2nd Japan-UK Advanced Connectivity Technologies Innovation Forum Report

Co-organised by NICT and UKRI-EPSRC with support from MIC and DSIT

6 March 2026 | London, UK

Contents

Background and purpose of the workshop

The 2nd UK–Japan ACT Innovation Forum convened more than 100 participants[1], from government, academia, and industry to advance collaboration in AI for digital networks, non-terrestrial networks (NTN) and optical/photonics-based communication systems. Building on the discussions and outputs from the 1st Innovation Forum in Tokyo, the 2nd forum further examined emerging technological challenges, opportunities for bilateral innovation, and pathways toward joint standards, testbeds, and deployment. In particular, offered an opportunity for researchers to speak together to develop their project thinking.

The event emphasised growing global pressures on communication infrastructures, including increasing energy consumption, resilience needs, AI integration, satellite expansion, and optical network capacity. UK–Japan cooperation was repeatedly framed not only as mutually beneficial but as essential for remaining competitive in a rapidly evolving global landscape.

Opening Keynotes

Prof. Kaoru Ota (Tohoku University) – Resilience Through Integrated NTN–TN Architectures

Prof. Ota highlighted Japan's unique vulnerability to natural disasters and the corresponding need for highly resilient communication networks. She described three typical failure modes during emergencies: network congestion, partial infrastructure collapse, and complete loss of terrestrial communication. Her team is developing a disaster-response platform integrating terrestrial, satellite, HAPS, and drone-based systems.

The example of Hokkaido's earthquake-induced isolation illustrated the urgency of hybrid terrestrial–non-terrestrial systems, as well as AI-driven resource allocation and multi-layered connectivity.

Prof. Mike Short – Market Drivers, Standards, and Strategic Imperatives

Prof. Short underscored that collaboration must be aligned with real-world market needs. The global mobile ecosystem now supports 8.8 billion connections, and AI has become a fundamental layer across networks, devices, and customer services. Japan's role as a long-standing communication systems innovator was highlighted, as was the strategic risk of failing to keep up with the technological curve.

International standards emerged as a recurring theme: without aligned standards, roaming, security and cost-efficient global systems cannot be guaranteed. He argued that the UK and Japan have successfully collaborated in the past and must now recommit to coordinated innovation across AI, NTN, and optical technologies.

[1] including organisers and secretariat staff

Dr. Hiroaki Harai (NICT) – Japan's Beyond-5G/6G Vision

Dr. Harai provided an overview of Japan's national strategies in Beyond-5G and 6G, citing multi-year policy frameworks and emerging research priorities including AI-driven network automation, optical satellite systems, multicore fibre breakthroughs, and fusion of fixed, wireless, satellite, and computing networks.

He emphasised that UK–Japan collaboration should function as a "sibling relationship," prioritising knowledge exchange, joint testbeds, and global leadership in standards and next-generation architectures.

Panel 1: AI for Telecoms and Digital Networks

The first panel focused on AI's transformative influence on telecom operations, infrastructure design, network efficiency, and user interaction.

Japan's Contributions

Japanese participants described AI as operating across three interconnected dimensions:

- as an **application layer** via datasets and services
- as a **management tool** to operate increasingly complex networks
- as an **embedded component** of future network technologies

Their priorities included trusted AI data, low-compute-cost models, open data, and cross-domain resource allocation. Japan's strong mathematical foundations and experience with AI for connectivity were highlighted.

UK Contributions Panellists from the UK emphasised that AI is now indispensable for meeting sustainability goals, ensuring network resilience, and supporting economic growth. A speaker from industry outlined the growing use of AI for cybersecurity, automation, and anomaly detection. From an academic perspective, AI-driven systems must remain explainable, auditable, and secure, noting risks associated with AI-generated content, rogue chatbots, and data reliability.

Challenges Raised

- Difficulty testing AI systems due to proprietary models
- Lack of specialists combining telecom engineering and AI/data science
- The rise of agentic AI generating large machine-to-machine traffic loads
- Early need for AI auditability and human-in-the-loop safeguards

One-Year Vision

Speakers from both countries expressed a desire for practical outputs rather than theoretical work: small but deployable demonstrators, shared testbeds, and frameworks that shape global standards.

