



Global Value-Driven 6G Investment Strategy

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A portrait of Aki Nakao, a middle-aged man with dark, wavy hair, wearing a dark blue suit, white shirt, and a blue patterned tie. He is standing and looking slightly to the right of the camera.

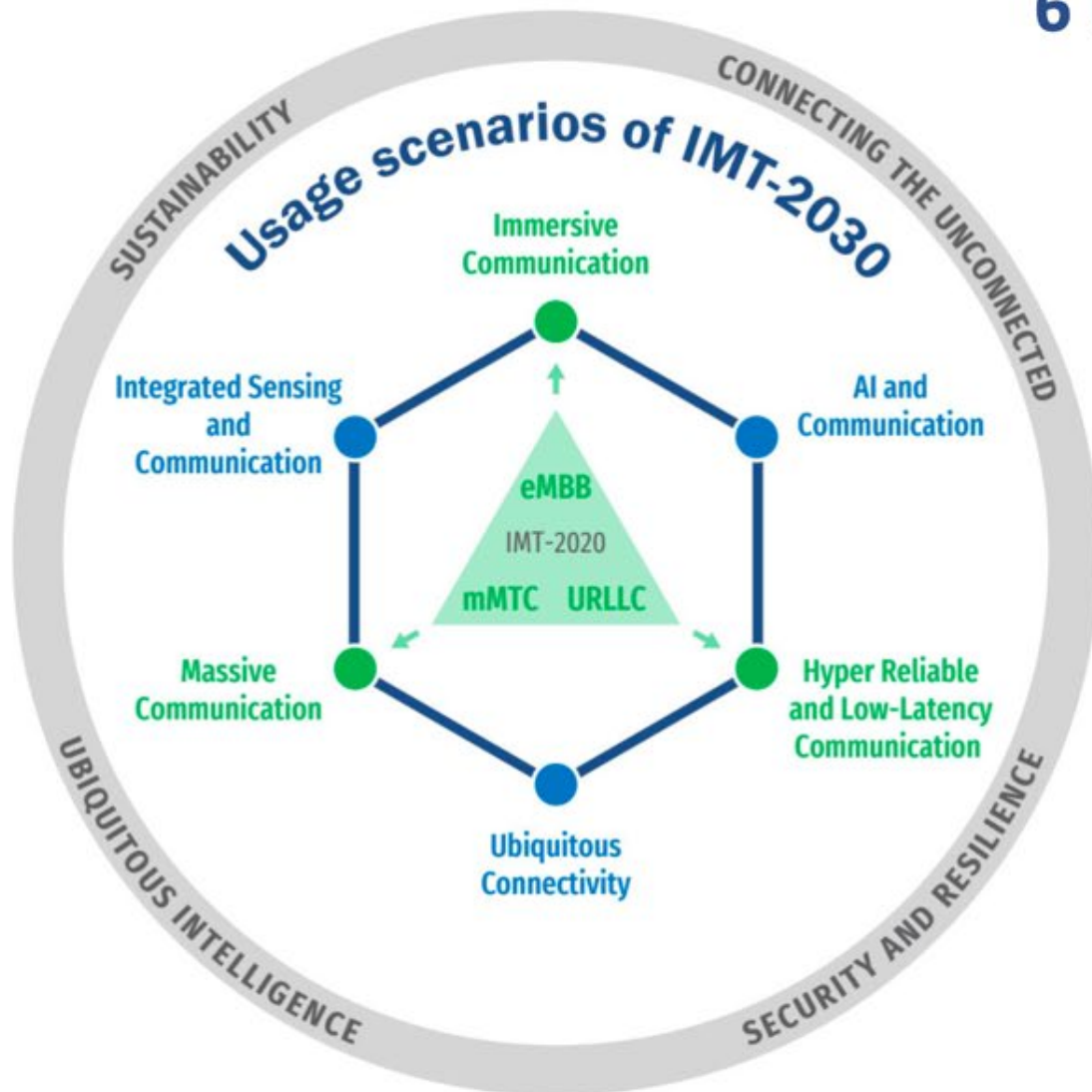
Aki Nakao

- Professor, Department Head of Systems Innovation, School of Engineering, the University of Tokyo
- Special Advisor to the President of the University of Tokyo
- Director of Next Generation Cyber Infrastructure Institute, the University of Tokyo
- Member of Science Council of Japan
- Co-Chairman of XGMF
- President of Communication Society of IEICE
- Program Officer of CRONOS (JST)
- Chairman of 5G/Beyond5G Committee of Space ICT Forum
- Community Informatization Adviser to the Ministry of Internal Affairs and Communications, Japanese Government
- Chairman of Local5G Promotion Research Group
- Founder of FLARE SYSTEMS

