Chapter 4

Section1

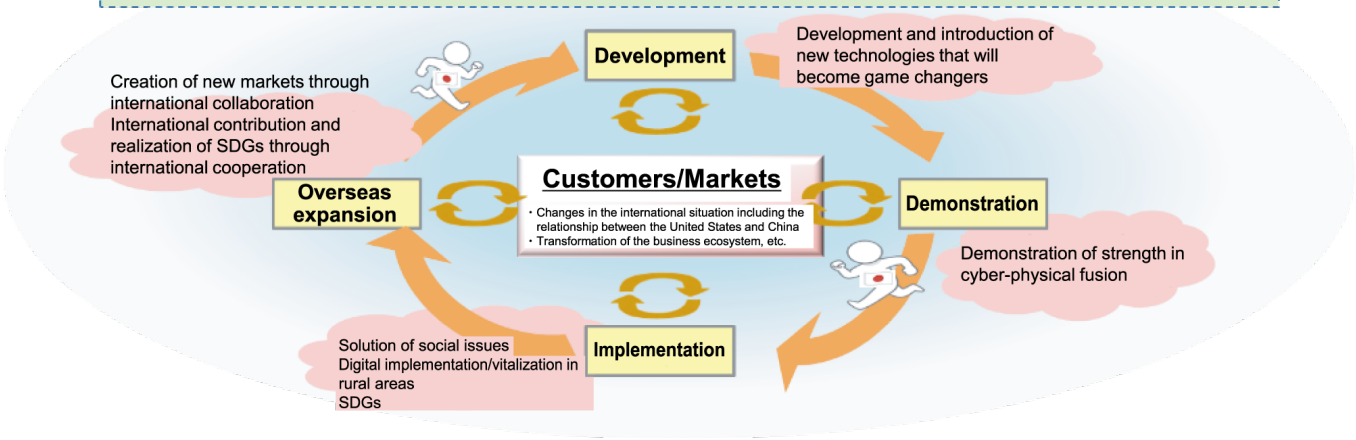
2. Basic approach toward the realization of Society 5.0 (Figure 4-1-2-2 in White Paper)

Information and communications policies to support Society 5.0 and economic security

In order to ensure the independence, existence and prosperity of Japan, we aim to ensure strategic autonomy and to acquire strategic indispensability of the information and communications industry which is playing an increasing role as a strategic core industry.
(1) Advancement and maintenance of information and communications infrastructure that supports Society 5.0
(2) Maintaining and strengthening of international competitiveness of the information and communications industry (R&D, solutions, human resources)
(3) Construction of a free and highly reliable information space

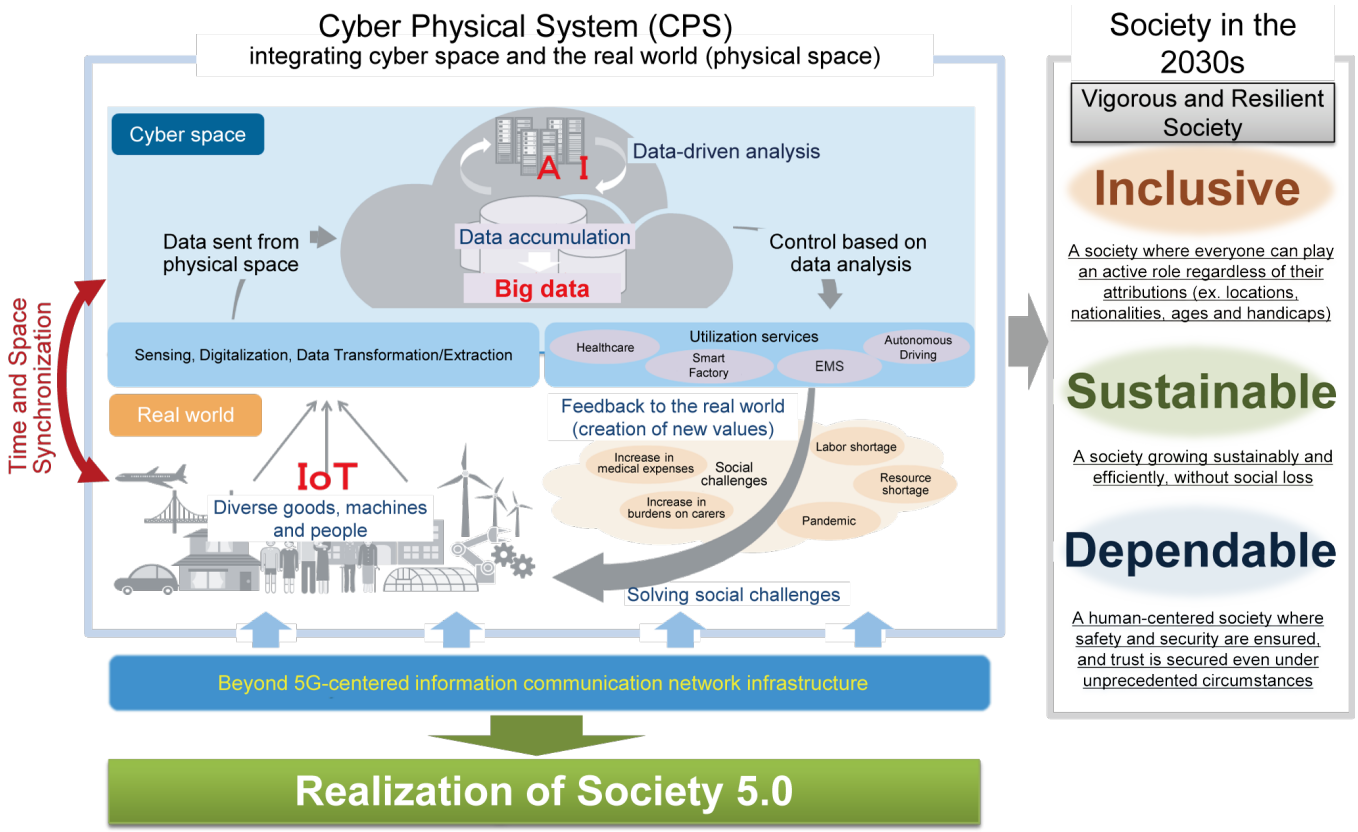
Resilient and vigorous society in the 2030s (Society 5.0)

