CTO Message

Researching Next-Generation Technologies that Support the Future with Measurement

We established Advanced Technology Research Center in April 2020 in order to cultivate the technological capabilities that will support the future with measurement. We will move forward with R&D under an open and innovative research environment to strengthen Anritsu's "Original & High Level."

Hanako Noda

Executive Officer, CTO
General Manager of Advanced Technology Research Center

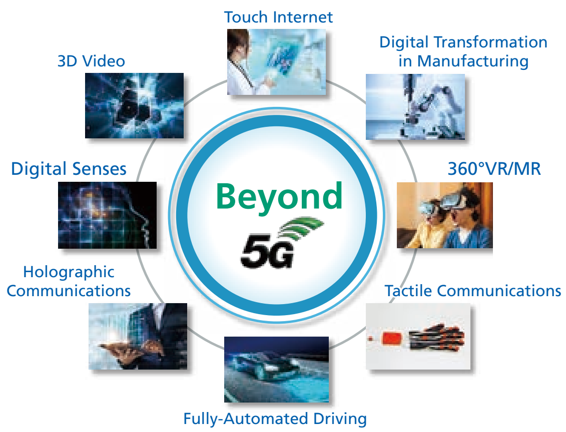
Establishment of the Advanced Technology Research Center

In order to remain a company that supports society, decades into the future through measurement, Anritsu established the Advanced Technology Research Center in April 2020, with the goal of advancing measurement and expanding its domain. This research center will undertake research and development of the 6G technology that will be needed a decade from now, and looking further, it will tackle the basic research to turn NEMS into reality. Inviting research leaders from outside the Company, the Advanced Technology Research Center will undertake fundamental research through innovative teams of highly diverse members to strengthen Anritsu's "Original & High Level."

Initiatives of the Advanced Technology Research Center

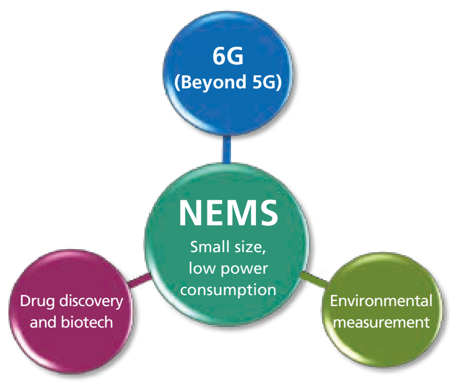
6G (Beyond5G)

- 100+ GHz component development
- Radio interference monitoring technology



Next-Generation Technology Acquisition

- Realization of NEMS*, a promising technology for ultra-sensitive sensors



* Nanoelectromechanical systems (NEMS) are devices with mechanical structures on the order of nanometers in size, making them even more compact than microelectromechanical systems (MEMS), micromachines based on semiconductor processing technology.

Technology Development for the Commercialization of 6G in 2030

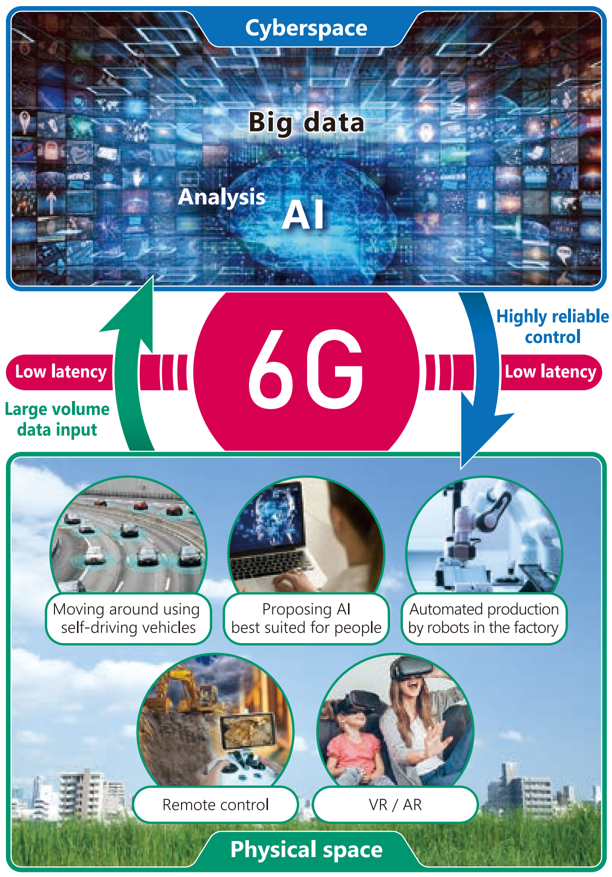
Initial 5G trials services commenced in 2019, followed by 5G commercial services launched overseas in the same year and in Japan in March 2020. Unfortunately, the Tokyo 2020 Olympic and Paralympic Games, slated as the stage for 5G's spectacular debut, were postponed for one year due to the COVID-19 pandemic. At the same time, changes in lifestyles and restrictions on activities have made advanced ICT infrastructure to support the digitalization of society all the more important, drawing even greater attention to 5G. Interest is growing in local 5G, for which 28GHz band license applications began in December 2019. Policy measures to promote 5G are being hammered down, as seen in the allocation of Sub-6GHz bands, discussions to enable outdoor use, and the readying of tax incentives for investment in 5G. We have hopes that, with the start of the Tokyo Olympic and Paralympic Games, 2021 will be a breakthrough year for 5G.

