

May 20, 2021

Nippon Telegraph and Telephone Corporation

SKY Perfect JSAT Holdings Inc.

NTT and SKY Perfect JSAT conclude collaboration agreement on new space enterprise to aid realization of a sustainable society

NTT Corporation (NTT, President & CEO: Jun Sawada) and SKY Perfect JSAT Holdings Inc. (SKY Perfect JSAT, Representative Director, President : Eiichi Yonekura) announced today that the parties have agreed to jointly work together with the goal of creating a new space enterprise to aid realization of a sustainable society, and accordingly concluded a business collaboration agreement on May 19, 2021. NTT, which has global computing network technology and is working on the implementation of IOWN, and SKY Perfect JSAT, which has abundant technology and achievements in the space business including satellite communication and satellite broadcasting for more than 30 years, will collaborate to build a new space infrastructure through innovation in a space integrated computing network, thereby helping to realize a sustainable society.

1. Background of the business collaboration

There is a pressing need to ensure the sustainability of economic and social activity, which makes it more important than ever to utilize outer space effectively and to the greatest extent possible. This involves ICT infrastructures for a variety of fields, such as energy, environment and climate change, disaster prevention, and smart cities. Novel technologies and architectures are needed to build these ICT infrastructures in outer space.

NTT and SKY Perfect JSAT have proceeded with studies and discussions toward the realization of an ICT infrastructures in outer space, and have reached the conclusion of this business alliance agreement.

NTT, which has global terrestrial infrastructures and is dedicated to making the IOWN concept a reality, and SKY Perfect JSAT, which has abundant technology and achievements in the space business including satellite communication and satellite broadcasting for more than 30 years, will together take on the challenge of building a novel space integrated computing network to create the infrastructure needed for a sustainable society.

2. Space integrated computing network

The space integrated computing network is a novel infrastructure to be built by combining NTT's network/computing infrastructure and SKY Perfect JSAT's space assets/business. It

integrates multiple orbits from the ground to HAPS floating at high altitude, Low Earth Orbits and Geostationary Orbits. In addition, they are connected to the ground by an optical wireless communication networks to form a constellation, and distributed computing enhances various data processing. It also provides access to terrestrial mobile devices for ultra-wide service coverage.

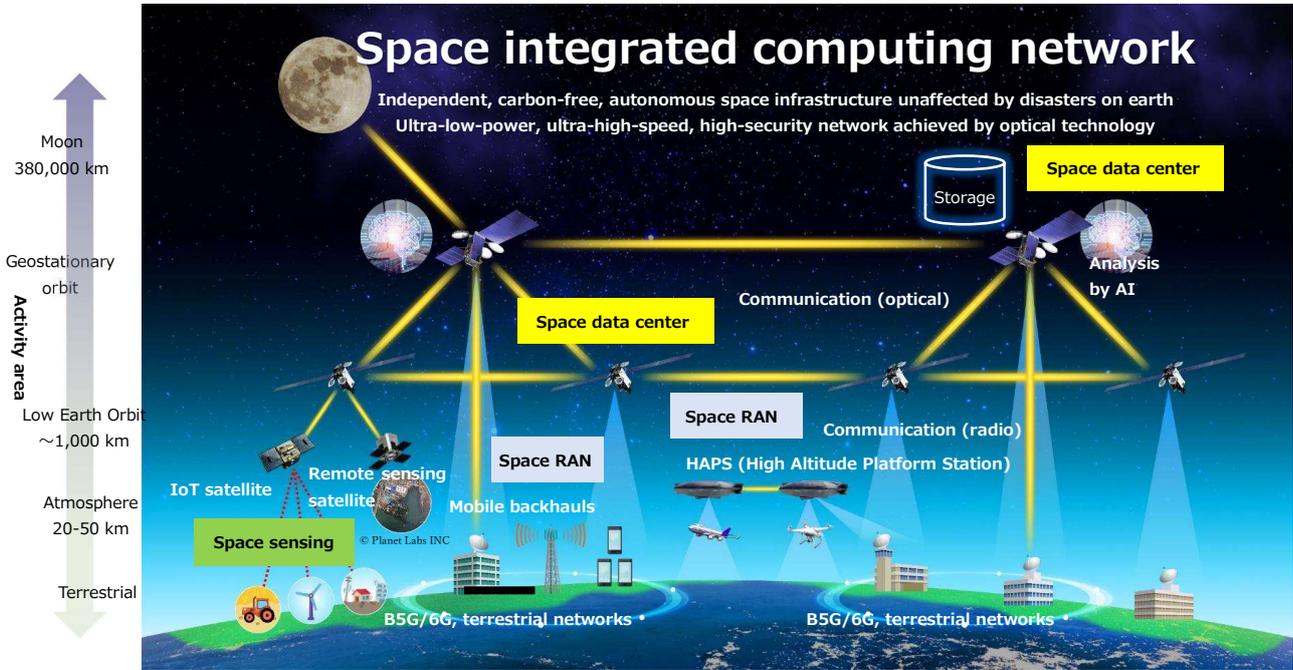


Fig. 1: Configuration of the space integrated computing network

3. Examples of business projects

The activities envisaged in this business collaboration and currently planned project examples are shown below.