- ✓ **Inclusive: society where everyone can be active**
- ✓ **Sustainable: society which sustainably growing**
- ✓ **Dependable: society that enables activities with security**



Section7

1. Society expected in the 2030s (Figure 4-7-1-1 in White Paper)



(Source) Beyond 5G Promotion Strategy (MIC in June 2020)

2. Science, Technology, and Innovation Basic Plan (Cabinet Decision in March 2021) for the entire government

Recognition of the Current Situation

Changes in the Situation at Home and Abroad

- ○ Beginning of a reorganization of the world order and increasingly intense leadership competition among countries surrounding science, technology, and innovation (STI)
- ○ Manifestation of global agenda threats such as the climate crisis
- ○ Information monopoly by IT platformers and uneven distribution of great wealth

accelerate

Expansion of the Novel Coronavirus Infection

- ○ Major Changes in the International Community
  - Rapid social changes in order to prevent the spread of the infection and to maintain economic activities
  - Disruption of the supply chain pressing each country to review the sustainability and resilience of its economy
- ○ Rapidly Changing Life in Japan
  - Transition to a new lifestyle such as work-from-home and online education

Review of STI Policies

- ○ Digitalization for digitalization's sake and relative decline in research capabilities
  - Digitalization focuses on improving efficiency of existing operations and the original power of ICT is not being fully utilized.
  - Decline of international standing for research papers and severe research environment continues
- ○ Revision of the Basic Act on Science and Technology
  STI policies should contribute to comprehensive understanding and problem solving of human beings and society through the "convergence of knowledge" that fuses the natural sciences with humanities and social science

Balancing response to global issues with the reform of social structures in Japan is essential

Society That Japan Aims for (Society 5.0)

Sustainable and Resilient Society That Ensures the Safety and Security of the People

Securing Sustainability
- ☐ Realization of a **sustainable global environment** with a focus on achieving the SDGs
- ☐ Realization of a society in which **future generations can live in abundance while satisfying the needs of the present generation**

Securing Resilience
- ☐ Realization of **comprehensive security** against threats such as disasters, infections, cyber terrorism, increasingly severe security environment, and disruption of the supply chain

A Society in Which Each Individual Can Realize Diverse Happiness (Well-Being)

[Realization of Economic Affluence and Qualitative Affluence]
- ☐ Realization of an educational, labor, and employment environment that enables everyone to **develop their own abilities** and **diverse work styles**
- ☐ Realization of an environment that allows people to **participate in society in health throughout their life** in an age of a 100-year lifespan
- ☐ Realization of a society that allows people to continue to have their dreams and **always participate in society with a positive view of their presence**

Incorporate **traditional Japanese values** of trust and sharing into this vision for society and transmit it to the world as **Society 5.0**.

