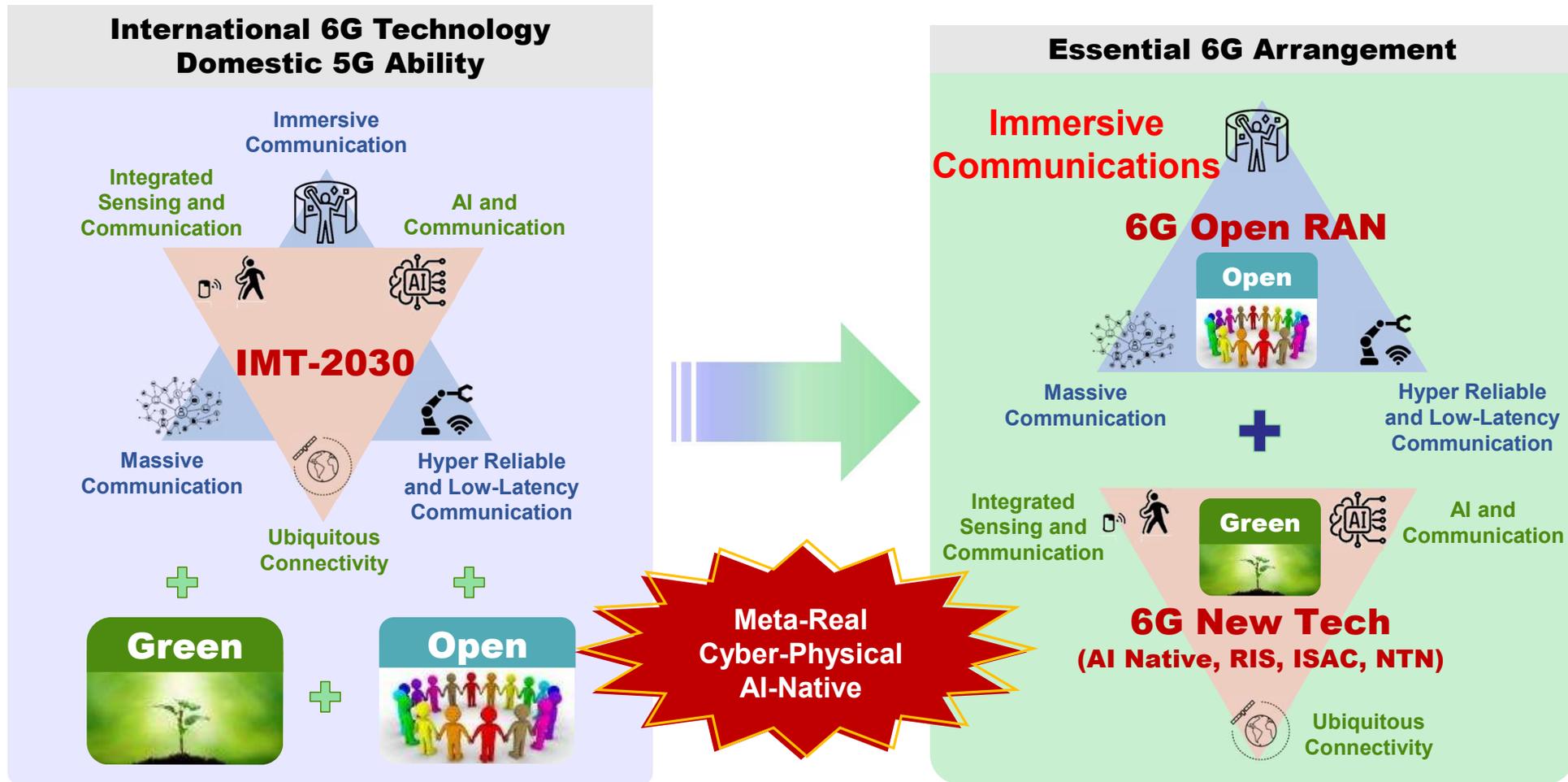
What's 6G? ITRI's View

U.N. SDGs : Intelligence, Green and Sustainability

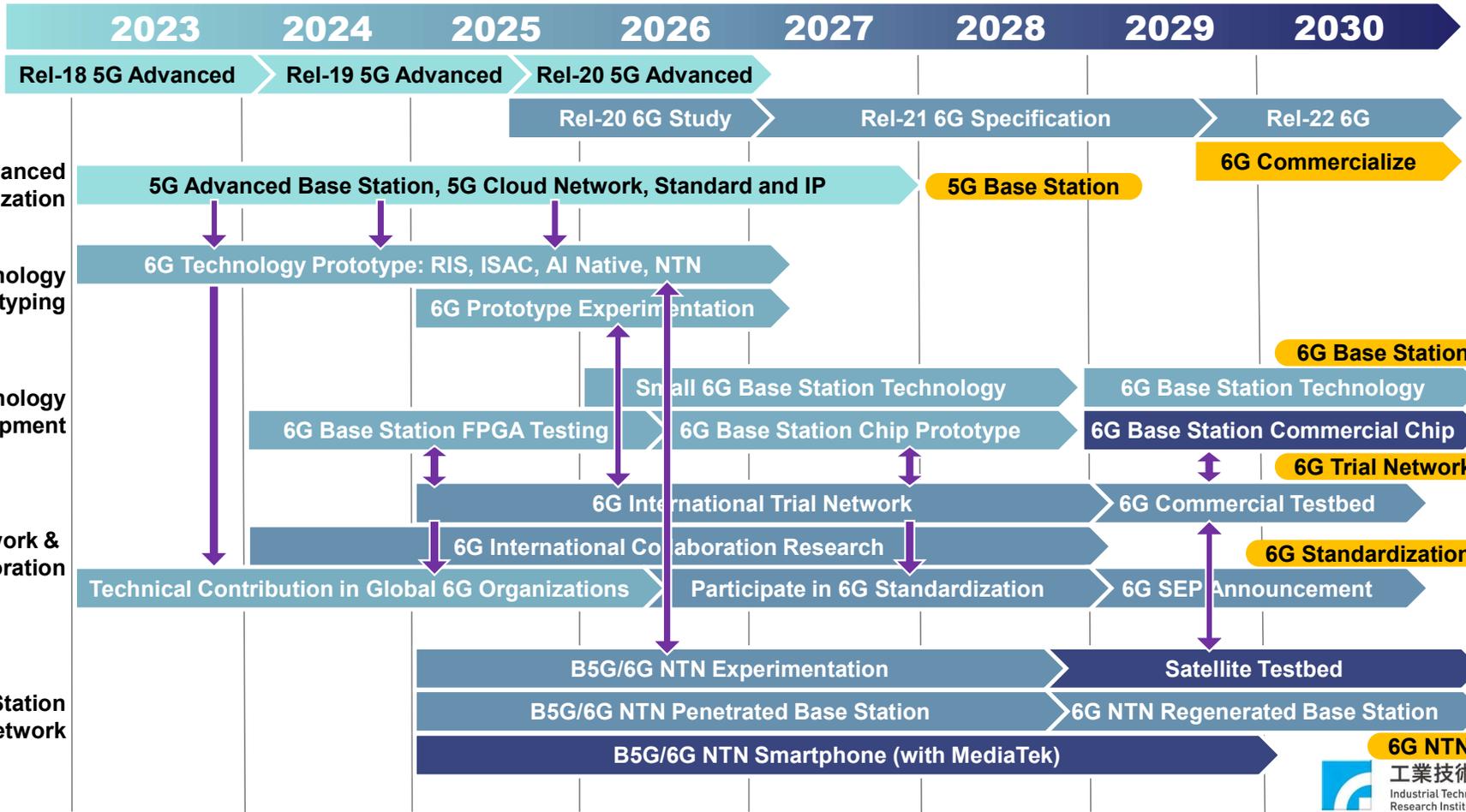


Looking for an Intelligent, Green and Open 6G Network, connecting Digital and Physical Worlds

From 5G to 6G, What's the "Major" Difference?