Although 5G has just made its start, preparations projecting a decade ahead to 6G have already begun around the world. The aim of 5G is not only the advancement of the communications infrastructure existing through 4G, but also the transformation of society artificial intelligence and the IoT as components of lifestyle infrastructure together with artificial intelligence and IoT. 6G is expected to form foundational technology for taking this infrastructure even further.

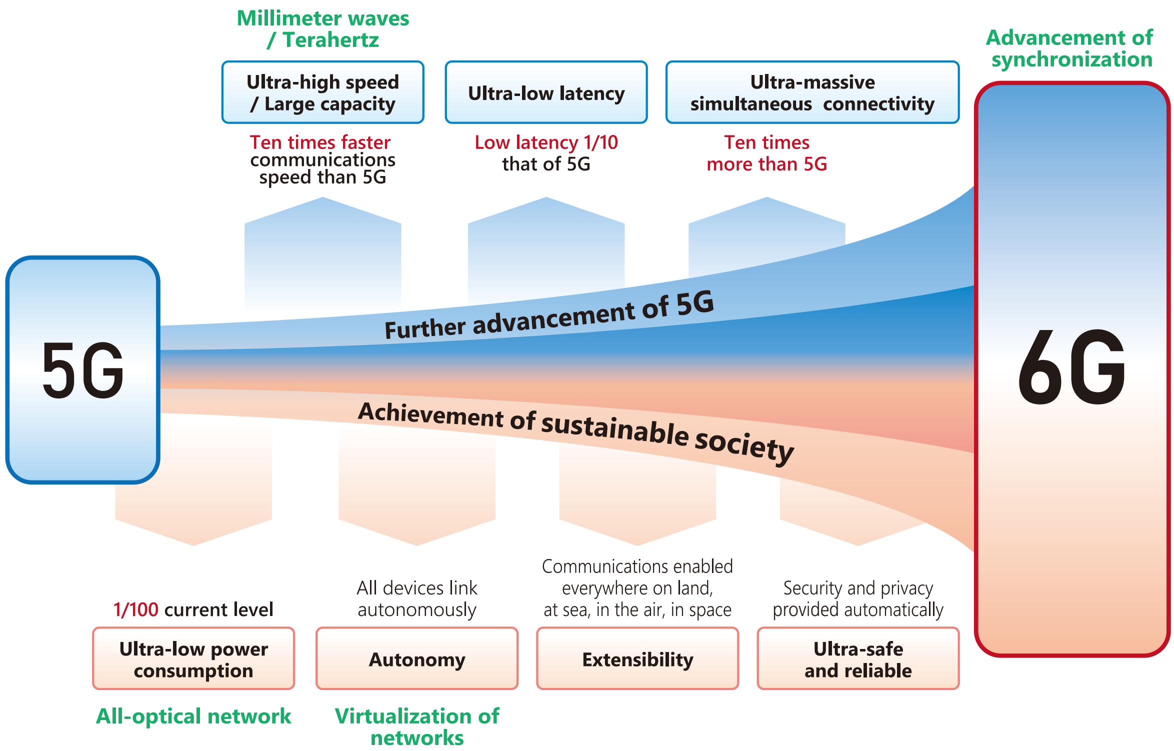
Forecasts call for 6G to launch around 2028, with full-scale use around 2030. Under the Japanese government's proposal for Society 5.0, a concept expected to see realization around the same time as 6G, the fusion of physical space and cyber space will further advance. Physical space is the real space in which we live, while cyber space is the virtual space constructed through computers and networks. Within current information society, i.e., Society 4.0, people have accessed data in cyber space via the Internet, to analyze and make use of information and data. In Society 5.0, by contrast, large volumes of data will be transacted between physical space and cyber space with low latency and high reliability. This will enable anyone, at any time and any place, to access people, information, and things in a hyper-realistic manner, increasing people's freedom in where and when to work. Already, the COVID-19 pandemic has made online meetings the norm in business, while real-time music sessions can now be enjoyed in private. The fusion of physical space and cyber space is taking place. As this transformation progresses, some watchers predict that large amounts of data in the physical space will be sucked up into cyber space, where physical space will be recreated and hence the future is predicted. This will be fed back into physical space, allowing people to make decisions on their next actions. Toward this end, data from a wide range of sensors in every location must be collected, analyzed, and fed back in an instant. 6G is the communications infrastructure that is expected to make this sort of society a reality.