Contribute to the international community and attract global **human resources** and **investment**

What is Necessary to Realize Society 5.0

- Transformation into a sustainable and resilient society through the fusion of cyberspace and physical space
- Creation of "knowledge" as a source of value creation by designing a new society
- Development of human resources to support a new society

Push through social transformation and advance investment looking ahead into the future (knowledge and human resources)

STI Policy for the Realization of Society 5.0

- Draw up policies based on **backcasting** from the future vision and **forecasting** from the current situation while utilizing **convergence of knowledge** and **evidence**, and flexibly improve them through evaluation.
- Aim for a total government R&D investment of approximately 30 trillion yen and a total public and private R&D investment of a pproximately 120 trillion yen.

Transformation into a sustainable and resilient society that ensures the safety and security of the people

(1) Creation of new value through the **fusion of cyber space and physical space**
- Digitalizing the government, launching a Digital Agency, and completing a data strategy (developing a base registry, etc.)
- **Maintaining and developing next generation infrastructure and technologies** for **Beyond 5G**, supercomputers, **space systems**, **quantum technologies**, **semiconductors**, etc.

(2) Advancement of social changes and discontinuous innovation aimed at **overcoming issues on a global scale**
- Promoting R&D to achieve **carbon neutrality** (utilizing funds, etc.) and transitioning to a circular economy

(3) Building of a resilient, **safe and secure** society
- **Identifying and R&D of important technologies** for responding to threats and advancing **social implementation and technology outflow countermeasures**.

(4) Formation of an innovation ecosystem that is the foundation for creating new value-sharing industries
- Advancing an SBIR system and entrepreneurial education, forming start-up hub cities, and strengthening a cocreation system through industry, academia, and government collaboration

(5) Urban and regional development (development of smart cities) as the foundation for succeeding to the next generation
- Creating smart cities and super cities, their nationwide spread through a private collaboration platform, and international deployment at expos.

(6) R&D for solving various social issues, advancement of social implementation, and utilization of convergence of knowledge
- Social implementation through the utilization of convergence of knowledge, **overview** and formulation of evidence-based **national strategies**, and **advancement of R&D**
- Advancing SIP and moonshot R&D, market gain through the utilization of intellectual property and standards, and advancing new science and technology diplomacy

* **AI technologies**; biotechnologies; **quantum technologies**; **materials**; **space**; ocean; **environmental energy**; health and medical care; food; agriculture, forestry, and fisheries; etc.

Demand from society

Injection of knowledge and human resources

Development of frontiers of knowledge and strengthening research capabilities as sources of value creation

(1) Rebuilding the environment to produce diverse and outstanding research
- Improving the treatment of doctoral students and expanding their career paths and securing posts for young researchers
- Promoting active participation of female researchers. strengthening basic research and academic research, and advancing joint international research and international brain circulation
- Strengthening the humanities and social sciences and creating convergence of knowledge (strengthening funding and DX of research in the humanities and social sciences)

(2) Construction of new research systems (promotion of open science and data-driven research, etc.)
- Managing and utilizing research data and acceleration of research utilizing smart labs, AI, etc.
- Maintaining and sharing research institutions, facilities, and equipment and fostering of new research communities and environment cultivated by research DX

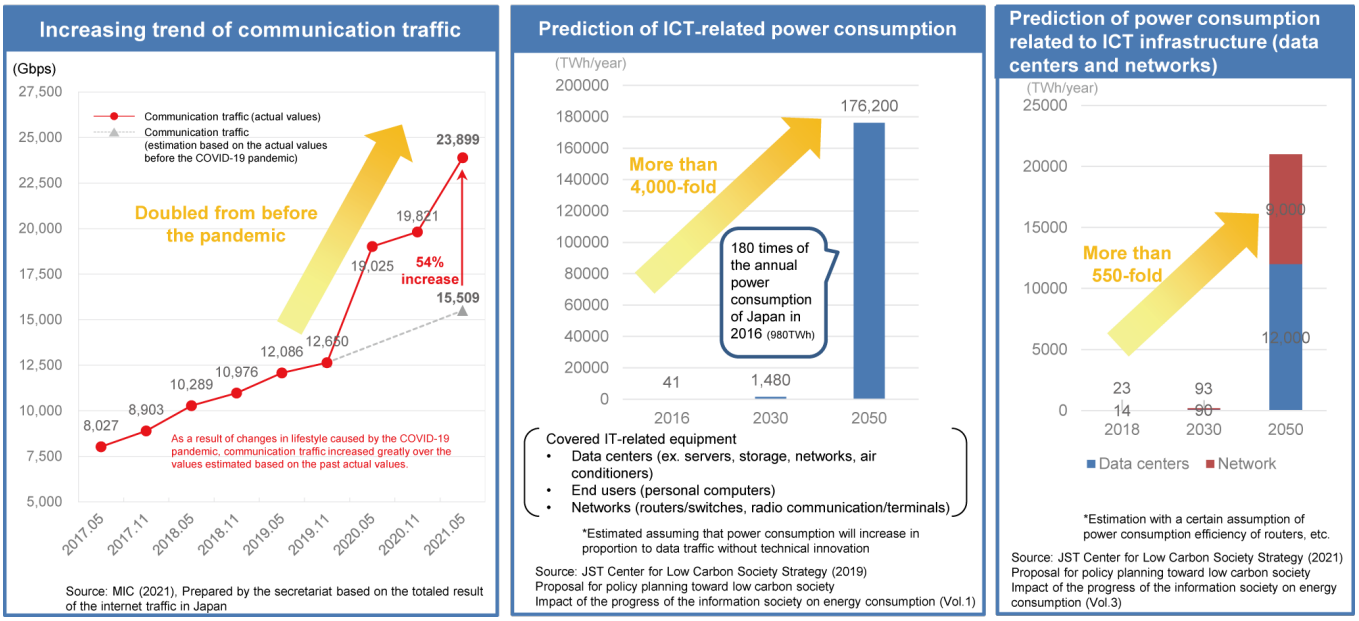
(3) Promotion of university reform and expanding functions for strategic management
- Developing diverse and unique university groups (transition to a true management entities and further growth as research universities that are on par with top international universities)
- Creating a 10 trillion yen university fund