Project Timeline



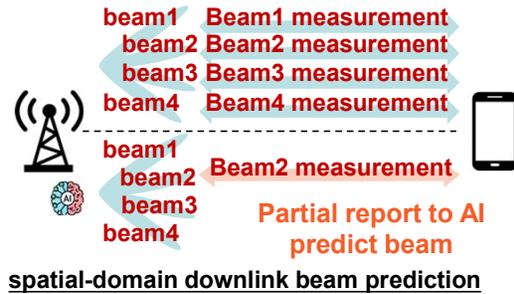
6G AI-RAN

3GPP focus

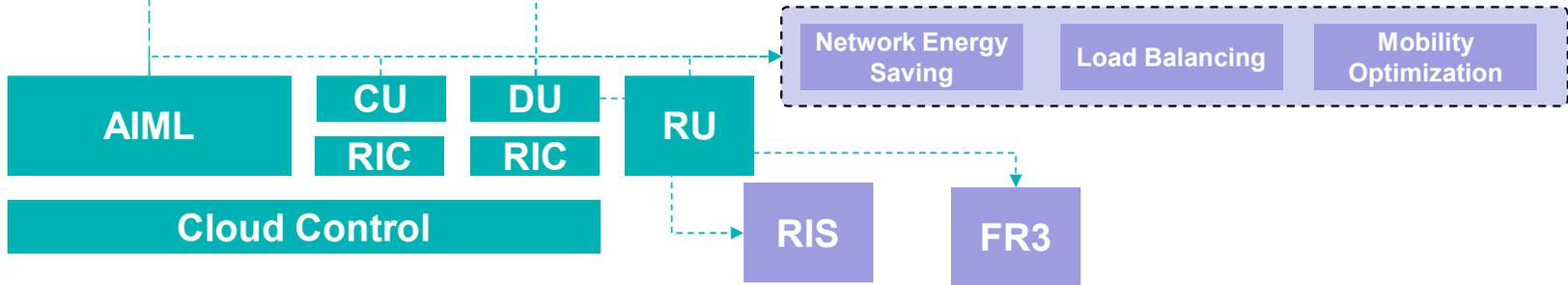
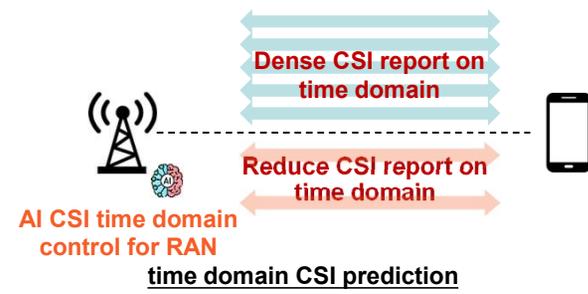
ITRI focused AI for RAN