6G is expected to enable communications not only on land but in the sky, at sea, and in every area, extending the coverage of communications. By comparison with 5G, numerical targets for the technology include 5 times the maximum communication speed (100 billion bits per second), 1/10 the latency (100 microseconds) and 10 times the simultaneous connectivity (10 million devices per km^2). Targets have also been set for the effective utilization of frequencies, reduced power consumption, high-reliability, and high-speed mobility.

CPS (Cyber Physical System)

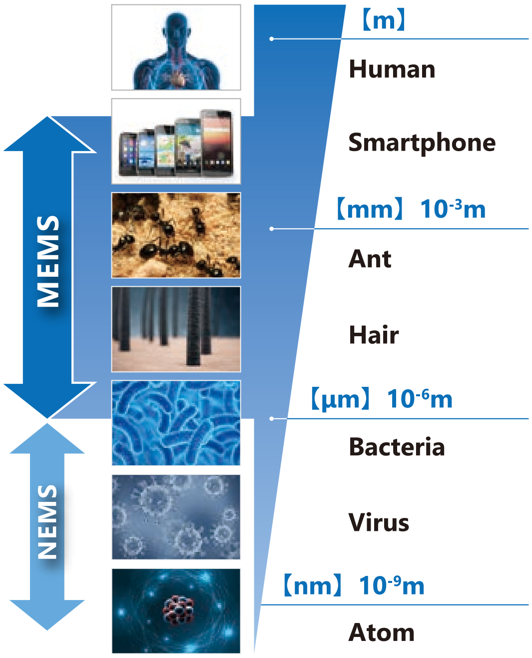


Difference Between 5G and 6G



Important technologies for achieving these numerical targets include the utilization of millimeter waves and terahertz waves, advances in space-time synchronization, full network virtualization, and all-optical networks. Each of these faces technical challenges. So far, multi-level modulation, MIMO and other forms of multiplexing, bandwidth broadening, and other technologies have been introduced to speed up communications. While each of these has room for improvement, bandwidth broadening in particular is essential to achieving speed of 100 billion bits/second. Doing so requires the availability of continuous usable frequencies. For example, to secure a continuous band of 10GHz, a frequency band of 100GHz or higher must be used. This raises the frequency beyond that of the millimeter waves used in 5G, limiting communication area due to further shortening of communication range and a requirement for higher linearity. Therefore, those such as improvement of massive MIMO technology, utilization of reflection to expand communication area are the important challenges that lie ahead. Applying higher frequency with measuring instrument is another challenge. Anritsu has committed itself to the study of millimeter wave measurement technology. In 2019, we began research and development of technology beyond 5G, and in 2020, we launched new development of fundamental millimeter wave technology aimed at 6G. Anritsu will support the foundation of people’s lifestyles by supporting the development of communications technology.

What is MEMS?



*1 Bulk acoustic wave (BAW) filter: A type of high frequency filter

Tackling Basic Research for NEMS

As a medium- and long-term research theme, in April 2020 Anritsu began basic research aimed at making NEMS a reality. NEMS are devices with mechanical structures on the order of nanometers in size. Devices on a scale larger than NEMS are known as MEMS, or micromachines; these are used in smartphones, RF circuit switches, acceleration sensors for the detection of orientation and movement, pressure sensors, and more. Mechanical parts with the thickness of a human hair (50 micrometers) have already been put to practical use. NEMS devices are even smaller, enabling the detection of even more minute changes, down to the ability to sense a single molecule. NEMS also reduce power consumption through this miniaturization, and achieve higher sensitivity due to lower noise.

Making NEMS a reality will enable applications in a vast range of fields, including biosensors for cancer and for viruses such as coronavirus, sensors for environmental measurements such as pollen, radiation, and carbon dioxide, and wearable devices. Great expectations have been placed on NEMS, but the need for even finer processing technology than that developed for MEMS has left NEMS technology to the future. The tremendous social and academic significance promised by NEMS makes it a “dream” field of technology. Viewing NEMS as a technology for the future a dozen or so years ahead, Anritsu will undertake basic research to make this technology a reality.