Realizing the flow from information gathering to value in space with three functions

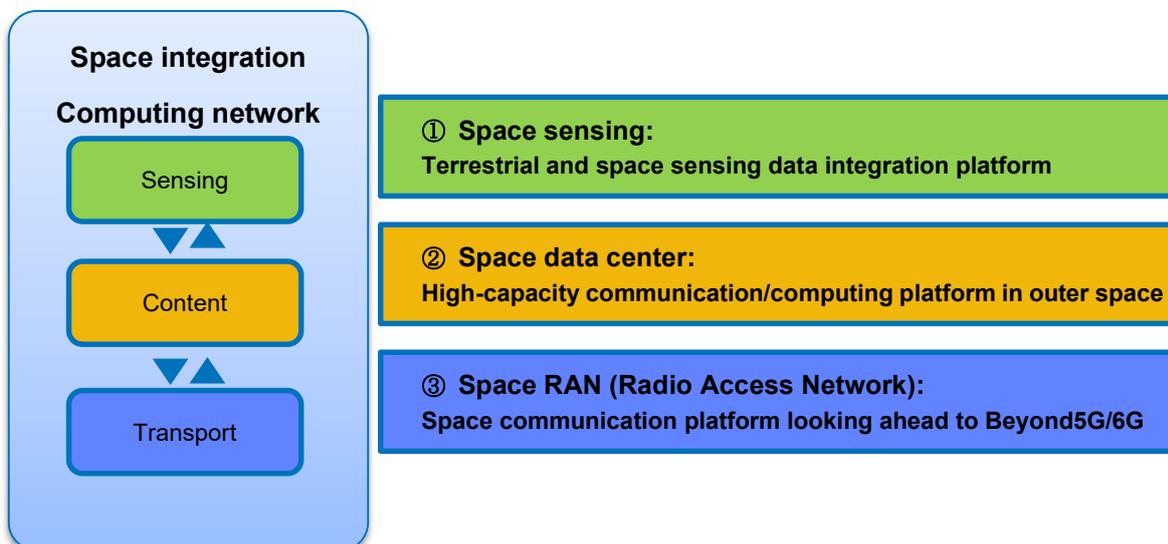


Fig. 2: Fields to be addressed in the space integrated computing network

① **Space sensing project: terrestrial and space sensing data integration platform**

In addition to observation data captured by conventional observation satellites, we will establish an integrated space and earth sensing platform that uses the world's first low earth orbit satellite MIMO*¹ technology to collect data from IoT terminals installed around the earth and provide a service using this platform. Furthermore, we will develop a new sensing technology that uses terahertz radio waves to visualize information that would ordinarily be invisible, thereby enhancing the value of space data and expanding its potential use.

② **Space data center project: high-capacity communication/computing platform**

Using photonics-electronics convergence technology which enables reducing power consumption and high cosmic ray resistance of computing resource, we will establish a computing processing platform in outer space and launch a service using this platform. In addition, distributed computing using optical communication technology enables a variety of advanced data processing. For example, a huge volume of diverse data collected in outer space will be instantly gathered and analyzed over a high-speed optical communication network, and only essential information will be delivered to users who need that information. This will dramatically enhance both real-time usage of space data and user convenience.

③ **Space RAN (Radio Access Network) project: communication platform in Beyond5G/6G**

Using a satellite (Low Earth Orbit) and HAPS expected to be used for Beyond5G/6G, we will establish a mobile communication platform and use it to launch an access service of network. This will further enhance the convenience and value of mobile communication. For example, a high-reliability messaging service can be provided, and ultra-wide-area service coverage can be achieved.

4. Division of roles

Company	Main roles
NTT	Leading-edge computing technology (AI processing, distributed processing/memory, etc.), network technology (MIMO* ¹ , FSO* ² , etc.), and global networks/data centers
SKY Perfect JSAT	Knowledge and industrial leadership as a satellite operator, such as optimization in the economics and reliability of satellite and control systems, procedures for frequency usage and radio station licenses, and satellite and network operations.