Beam Prediction

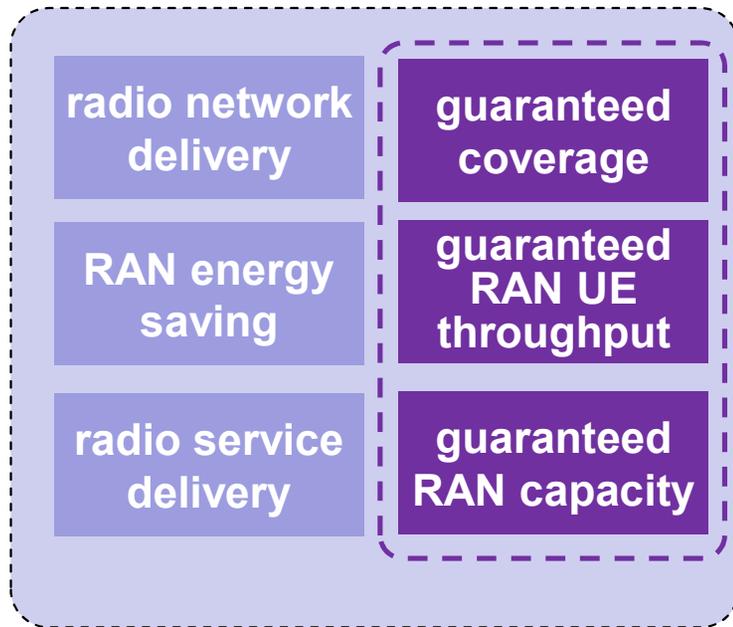


CSI: Channel State Information

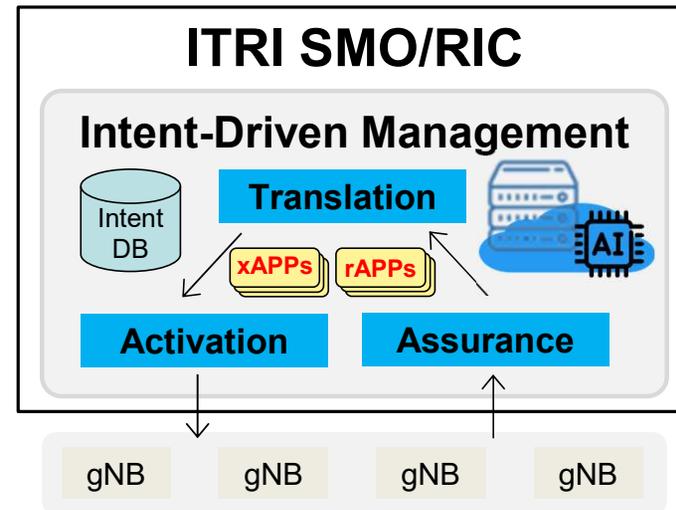


AI for SMO (Intent-based Network Management)

“Intent driven management” as defined in R18 (TS 28.312).



ITRI has been engaged in the research and development of **coverage performance**, **RAN UE throughput performance**, and **RAN capacity**.

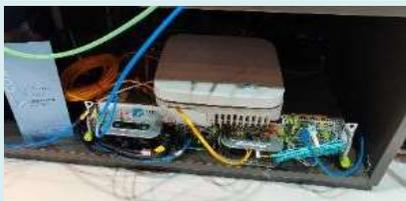


Service Management and Orchestration

6G Technology Prototyping

FR3 Array Antenna / NTN (with MediaTek)

- The world's first LEO satellite broadband streaming experience joint demo with MediaTek and Rohde & Schwarz in MWC 2024.
- Allow cars or future terminal devices to receive HD video streaming with DL 100 Mbps in the future.



6G-SANDBOX RISFORCE

- The winner of 6G-SANDBOX Open Call 2.
- The first 6G-SANDBOX & RISFORCE joint demo in 2024 EU-Taiwan 6G SNS Joint Workshop.



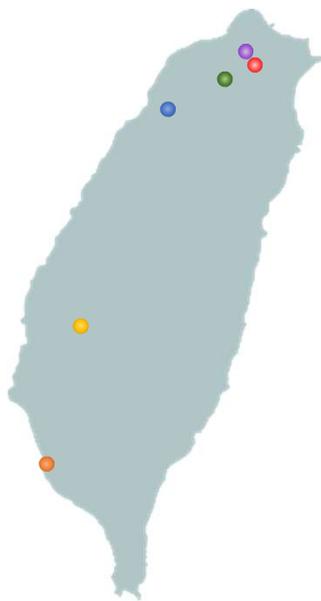
6G-SANDBOX Testbed



- The 1st 6G-SANDBOX oversea testbed.
- ISAC Live Demo with 6G-SANDBOX in 2024 EU-Taiwan 6G SNS Joint Workshop.

Program for 6G Advanced Research (NSTC 2022-2027)

