

The previous chapters have presented the trends relating to the start of 5G commercialization and the envisioned structural changes in the ICT industry, introduced various initiatives aimed to resolve social issues through the use of ICT, including developments connected to COVID-19, and described the latest trends and user views surrounding the use of digital data, which is increasing in importance. The 2020s will see accelerated application of AI, the IoT, and big data on new 5G platforms and the introduction of digitalization in the entire society. This chapter looks at what kind of society is envisioned in the 2030s after digitalization has been advanced and provides perspectives on the “Beyond 5G” infrastructure that will be needed in the 2030s”.

Section 1 Future Vision of Japan’s Digital Economy and Society in the 2030s

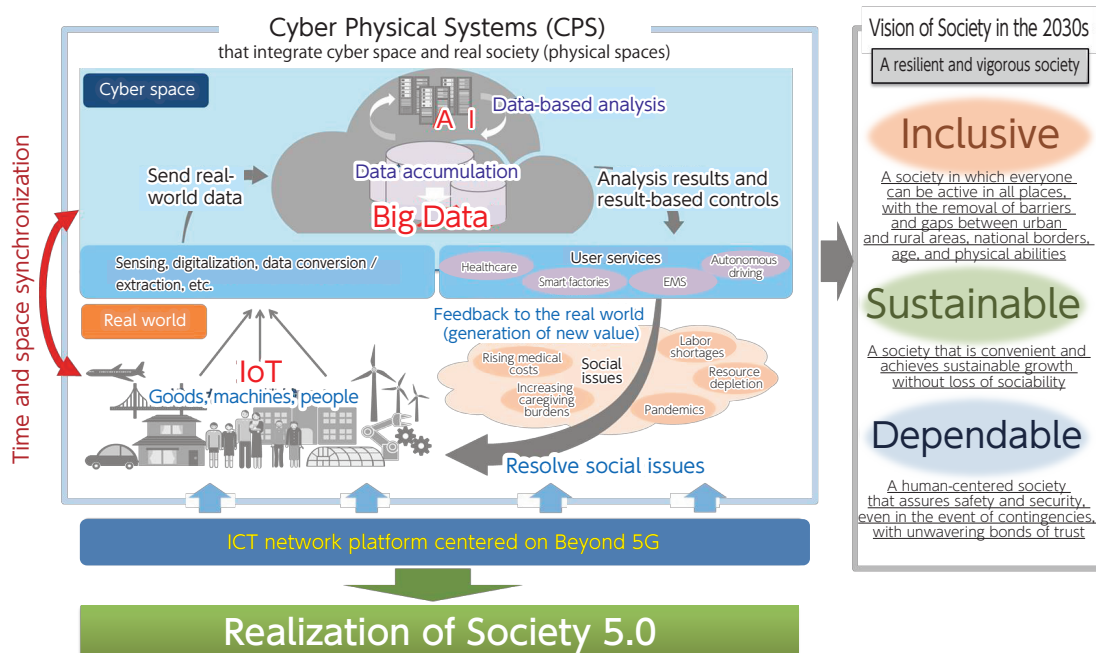
1. Migration to a data-driven “Super Smart Society”

The proliferation of 5G into our lives and the further social implementation of AI and the IoT will bring about cyber physical systems (CPS) that integrate cyber space and physical spaces and drive the migration to a data-driven “Super Smart Society”, in which data utilization is maximized. These developments will enable the generation of new value from big data, a new resource of the digital era, as well as allow for the transformation of tacit knowledge into explicit knowledge, the movement from analyzing the past to predicting the future, and the switchover from partial optimization to total optimization. These transformations will lead to the creation of “Society 5.0”, which will resolve many different social issues

while achieving economic growth through the provision of the necessary goods and services to the necessary people at the necessary time in just the necessary quantities (Figure 4-1-1-1).

In the 2030s, cyber space and physical spaces will become even more tightly integrated. Moreover, a resilient and vigorous society will emerge in which cyber space not only extends the functions of physical spaces but also maintains the smooth functioning of people’s lives and economic activities even when contingencies occur in physical spaces. It is expected to achieve a higher order of social issue solutions and economic growth in Japan, and it is expected to make huge contributions to the

Figure 4-1-1-1 Vision of society expected in the 2030s



Source: “Beyond 5G Promotion Strategy–Roadmap towards 6G–”(2020)

https://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/presentation/pdf/Beyond_5G_Promotion_Strategy-Roadmap_towards_6G-.pdf

fulfillment of the ideals expressed in the Sustainable Development Goals (SDGs), a common foundation for humanity, such as “a sustainable, diverse, and inclusive society for all” and “preservation of the earth (environment)”.

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Section 2 Preparing to Implement Beyond 5G

Essential to the realization of a data-driven Super Smart Society in the 2030s is highly advanced CPS synchronization. Such CPS synchronization involves the collection of detailed data on various phenomena occurring in physical spaces everywhere, such as land, sea, sky, and space, and the digital conversion of the collected data, after which the data is stored and analyzed in cyber space for instant feedback to physical spaces. This synchronization will require communication infrastruc-

ture more advanced than 5G that is capable of circulating massive amounts of information to all locations securely, reliably, and without latency.