Abstract

Next-generation cyber infrastructure is a societal foundation essential for human safety, security and socio-economic activity, and its upkeep and renewal demand a sustainable investment strategy. In this presentation, we discuss the importance of R&D and social implementation toward building a sustainable next-generation cyber infrastructure by making selective, concentrated investments driven by globally shared values underpinned by international standardization

Usage scenarios



So called "Wheel diagram"

Source: Document 5/131 and edited in SG 5

6 Usage scenarios

Extension from IMT-2020 (5G)

eMBB → Immersive Communication

mMTC → Massive Communication

URLLC → HURLLC (Hyper Reliable & Low-Latency Communication)

New

Ubiquitous Connectivity

AI and Communication

Integrated Sensing and Communication

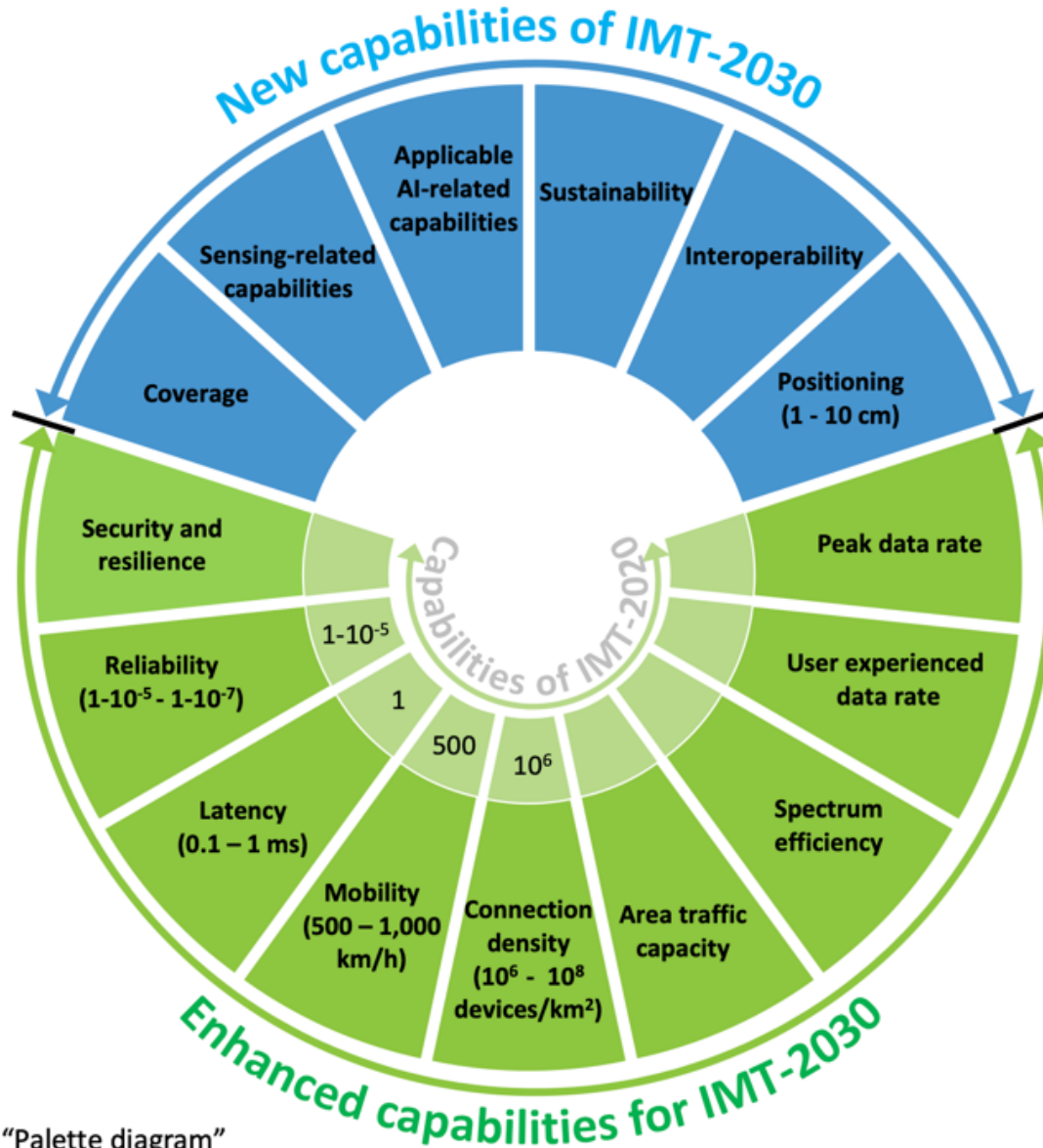
4 Overarching aspects:

act as design principles commonly applicable to all usage scenarios

Sustainability, Connecting the unconnected,
Ubiquitous intelligence, Security/resilience

IMT2030 Usage Scenarios

Capabilities of IMT-2030



The range of values given for capabilities are estimated targets for research and investigation of IMT-2030.

All values in the range have equal priority in research and investigation.

For each usage scenario, a single or multiple values within the range would be developed in future in other ITU-R Recommendations/Reports.

So called "Palette diagram"

IMT2030 Capabiliteis

XGMF



5G Mobile Communications
Promotion Forum (5GMF)



Beyond 5G Promotion
Consortium (B5GPC)

Incorporated

From April 1, 2024

XG Mobile Promotion Forum
(XGMF)



<https://xgmf.jp/en/>

Co-chair

Prof. MORIKAWA, Hiroyuki (The UNIVERSITY OF TOKYO)
Prof. NAKAO, Akihiro (The UNIVERSITY OF TOKYO)

Number of members: 192 (as of May 22, 2025)

XGMF's Goals in International Relationship

- **Sharing 5G/6G Global information**

Gathering global information on 5G deployment, 6G technology development, understanding trends and landscape, etc., and disseminating the 5G/6G information in Japan.

- **Strengthening international coordination**

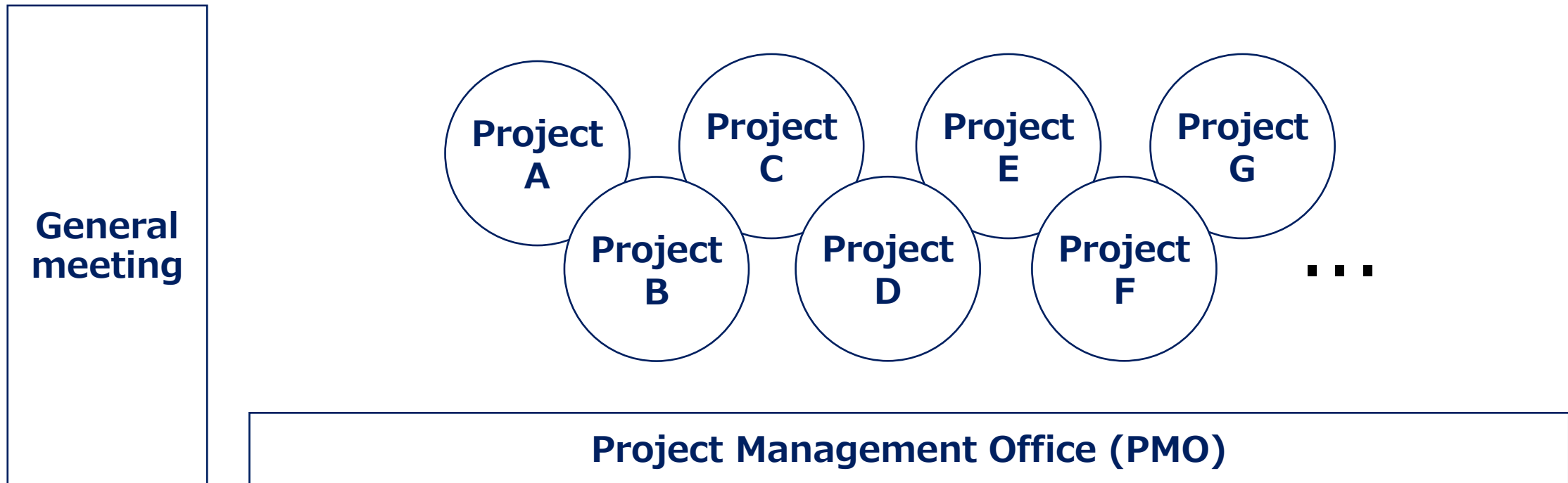
Building consensus in pre-standardization activities in preparation for the full-scale launch of 6G standardization activities

- **Promoting international industry-academia collaboration**

Building a human resource network for international industry-academia collaboration, such as organizing 5G/6G events and academic conferences in Japan and overseas.