Universities participate in the program



Key Technologies Development

Sub-THz Transceiver Circuits/Systems

B5G/6G Communication Software Technology

Intelligent 3D network

Development of Open-source B5G/6G Core Networks

Large Scale mmWave RIS Development

RIS-aided FR3 Massive MIMO System

4-D Sub-THz Radar System

University Participation in 3GPP Standard Meetings

Prototype Platform

LEO Satellite NTN Communications Prototype

Open Integrated Optical/Wireless Prototype

AI enabled Open CN-RAN Integration Prototype

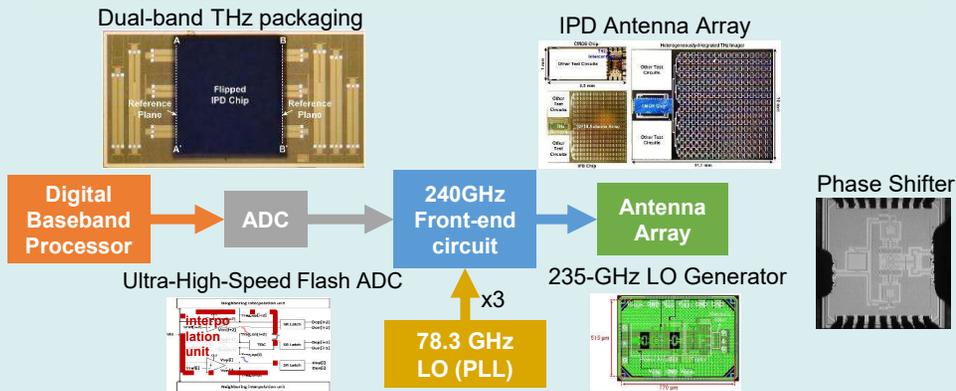
RIS Management Prototype

FR3 MIMO Antenna System Prototype

6G Key Technology Researches from Universities

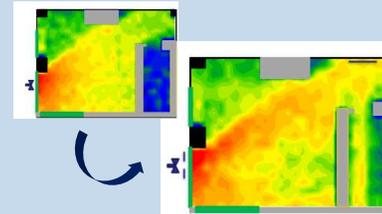
Source: Program for 6G Advanced Research, NSTC

Integrated Transceiver Circuit for Sub-THz/THz Communication



Reconfigurable Intelligent Surface (RIS)

Large-scale mmWave RIS



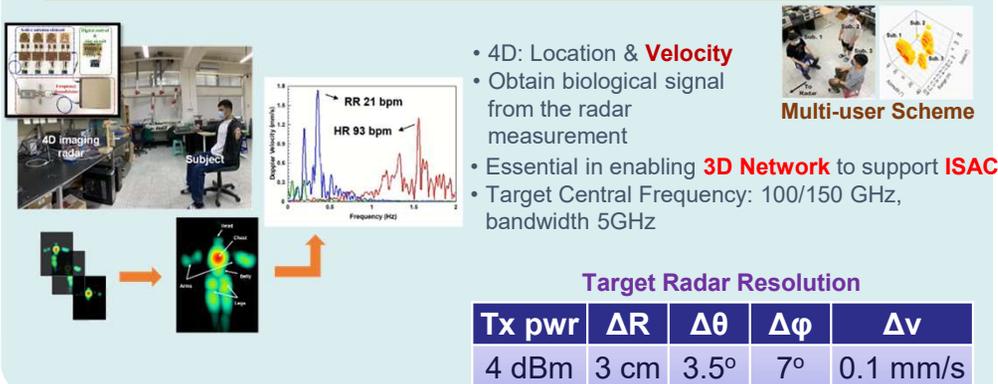
Use large scale RIS to enhance mmWave MIMO beamforming coverage and automatically detect the direction of incoming signal

RIS-Aided FR3 MIMO System



Use small scale RIS to enhance upper mid-band MIMO performance by improving the richness of the environment multipath

4D Sub-THz/THz Radar System



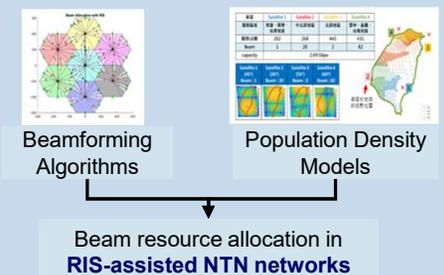
LEO Satellite/NTN Communications

Low Earth Orbit Satellite Simulation Platform System



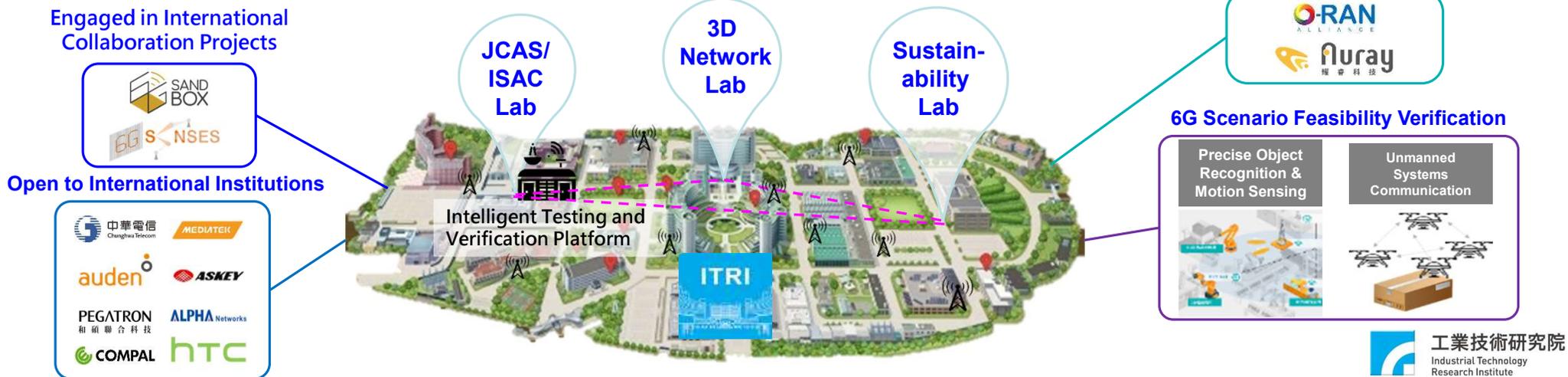
Planning end-to-end network architecture development from ground-based transceiver systems to satellite communication payloads, regardless of UAV simulations.