Education and human resource development to realize diverse happiness for each individual and ability to face challenges

Transition to an education and human resources development system that enhances people's ability to explore and attitude to continue learning
- Advancing STEAM education from the elementary and secondary education stage and the GIGA School Concept, and reducing teachers' burden
- Providing diverse curricula and programs at universities, etc. and fostering an environment and culture that promotes recurrent education

(Source) Prepared by MIC from Cabinet Office materials

3. Trends of communication traffic and energy consumption in the ICT sector (Figure 4-7-1-2 in White Paper)

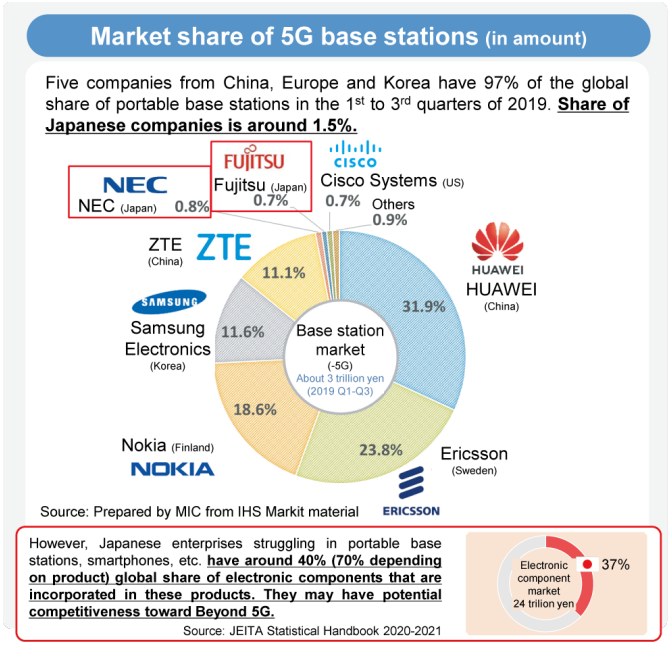


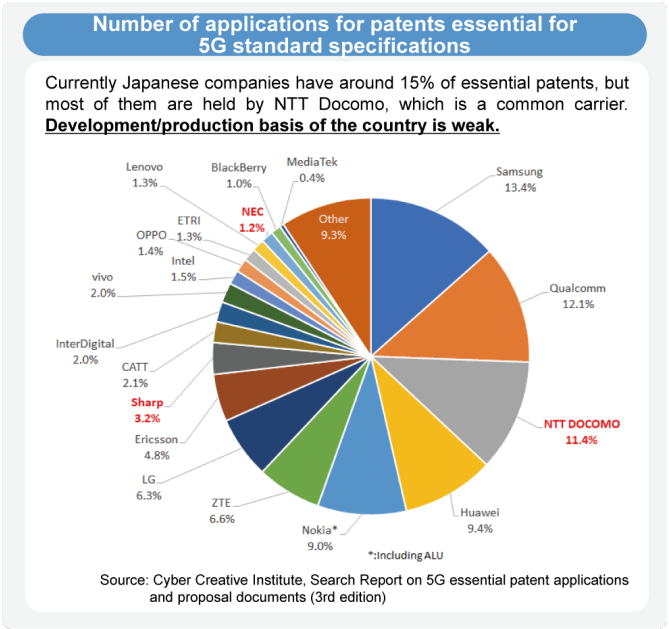
(Source) MIC, the Department of Information and Communications Technology of the Information and Communications Council, materials of the 27th technology strategy committee