*1 MIMO(multiple-input and multiple-output): A technique for multiplying the capacity of a radio link using multiple transmission and receiving antennas to improve the quality of wireless communication.

*2 FSO(Free Space Optics): An optical communication technology that uses light propagating in free space.

5. Future prospects

We will conduct technical demonstrations beginning in 2022 to develop technologies that will lay the foundation for these projects. In parallel, we will prepare for the launch of commercial satellites, which will be planned to start its commercial services from around 2025.

We aim to create businesses that spearhead space development both in Japan and worldwide by collaborating with global space and satellite operators and co-creating innovations.

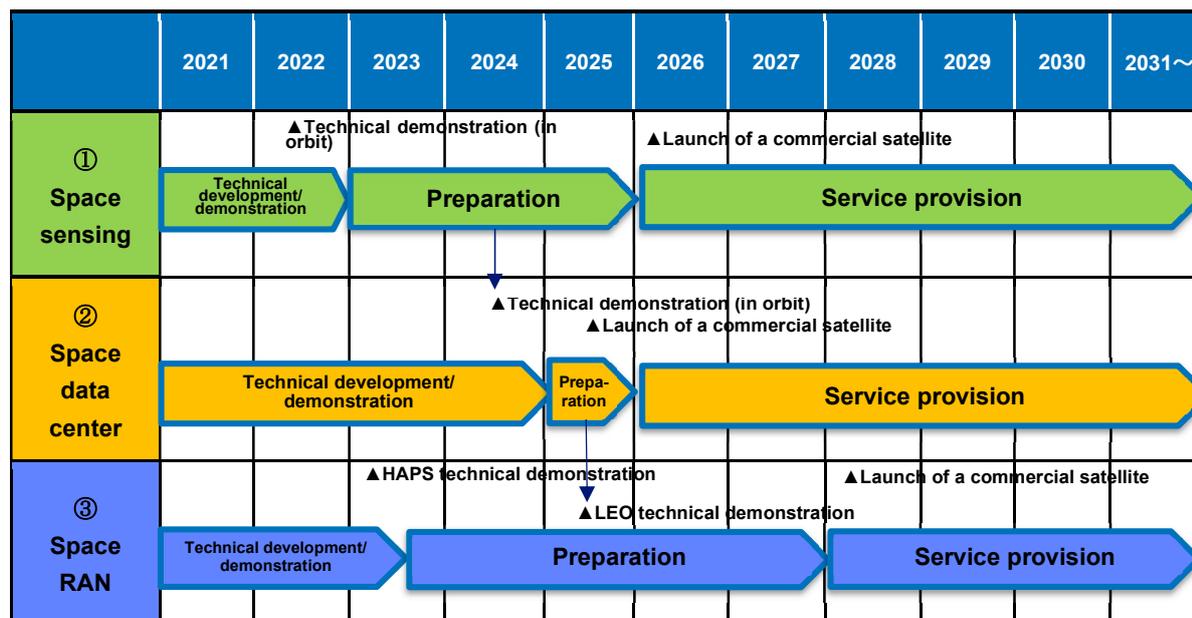


Fig. 3: Assumed schedule for service provision

6. Overview of each corporation

□ About NTT

NTT believes in resolving social issues through our business operations by applying technology for good. We help clients accelerate growth and innovate for current and new business models. Our services include digital business consulting, technology and managed services for cybersecurity, applications, workplace, cloud, data center and networks all supported by our deep industry expertise and innovation. As a top 5 global technology and business solutions provider, our diverse teams operate in 80+ countries and regions and deliver services to over 190 of them. We serve over 80% of Fortune Global 100 companies and thousands of other clients and communities around the world. For more information on NTT, visit www.global.ntt/.

□ About SKY Perfect JSAT HD

The SKY Perfect JSAT Group has SKY Perfect JSAT Corporation as its core operating company, and as a top runner in the fusion of broadcasting and communications, it is the only company group in Japan that utilizes 18 satellites, the largest in Asia, and provides pay multi-channel broadcasting and satellite communications services.



SKY Perfect JSAT delivers a broad range of entertainment through the SKY PerfecTV! platform, the most extensive in Japan with a total of 3 million subscribers. In addition, SKY Perfect JSAT's satellite communications services, which cover Japan and the rest of Asia, as well as Indian Ocean, Oceania, Russia, Middle East, Hawaii and North America, play a vital role in supporting safety, security and convenience for the society as a whole. We also are developing business solutions that utilize the world's most advanced technology using satellite data. And we are confident that with our customers we can build a better future by further digital transformation.

website: <https://www.skyperfectjsat.space/en/>