XGMF organizational structure

- **Project : Unit of activity established based on XGMF member proposals for each mission**
- **The Project Management Office (PMO) : Supports project activities and makes decisions on general Forum management matters**




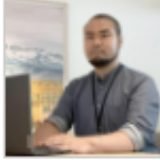




















★**General meeting: Decision-making body for important matters (business plans, income and expenditure accounts, election of directors, etc.)**

XGMF Projects

Currently 22 projects on 6G, mmWave, Local 5G, NTN, verticals, ...

Project List

 NTN Promotion Project Leader: TOYOSHIMA, Morio NICT	 6G Promotion PJ Leader: NAKAMURA, Takehiro NTT DOCOMO	 Planning for a city-sized large-scale living laboratory Leader: NISHIMURA, Hiroki, NEC	 Creation of 5G × OT business use cases for industry Leader: ISHII, Takanori SOFTBANK Corp.
 6G Network Architecture Project Leader: IWASHINA, Shigeru NTT DOCOMO	 6G Radio Technology Project Leader: OHTSUKI, Tomoaki Keio University	 Terahertz Wave Wireless Technology Project Leader: HOSAKO, Iwao NICT	 XG-Supply Chain Management Project Leader: NATSUME, Shinobu Gems Co., Ltd.
 StarNet Earth Leader: TAKAHASHI, Madoka NIPPON TELEGRAPH AND TELEPHONE CORPORATION	 Agriculture × XG Project Leader: KANO, Kayo ON BOARD Co., Ltd.	 Local 5G Licensing Process Shortening Project Leader: MASHIYAMA Daishi NTT East	 Updating the Future of Manufacturing (factories, etc.) × XG Leader: KAMATA, Naomi ON BOARD Co., Ltd.
 Greedy Multi-Tasking Displays Leader: SAKUMA, Morika inciri Inc.	 Social Ed-Tech for Individuality and Diversity Leader: ONIZAWA, Miho inciri Inc.	 Space-Time Synchronization Project Leader: IDO, Tetsuya NICT	 Project for realization of cross-industry orchestration Leader: ISHIZU, Kentaro NICT
 ODAIBA IX Core Leader: IWANAMI, Gota INFOCITY, Inc., NAKAMURA, Takehiro NTT DOCOMO	 The Social Infrastructure in the Decreasing Population Era Co-leader: NAGATA, Satoshi NTT DOCOMO, IIZUKA, Rumi Multimedia Promotion Center	 Project on creation of mechanisms for linking technology with social and economic value Leader: HASEGAWA, Fumiki Mitsubishi Electric Corporation	 OSHIKATSU x 5G (millimeter wave and local 5G) Leader: YOSHII, Daijiro Murata Manufacturing Co., Ltd.
 Space × Ground Use Case Study Project Leader: FUJIMOTO, Koichiro NEC	 Local 5G testbed for smart manufacturing Leader: SAKAMOTO, Yosuke NEC		

6G Projects



NTN Promotion Project

Leader: Morio Toyoshima NICT

Subleaders: TSUDA, Yuya SOFTBANK Corp.



6G Promotion PJ

Leader: NAKAMURA, Takehiro NTT DOCOMO

Subleaders: KISHI, Yoji KDDI Research
Kashima, Tsuyoshi Ericsson Japan
SHIROTA, Masakazu Qualcomm Japan

Advisor: NAKAO, Akihiro The University of Tokyo



6G Network Architecture Project

Leader: IWASHINA, Shigeru NTT DOCOMO

Subleaders: KUWABARA, Takashi FUJITSU
TAKAHASHI, Hideaki Nokia Solutions and Network Japan

Advisor: NAKAO, Akihiro The University of Tokyo



6G Radio Technology Project

Leader: OHTSUKI, Tomoaki Keio University

Subleaders: SUYAMA, Satoshi NTT DOCOMO
KANNO, Issei KDDI Research



Terahertz Wave Wireless Technology Project

Leader: HOSAKO, Iwao NICT

Subleaders: KAWANISHI, Tetsuya Waseda University
SHOJI, Yozo NICT



Space-Time Synchronization Project

Leader: IDO, Tetsuya NICT

Subleaders: HARA, Motoya NICT
SHIGA, Nobuyasu NICT

Global Collaborations

Collaboration partners



5G ACIA



WWRF



Indonesia 5G Forum



IMT-2020(5G) Promotion Group



5GTR Forum



NBTC



5GAA (LOI)