4. Beyond 5G R&D by the governments of other countries (Figure 4-7-2-1 in White Paper)

The United States	● **Next G Alliance that is an industry group to promote 6G set up a Roadmap WG and a Green G WG** and started studies to clarify the elements necessary for promotion of 6G and other new technologies and realization of a sustainable ecosystem through new technologies. (March 2021) ● The government expressed **2.5 billion dollar** (4.5 billion dollar in total from Japan and the U.S.) **investment** in the next generation mobile communication network, etc. in the **U.S.-Japan Joint Leaders' Statement** (April 2021) ● **Next G Alliance formulated 6G Roadmap** and recommended government support in three areas: "consistent policy framework for success of 6G", "support for 6G research and development" and "policies to incentivize private investment in 6G" (February 2022) ● Federal Communications Commission (FCC) reorganized the Technological Advisory Commission (TAC) with 6G as a new focus (February 2022). ● National Science Foundation (NSF) announced projects adopted for RINGS that is 6G R&D support partnership (April 2022)
Europe	**EU, Germany and Finland governments invest 1.85 billion Euro (about 240 billion yen) in total in 6G R&D** (as of March 2022)
EU	● 6G R&D project Hexa-X started, funded by Horizon 2020 (from January 2021 to June 2023) ● EU decided **900 million Euro investment in 6G R&D** in the next R&D program **Horizon Europe (2021-2027)** (March 2021) Combined with 1.1 billion Euro from the private sector, SNS JU secured 2 billion Euro (260 billion yen) in total (March 2022) and already made 240 million Euro (31 billion yen) contributions to Work Program (2021 to 2022) (December 2021)
Germany	● Decided to **invest 700 million Euro** in total in 6G technology R&D (2021 to 2025) (April 2021). 250 million Euro (about 33 billion yen) of the amount is invested in construction of 6G R&D hub (June 2021)
Finland	● Started **6Genesis Flagship Program** and budgeted **250 million Euro (about 33 billion yen) in eight years from 2019 to 2026** (May 2018) ● Held the 1st **6G Wireless Summit** (March 2019)
China	● Established a 6G promotion organization 2IMT-2030(6G)" and started 6G R&D (June 2019) ● Released a digital economy plan to enhance 6G R&D as part of the 14th five-year plan (January 2022) ● Tsinghua University announced a success of 1TB/sec transmission experiment at a Beijing Olympic venue (February 2022)
Korea	● Ministry of Science and ICT (MSIT) announced a 6G R&D action plan, including **220 billion won (about 21 billion yen) investment by 2025** (June 2021). ● Started to formulate "the Next-Generation Network Development Strategy" that includes 6G (January 2022) ● Discussed cooperation in ICT including 6G with the United States, Finland and Indonesia (March 2022)

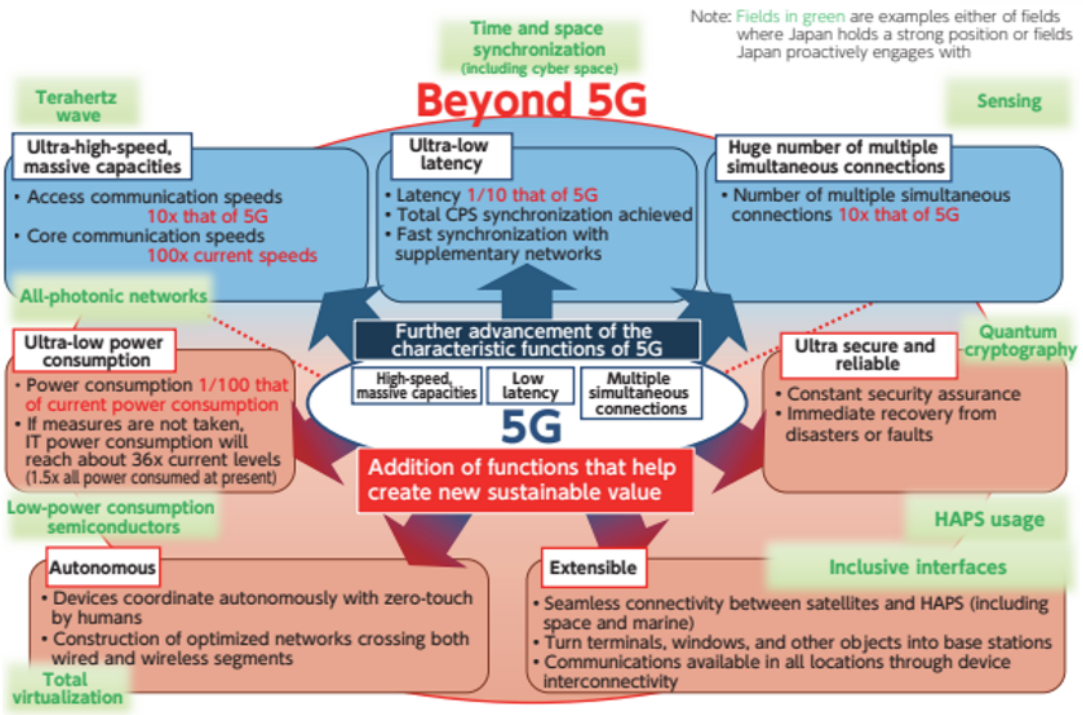
5. International competitiveness of Japan in the communication infrastructure market (Figure 4-7-2-2 in White Paper)