Panel 2: Non-Terrestrial Networks (NTN)

This panel explored the growing importance of NTN systems, spanning satellites, LEO constellations, sensing, HAPS, and integrated terrestrial–non-terrestrial architectures.

UK Contributions

One of the speakers compared satellite communication as a “jigsaw puzzle” requiring global collaboration. Their technologies are deployed in hundreds of satellites and benefit from UK and Japanese strengths in chip design, hardware acceleration, and signal processing.

A representative from academia talked about global-scale measurement of Starlink performance and research on efficient Earth observation from LEO satellites - critical for disaster response and maritime services.

Japan’s Contributions

A contributor from industry emphasised the societal value of NTN, especially in rural or mountainous regions. Their focus is on satellite-first approaches, with potential future integration into drones or HAPS systems. The academic contributor reiterated the need for field trials and suggested new industry stakeholders like insurers could support deployments.

Technical Themes

Key issues discussed included bandwidth limitations, multi-layered NTN structures, amplifier linearisation, interference and waveform cancellation, cooling challenges in space, timing/positioning technologies, GaN semiconductor applications, and satellite - HAPS handover.

Regulatory and Strategic Issues

Satellite capacity and spectrum constraints were highlighted as core challenges. Participants stressed that space regulation is currently trailing behind deployment, reinforcing the importance of international cooperation.

Shared One-Year Priorities

UK priorities included TN - NTN integration, space-edge computing and open infrastructures. Japan emphasised applications for ageing communities and disaster management. Shared goals included joint field trials, common standards proposals, and strengthened ESA – JAXA - UKRI collaboration.

Panel 3: Optical Networks and Photonics

The final panel addressed optical communications, photonics and the technological foundation for future high-capacity, energy-efficient networks.

UK Contributions

The academic contributor described the UK’s innovations in hollow-core fibre, optical amplification, terahertz techniques and photonic-electronic integration. The UK’s photonics industry was noted as larger than its pharmaceutical sector, with strong routes to commercialisation through spinouts and licensing.

An industry representative explained its work on optical switching to replace electronic switches, with ongoing prototypes developed with BT and datacom partners. Their goal is to scale through partnerships and support energy reduction in data centres.

Japan's Contributions

A participant from Japan described IOWN Global Forum's leadership, which includes more than 180 companies across 10 countries. Additionally, Japan is driving the development of the All-Photonics Network (APN), new photonic switching technologies, and quantum-ready network architectures. Japan is expanding AI/optical datacentre facilities and sees APN as foundational for future high-responsibility AI infrastructures.

Shared Technical Themes

Participants discussed the need for future-proof optical networks that can handle rising capacities and coexist with quantum systems. Photonics was repeatedly described as the foundational technology enabling both classical and quantum communication. The panel touched on inter-satellite optical communications and the challenges of long-distance laser transmission (e.g., Earth–Moon links).

One-Year Vision

Speakers from both countries agreed that the next year should prioritise joint demonstrations, reduction of energy consumption in data centres, complementary R&D on multicore fibre and amplifiers, shared testbeds linking UK and Japanese facilities, and deeper UK engagement in IOWN.

Plenary Reflections

Plenary speakers reinforced the essential role of resilience, shared data systems, and collaborative experimentation. Speakers highlighted AI as a critical mechanism for rapid response during disasters, while others emphasised the value of shared datasets and frameworks. Other potential areas for collaboration included linearisation of amplifiers, integration and convergence of satellite systems, and reconfigurable intelligent services. Contributions stressed the importance of energy-efficient digital/analogue systems and advanced wireless domains. The need for governance frameworks was raised to ensure that AI-driven decisions do not create socio-economic risks.

Cross-Cutting Observations

Across sessions, several common themes emerged:

- **Resilience** was a universal priority, spanning AI, NTN and optical networks.
- **Standards** are essential for interoperability, trust and cost-efficient deployment.
- **Energy efficiency** was a recurring concern, especially in AI-heavy and data-centre environments.

- **Testbeds** are central to progress; both nations recognised the value of shared UK–Japan facilities.
- **Quantum convergence** will reshape optical and network architectures, requiring early preparation.
- **Complementarity** between UK and Japan is strong in photonics, AI, satellites, automotive and disaster management.
- **Practical, deployable outcomes** were emphasised over purely theoretical research.

