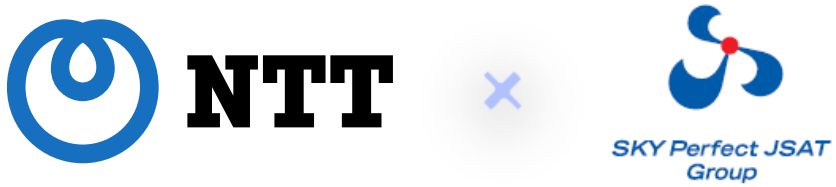
【作業中ファイル】



New space initiative to achieve a sustainable society

May 20, 2021

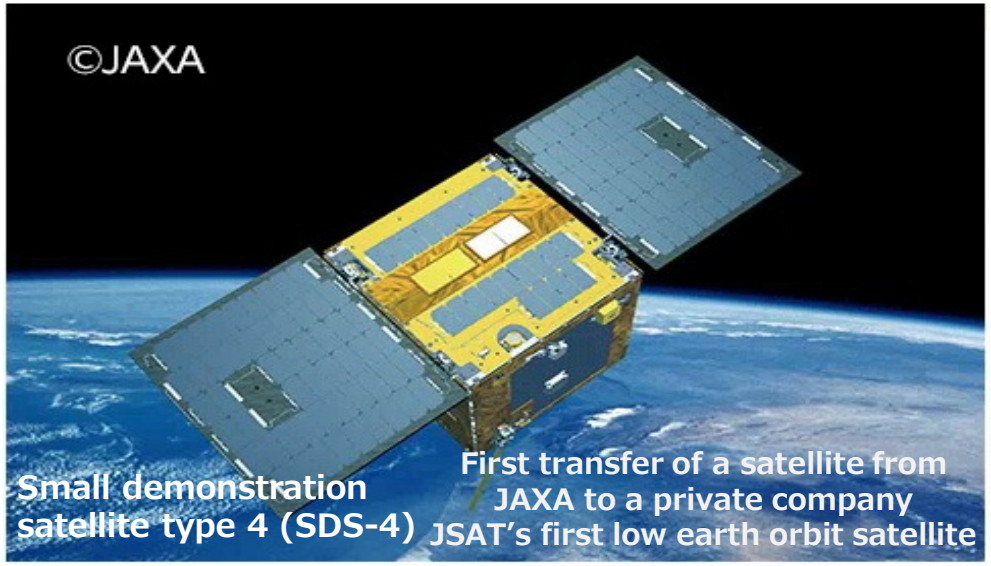
Introduction

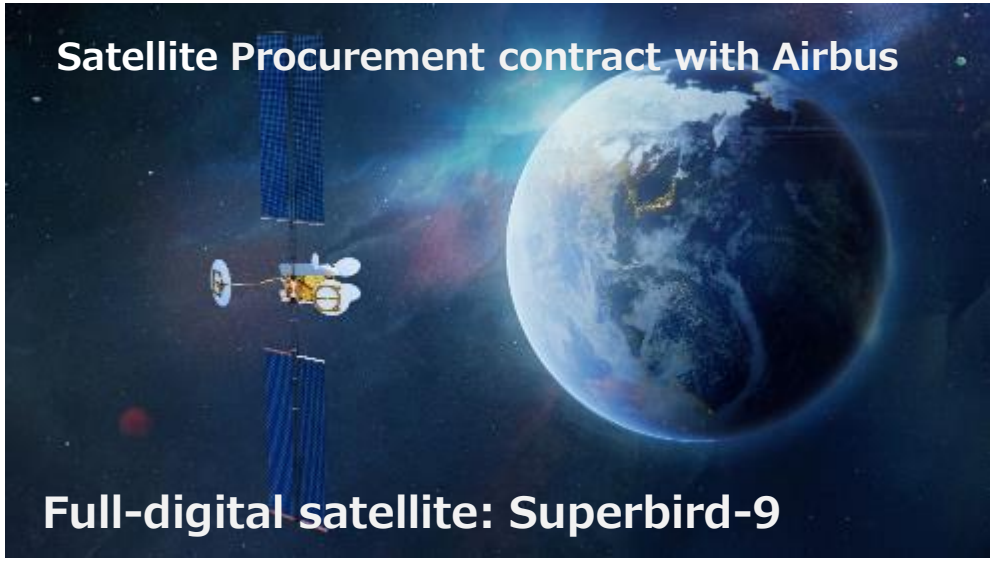
The key to the sustainable growth of human society lies in space.