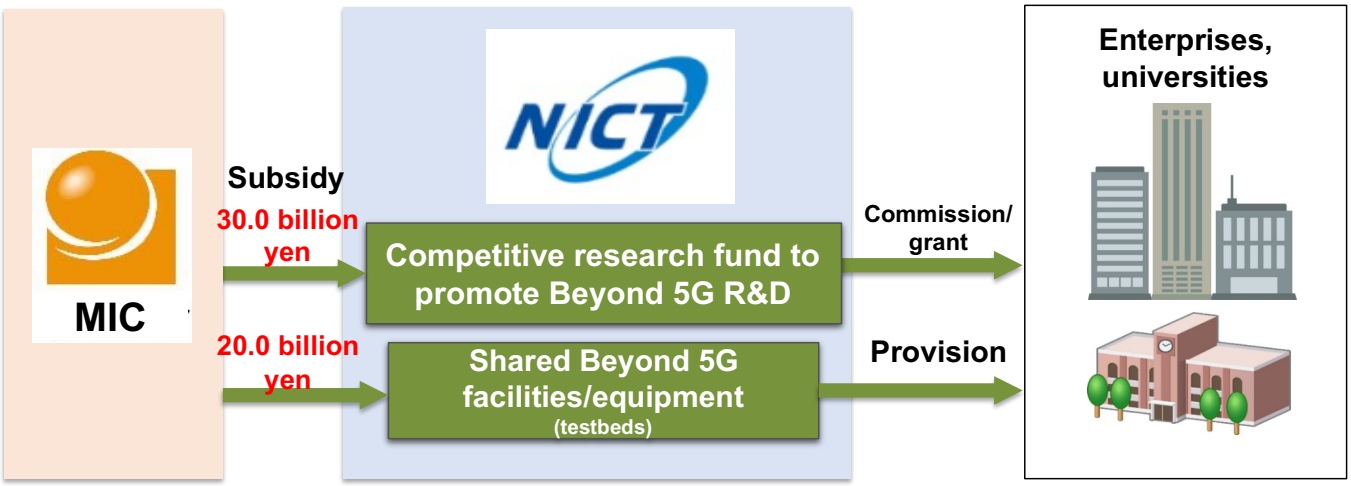
(Source) MIC, the Department of Information and Communications Technology of the Information and Communications Council, materials of the 34th technology strategy committee