MTSFB



FFPA



IMT-2030(6G) Promotion Group



6G Forum



Open6G



6G Flagship



6G Platform Germany



Bharat 6G Alliance



TNO



6G-IA

To be collaboration partners



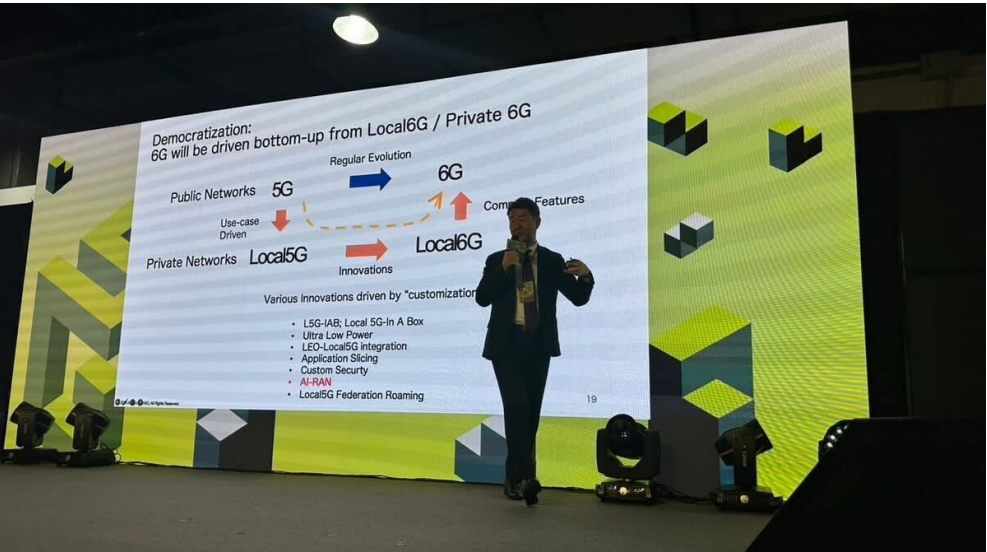
XGMF's International Collaborations with Partners