Conclusions and next steps

The 2nd UK–Japan ACT Innovation Forum demonstrated clear strategic alignment and strong momentum across AI, NTN, and Optical Network research. With complementary strengths, shared societal challenges, and aligned national priorities, the UK and Japan are well positioned to shape global standards and lead next-generation communication technologies. In addition, participants highlighted the importance of developing future skills and talent, combining complementary strengths such as Japan's strong mathematical foundations and the UK's expertise in areas like Open RAN, while attracting and nurturing the next generation of researchers and engineers.

The discussions confirmed that future connectivity demands integrated terrestrial, non-terrestrial, optical and quantum systems with computer science consideration, underpinned by AI. Both countries expressed a commitment to continued collaboration, joint testbeds, shared use cases, and practical deployments that advance resilience, sustainability, and global innovation.

In terms of next steps, the Prime Ministers of Japan and the UK announced in February a £6m joint research programme, with each side contributing £3m. Our current planning assumption is that we will run a single joint funding call in 2026. This is subject to final budget confirmation within our respective organisations.

Appendix: Technical Discussion Highlights

This appendix summarises the key technical discussion points that emerged across the forum sessions. While the main body of the report provides a consolidated narrative, this section highlights the underlying technical themes that shaped the discussions and informed future collaboration opportunities.

A.1 AI for Telecoms and Digital Networks

Discussions on artificial intelligence consistently positioned AI not merely as an application-layer technology, but as an **integrated and foundational component of future communication networks**. Participants converged on a shared three-layer perspective of AI deployment:

- AI applied through datasets and services at the application level
- AI as a tool for managing and operating increasingly complex networks
- AI embedded within future network technologies themselves

A strong emphasis was placed on the **integration of AI and cybersecurity**, particularly the need for explainability, auditability, trust, and human-in-the-loop mechanisms. Participants highlighted emerging challenges associated with **agentic AI**, including the traffic it may generate, its implications for security, and its impact on network reliability.

Across both UK and Japanese contributions, there was broad agreement that progress in this domain requires **practical validation through proof-of-concept activities and shared testbeds**, rather than purely theoretical research. Deployable demonstrations and interoperable frameworks were viewed as essential precursors to standardisation and wider adoption.

A.2 Non-Terrestrial Networks (NTN)

The NTN discussions focused strongly on **societal and operational use cases**, with disaster response emerging as a central theme. Participants examined architectures integrating terrestrial networks with satellites, HAPS, and unmanned aerial platforms, forming **multi-layered NTN–TN systems** capable of maintaining connectivity under extreme conditions.

Key technical topics included:

- Integration of terrestrial and non-terrestrial networks
- Satellite and HAPS handover mechanisms
- Precise timing and positioning technologies
- Amplifier linearisation, GaN-based devices, and interference mitigation
- Practical implementation challenges such as cooling and reliability in space

Beyond technical considerations, participants underscored the importance of **international cooperation**, including collaboration with space agencies such as ESA and JAXA. Field trials, joint

demonstrations, and coordinated standardisation activities were identified as critical next steps to bridge the gap between research and real-world deployment.

A.3 Optical Networks and Photonics

In the optical and photonics sessions, participants articulated a shared vision for **future-proof communication infrastructures** capable of supporting high capacity, low latency, and reduced energy consumption. The **All Photonics Network (APN)** concept served as a focal point, framing discussions on next-generation network architectures.

Key areas of focus included:

- Photonics-based network architectures and optical switching
- Multicore fibre and advanced optical amplification technologies
- Energy reduction in data centres through photonic integration
- Inter-satellite optical communications and long-distance laser transmission challenges

Participants also highlighted the growing importance of **coexistence between classical and quantum communications**, emphasising that early integration and complementary design approaches will be essential as quantum technologies mature.

A.4 Cross-Cutting Technical Themes

Across all sessions, several cross-cutting technical priorities consistently emerged:

- **Resilience**, particularly in the context of natural disasters and system failures
- **Energy efficiency**, driven by AI-intensive workloads and expanding data-centre infrastructure
- **Standardisation**, to enable interoperability and global scalability
- **Testbeds and demonstrations**, as enablers of practical validation
- **Complementarity between the UK and Japan**, leveraging distinct but synergistic strengths

These themes collectively define the technical foundation for future UK–Japan collaboration and provide a roadmap for joint research, demonstration, and standardisation activities.