6. Functions required for Beyond 5G

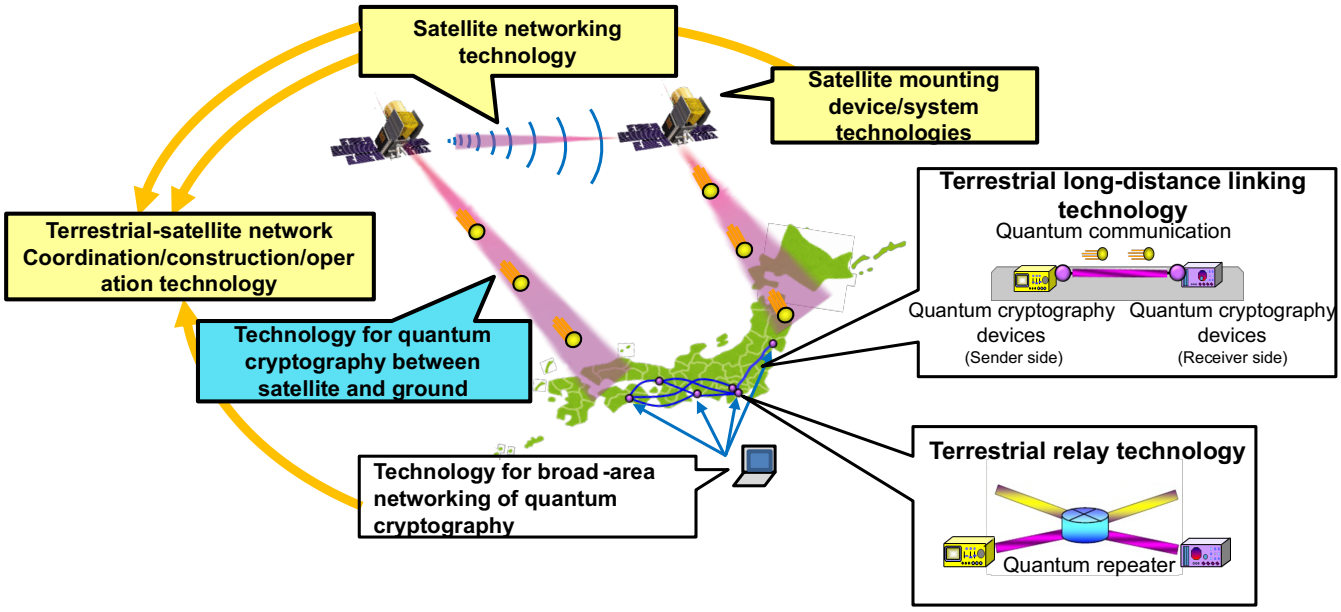


*1 Abbreviation for Cyber Physical System that refers to a system to collect and observe data of real (physical) space with sensors, process and analyze the data in the cyber space and feed back the results to the real space for creation of new values.
*2 Abbreviation for High Altitude Platform Station, which refers to unmanned aircraft, etc. that is mounted with mobile phone base station and flies at high altitude including stratosphere.

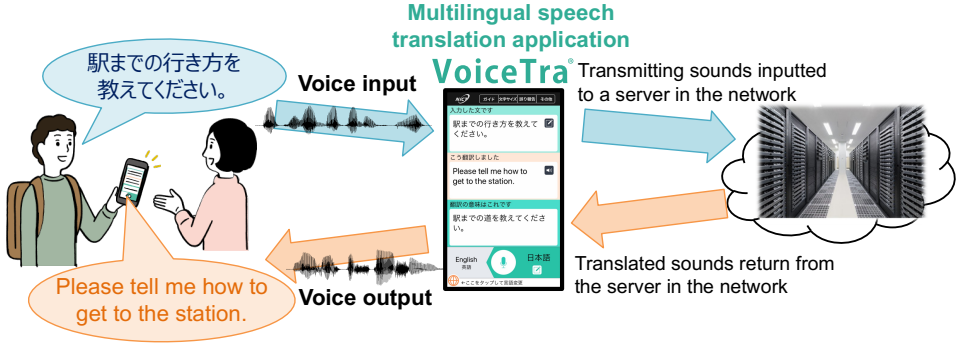
7. Schema of the Beyond 5G R&D Promotion Project (Fund)



8. Image of global quantum cryptography network



9. Multilingual translation technology



Priority language (at a practical level)	
Japanese	Vietnamese
English	Burmese
Chinese	French
Korean	Spanish
Thai	Brazilian Portuguese
Indonesian	Filipino

- ✓ Nepali, Khmer and Mongolian will be added with foreigners visiting/staying in Japan in mind.
- ✓ Russian, Arabic, German, Italian and Hindi will be added with economic security in mind.

10. Efforts to further advance the multilingual translation technology

Mission

Eliminate language barriers in the world

—Evolution from "serial translation" to "simultaneous interpretation" and further progress in social implementation—

Vision

1 Realize global and stress-free exchange

- Further advance multilingual translation technology and its social implementation to eliminate "language barriers" in the wor ld and realize a society where everybody freely exchanges with people around the world.

2 Strengthen business capabilities and realize a true convivial society

- Make AI capable of simultaneous interpretation at international conferences and business discussions to expand business oppor tunities of enterprises and promote overseas collaborations, etc.
- Eliminate language barriers in exchange with and daily life of foreigners visiting or staying in Japan who are expected to in crease across the country including rural areas.

3 Enhance Japan's presence

- Toward EXPO Osaka, Kansai in 2025, realize multilingual real -time talks and simultaneous interpretation between exhibitors and visitors of pavilions and lectures.
- Offer "Omotenashi" to people gathering from around the world to increase value and appeal of Japan in economic/social activit ies at home and abroad.