This section describes developments in various countries in preparation for Beyond 5G infrastructure construction. It also provides a description of Japan’s Beyond 5G implementation examinations and upcoming promotion strategies.

1. Global interest in “after 5G”

Countries around the world have been launching commercial 5G services one after another, starting last year (2019) and continuing into this year (2020). Even as 5G is being rolled out, many countries have begun examining standards for after 5G, looking ahead to the 2030s. With the conclusion of the 5G research phase and its ongoing implementation, researchers shifted their attention to “after 5G” in around 2018. Several countries and regions began having active academic discussions on promising communication technologies for the future.

Seeing these movements in other countries and regions, Japan’s National Institute of Information and Communications Technology (NICT) started researching and developing terahertz-wave communications in July 2018 along with other R&D projects focused on after 5G. MIC, for its part, launched the “Beyond 5G Promotion Strategy Roundtable” in January 2020 with the goal of establishing a comprehensive Beyond 5G strategy. The roundtable has examined what society in the 2030s will expect from communications infrastructure and the policy directions to realize these expectations.

2. Beyond 5G Directions in Japan

(1) Functions required for Beyond 5G

What functions will be required for Beyond 5G, the core infrastructure to realize the society expected in the 2030s, given future technical trends for communication networks? In the meantime, various research institutions and communications operators are citing requirements considered as necessary for Beyond 5G in pub-

lished white papers and other articles.

Based on developments within and outside Japan and on discussions at the aforementioned “Beyond 5G Promotion Strategy Roundtable”, MIC currently envisions the following functions as necessary for Beyond 5G implementation (Figure 4-2-2-1).

3. Establishment of the Beyond 5G Promotion Strategy

(1) Necessity of strategic initiatives in preparation for Beyond 5G implementation

MIC decided to formulate a national strategy to realize the Beyond 5G environment that Japan should strive for as described above, recognizing the importance of government and the private sector uniting and collaborating strategically under the umbrella of international cooperation.

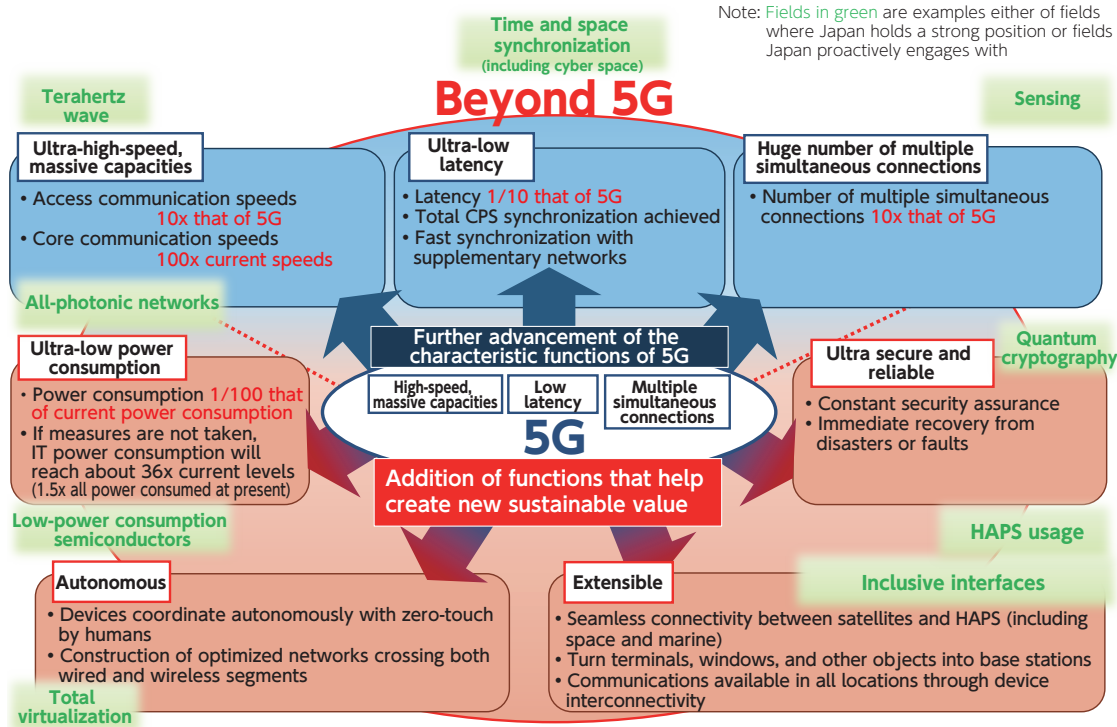
(2) Beyond 5G Promotion Strategy

The following provides an outline of the established Beyond 5G Promotion Strategy (Figure 4-2-3-1).

a. Basic principles

It is crucial that Japan corners a part of the global open innovation ecosystem, for the fast and smooth implementation of Beyond 5G, which will evolve rapidly and discontinuously, and for stronger international competitiveness in Beyond 5G. (The target is for Japanese