As terrestrial and space infrastructure providers, NTT and SKY Perfect JSAT have taken up the challenge of building a novel network and computing infrastructure to expand the reach of human activities into space.

SKY Perfect JSAT Objective

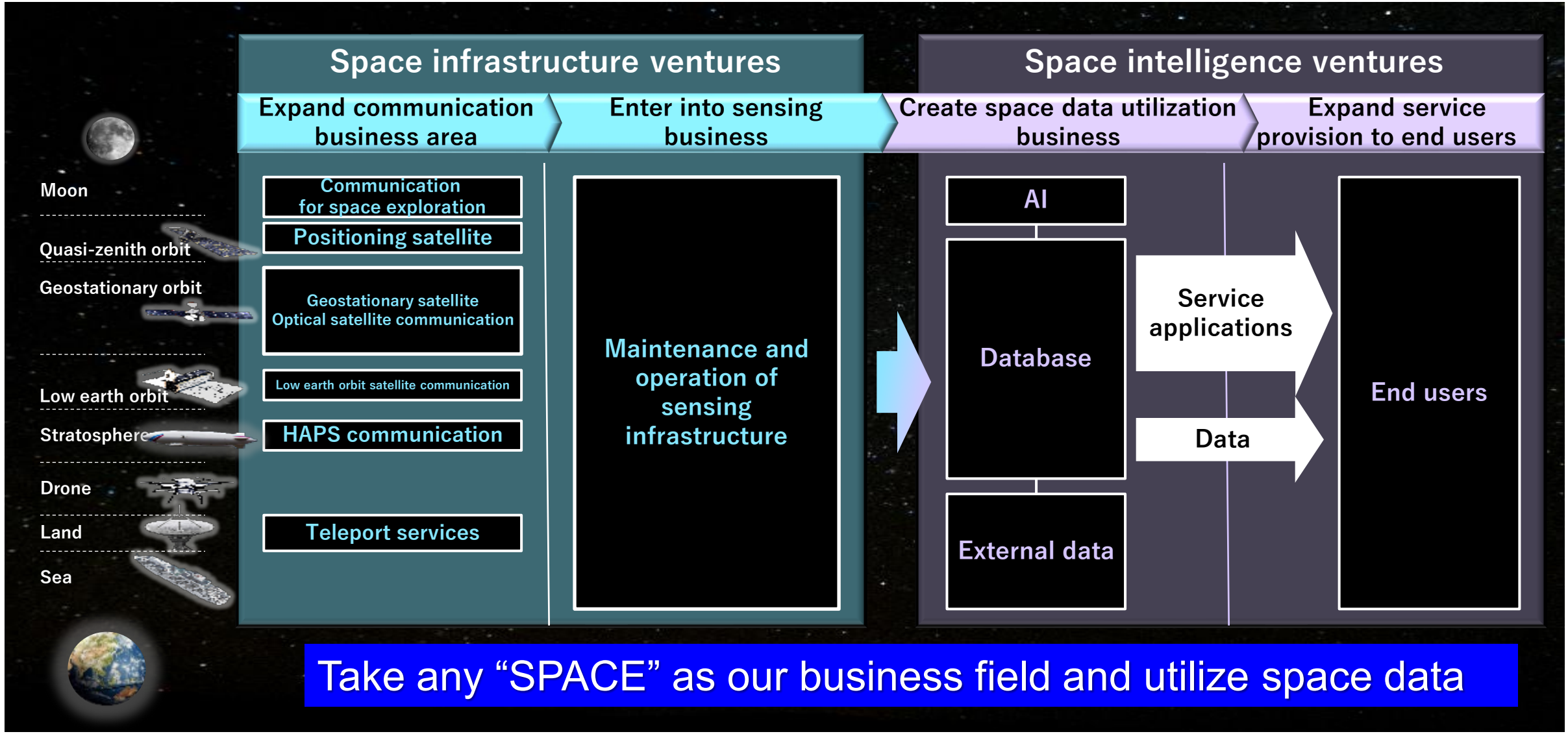
Operation of orbiting assets





Exploration of space and utilization of space data

SKY Perfect JSAT Group



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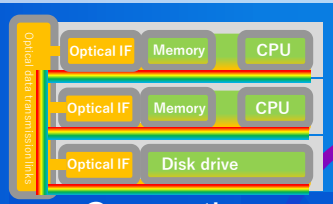
IOWN (Innovative Optical and Wireless Network) Concept

Fusion of Communication and Computing using Photonics-Electronics Convergence



Computing