Mobile Korea 2024



CEATEC International Conference 2024



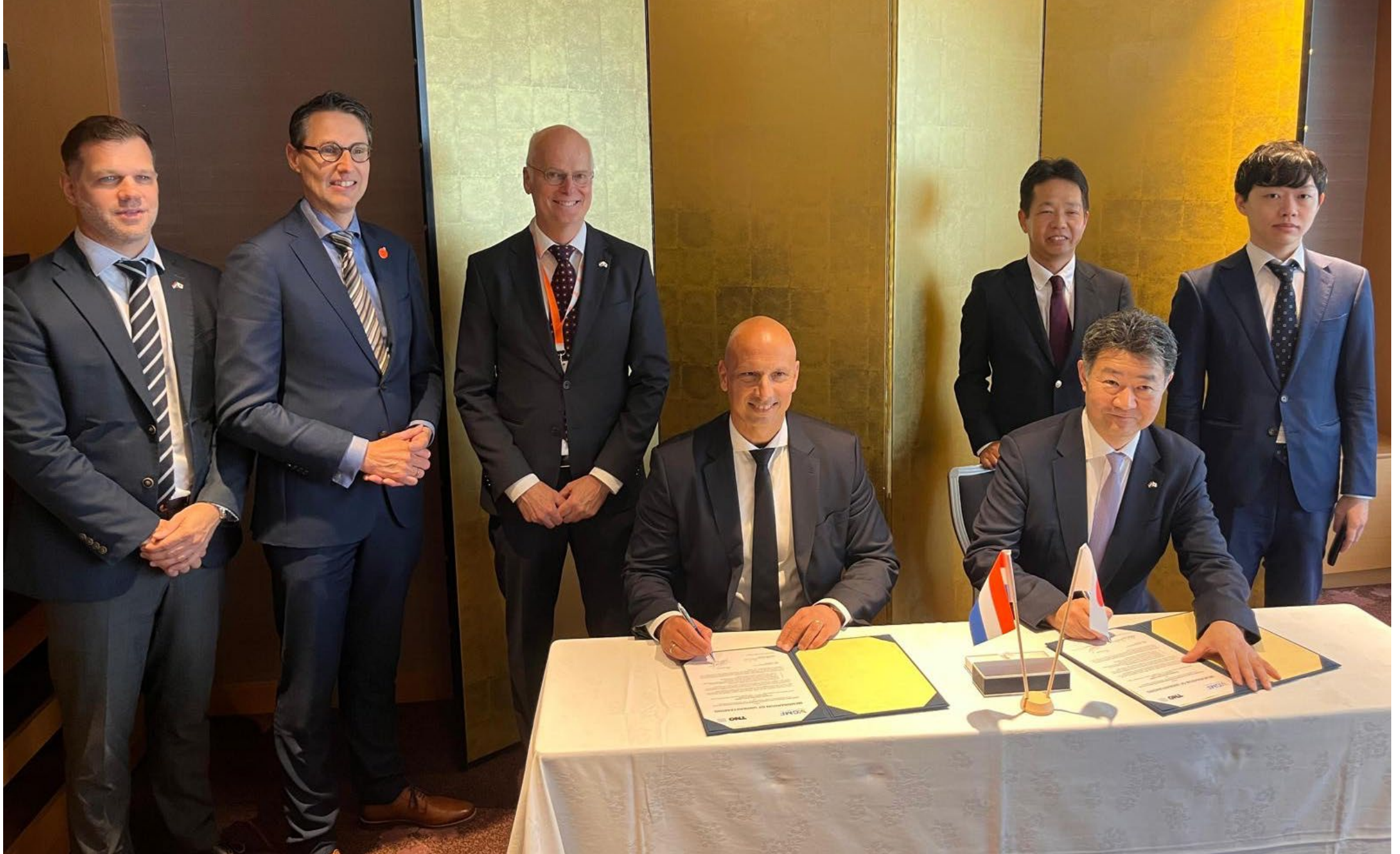
Private 5G Event in Taiwan 2024



Berlin 6G Panel 2024



MoU with TNO/FNS in Osaka, 2025/5/28 13



MoU with TNO/FNS in Osaka, 2025/5/28

MoU signed with 6GIA



2025/5/27@NTT Docomo ODAIBA Open Lab₁₅

Why do we value international collaboration?