RIS-assisted beamforming techniques for B5G/6G satellite communication



6G Trial Network

- Network Behavior Diversity: Offices, Dorms, Sports Fields, Restaurants, etc.
- Three 6G Labs: 6G Network Element Testing → Campus Real Environment Validation → 6G Scenario Verification
 - Labs: JCaS/ISAC Lab, 3D Network Lab, Sustainability Lab
 - Scenarios: Precise Object Recognition & Motion Sensing, Unmanned Systems Communication Collaboration
- Key Areas for Collaboration
 - 6G Network Element Integration Testing & OTIC Certification
 - Joint 6G Project Collaboration
 - Showcasing 6G in Cross-Regional Applications



6G International Collaboration

■ Open

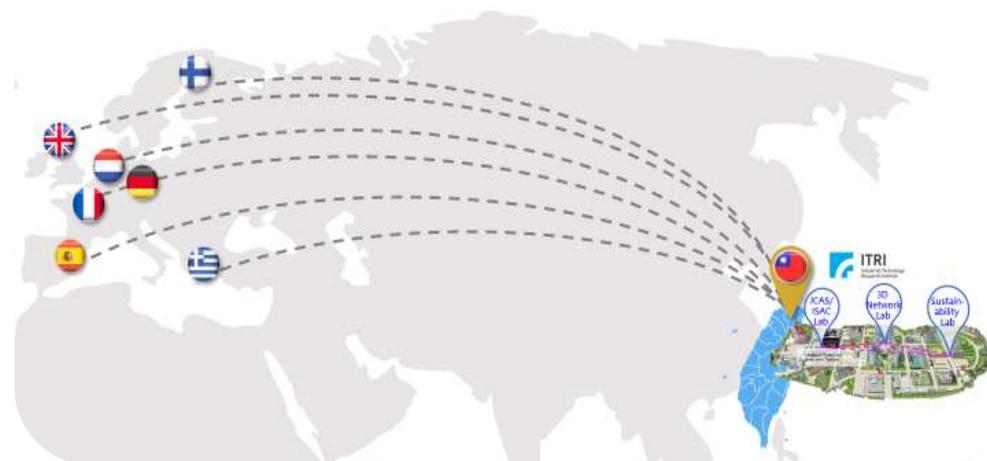
- Welcomes domestic/international partners for testing and validation
- Promotes collaborative innovation by providing an open platform for various technologies

■ Green

- Energy-efficient 6G systems including channel integration validation and generative testing environments
- Focus on spectrum efficiency and emerging network element power optimization

■ Intelligent

- Large-scale network digital twin enabling real-world's sandbox simulations
- Multi-gateway supporting 6G/5G/WiFi/NTN/IoT scenarios, ensuring seamless switching, offloading, and QoS across diverse networks



Current Partners				
Potential Partners				

6G Collaboration Opportunities

- 5G Open-RAN Eco-system is ready in Taiwan
 - Trusted and Agile Supply Chain
 - Vertical Application Fields (Sandbox for innovation)
 - Great Benefits to our global partners
- 6G R&D and Trial Network
 - Defining Use Cases
 - Exploring Core Technologies
 - Building Collaborative R&D Team
 - Seeking **Global Partners**



Questions and Comments?

About ITRI



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