Optical Disaggregated Computing

Network
Optical and Wireless Communication Technologies

Devices
Photonics-Electronics Convergence Technology

High capacity

Low latency

Low power con-sumption

Next Generation Communications Infrastructure

Digital Twin Computing

Mobile-fixed-line convergence

Remote World

IOWN's Vision for Society of the Future

Smart society

Low-carbon society

Well-being

Significance of collaboration

NTT's activities

IOWN
(low power consumption, high speed, and high reliability)

SKY Perfect JSAT's activities

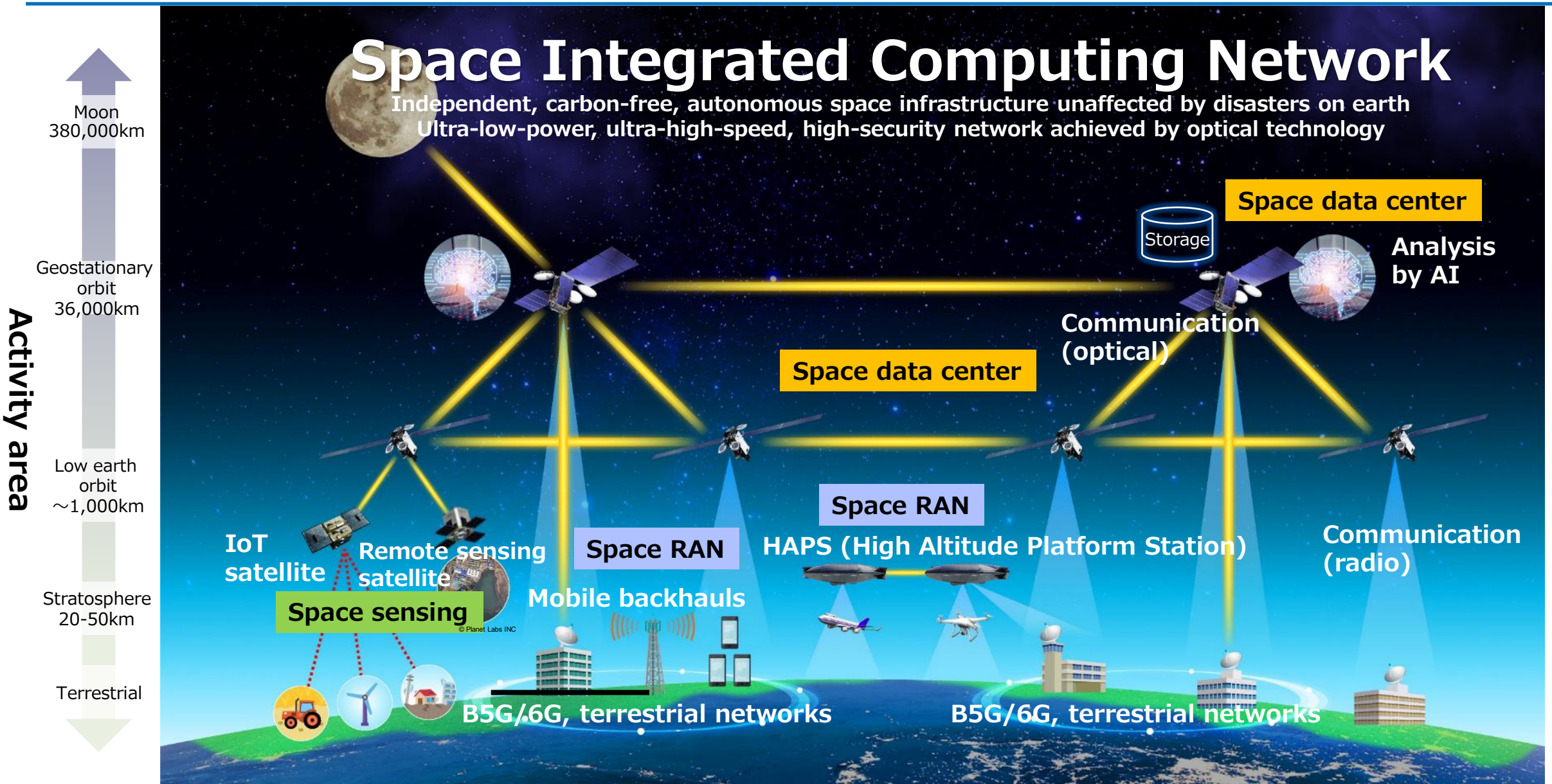
Operation of various orbiting assets
Space intelligence business