Japan

Priorities



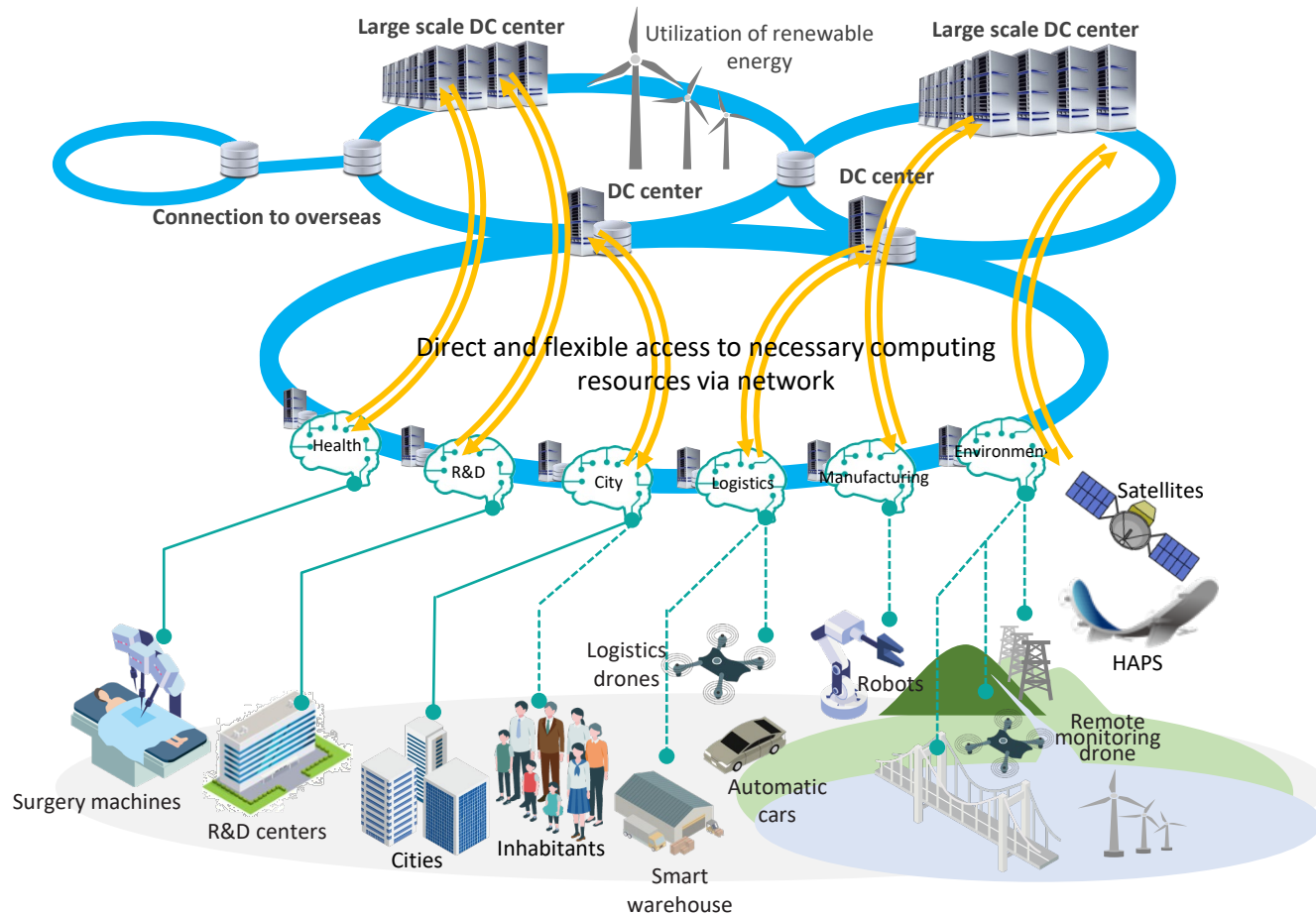
Other Regions

Priorities

Sharing Wisdom
Divide and Conquer
Standardization
(for cost efficiency)

Alignment makes impact

Digital Infrastructure That Will Support AI Society in the 2030s



A next-generation information and communication infrastructure (**Beyond 5G**) should be **connecting extensively**

- **a wide variety of users,**
- **objects and sensors,**
- **numerous small and distributed AIs** specialized in individual fields,
- **and computing resources,** such as **data centers** where **renewable energy** can be utilized

on multi-layered network (**RAN** and **NTN**) and **all-photonics network (APN)**.

Accelerate innovation that resolves social issues

by providing green, safe, secure, and reliable AI to the entire society through Beyond 5G!

Three Strategic Areas of Beyond 5G Promotion Strategy 2.0

All-Photonics Network (APN) field

- Support for **R&D, testbed development** and **standardization** toward 2030.

Non-Terrestrial Networks (NTN) field

- On **HAPS**, system development for **2026 introduction** in Japan, and support for **R&D**.
- On **satellite communications**, system development for smooth **introduction of globally provided services** in Japan, and support for **R&D**.

Radio Access Network (RAN) field

- Expand utilization of **Sub-6 GHz, millimeter waves**, and **Stand Alone (SA)**.
- Promote **R&D to secure frequencies** to meet the future growth of traffic demand, **upgrade RAN**, and further **utilize high frequencies**.

Beyond5G/6G Technologies Related XGMF Projects

NTN



NTN Promotion Project

Leader: Morio Toyoshima NICT



6G Promotion PJ

Leader: NAKAMURA, Takehiro NTT DOCOMO

6GP

APN



6G Network Architecture Project

Leader: IWASHINA, Shigeru NTT DOCOMO



6G Radio Technology Project

Leader: OHTSUKI, Tomoaki Keio University

RAN

THz



Terahertz Wave Wireless Technology Project

Leader: HOSAKO, Iwao NICT



Space-Time Synchronization Project

Leader: IDO, Tetsuya NICT

STS

Synergy among 6G related projects is being developed.

Key Strategic Actions for International Collaboration on 6G

- **Accelerate International Collaboration**

- Advance global joint research initiatives.
- Strengthen academia-industry partnerships internationally.

- **Strategic Investment in Beyond 5G/6G**

- Align funding with societal needs and global challenges.
- Invest in international cooperation and innovation.

- **Unified Ministry Coordination**

- **MIC & METI:** Primarily focus on industry promotion and partnerships.
- **MEXT/JST:** Primarily focus on talent cultivation and global mobility