Figure 4-2-2-1 Functions required for Beyond 5G



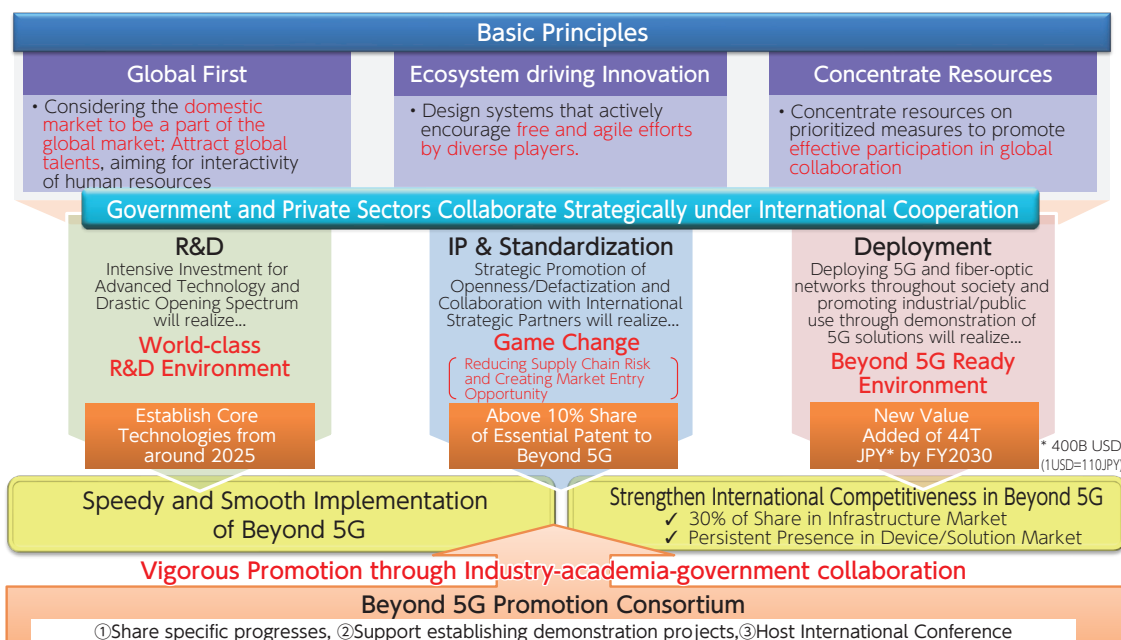
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companies and their partners to capture about 30 percent of the Beyond 5G infrastructure (hardware and software) market and to hold a continuous presence in the device and solution fields.) From this viewpoint, Japan will establish roadmaps and undertake strategies for R&D, IP and standardization, and deployment under the following basic principles.

- i. Global first: Regard the domestic market, both on the supply side and the demand side, as part of the global market, aiming for interactivity that will enable Japan to attract talent from around the world.
- ii. Building of an ecosystem that drives innovation: Build an ecosystem that drives innovation, founded on a systems design, using such measures as mini-

Figure 4-2-3-1 Beyond 5G Promotion Strategy: Basic principles



* Cross-department taskforce in MIC will manage the progress of the Strategy. Progress report will be published annually, and the Strategy will be reviewed when necessary.

Source: "Beyond 5G Promotion Strategy—Roadmap towards 6G—"(2020)

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mizing regulations wherever possible, that actively encourages free and agile initiatives by diverse players.

- iii. Concentrate resources: Concentrate fixed-term resources on high-priority measures for Japan from the viewpoint enabling Japan's players to participate effectively in global collaborations, on the premise that global collaborations bring together the respective "strengths" of each player.

b. R&D strategy

The R&D strategy goal is for the government to actively conduct and assist R&D into communication technologies that global markets will need for Beyond 5G and sequentially start to establish and standardize at 3GPP and other organizations elemental technologies from around 2025, leading to Beyond 5G service launch around 2030.

c. Intellectual Property and standardization strategy

The IP and standardization strategy is to incorporate technical requirements based on Japan's R&D outcomes and other priorities in international standards at 3GPP, ITU, and other organizations starting from around 2025, with the aim of lowering supply chain risks in the Be-

yond 5G market and creating market entry opportunities. Along with the early construction of strategic partner-collaboration frameworks, Japan will aim to acquire more than 10 percent of essential Beyond 5G patents by 2030, which is an equivalent level to the world's top share of essential 5G patents, in a form that can be used to secure international competitiveness and bargaining power. Japan will also encourage the acquisition of adjacent patents related to essential Beyond 5G patents.

d. Deployment strategy

The deployment target is to realize a "Beyond 5G-ready" environment by 2030. Specifically, the strategy is to achieve the rapid deployment of 5G for all areas as well as to establish and disseminate impactful, user-oriented use cases from Japan and other countries, thereby generating 44 trillion yen in added value by FY 2030.

e. Strategy promotion policies

The "Beyond 5G Promotion Consortium (tentative name)" will be set up as a parent organization to promote the Beyond 5G Promotion Strategy vigorously and proactively through industry-academia-government cooperation.