Target

2020 **Translation to support daily life and business** (Conversation Level)

2025 **Simultaneous translation that considers context, intention of the speaker, etc.** (Discussion Level)

- Highly accurate, prompt and practical simultaneous interpretation that considers the context (flow of conversation/sentence), intention of the speaker, surrounding conditions, cultural background and other factors
- Expand the priority languages for the multilingual translation technology based on the "Comprehensive Measures for Acceptance and Coexistence of Foreign Nationals"

2030 **Simultaneous interpretation capable of severe negotiations** (Negotiation Level)

Action

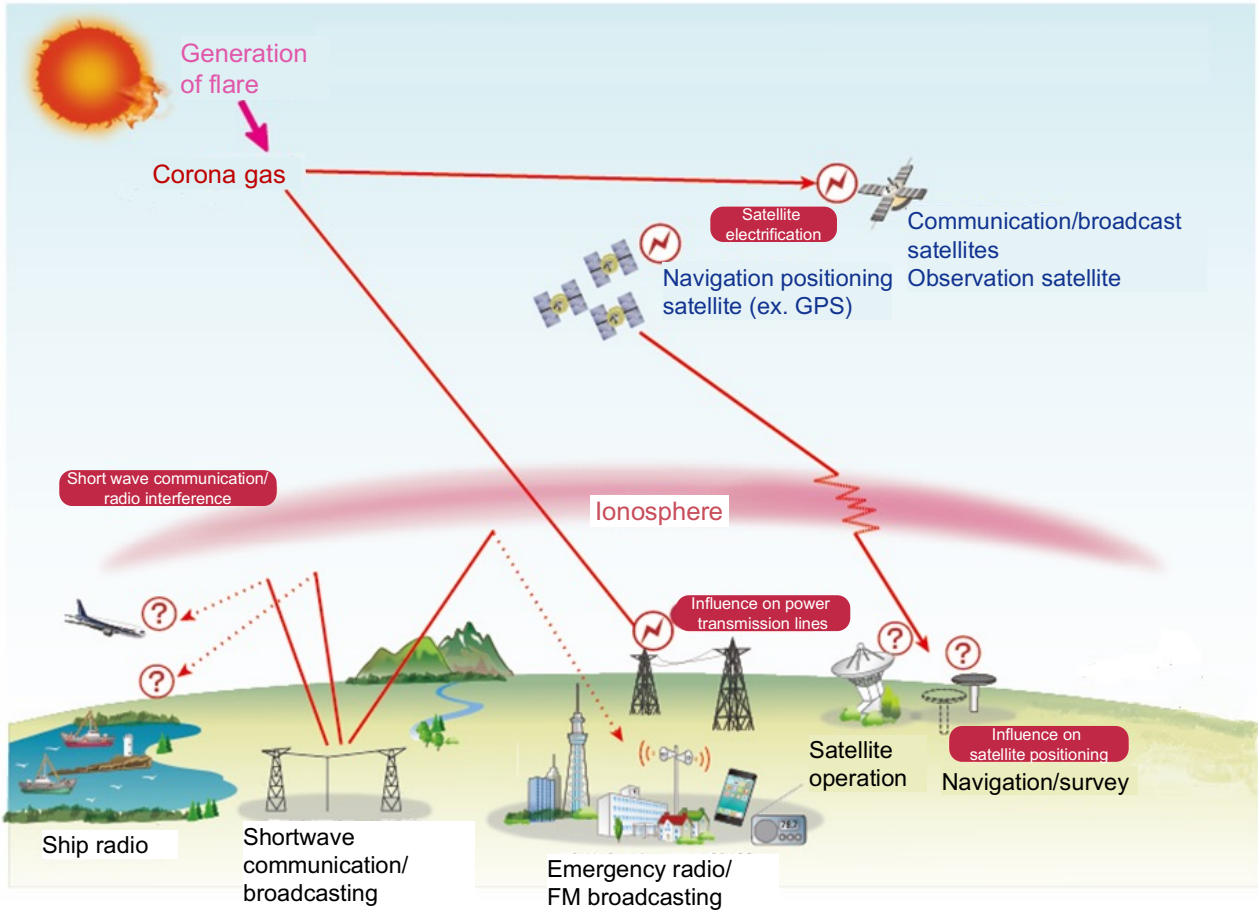
Share a roadmap to achieve the goals toward 2025 and promote specific actions in an industry-academia-government cooperation.

Project 1 **Develop the world's top level AI research base to support advanced natural language processing technology.**

Project 2

Project 3 **Social implementation of simultaneous interpretation system toward 2025 EXPO in Japan**

11. Influence of solar flares on the earth



Section8

1. Submarine optical cable share of major suppliers