Innovations that break through limits in space

▼

Build the space integrated computing network that contributes to realizing a sustainable society

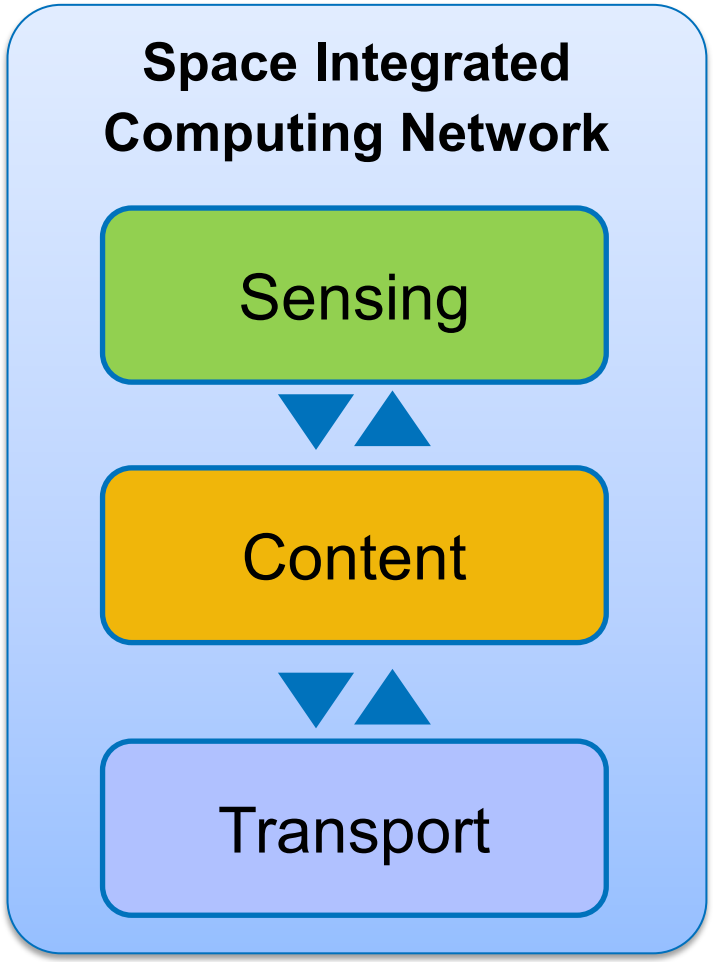
Vision for the future



New space business using Space Integrated Computing Network

NTT × SKY Perfect JSAT Group

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



① Space sensing:

Terrestrial and space sensing data integration infrastructure

②Space data center:

High-capacity communication/computing infrastructure in space

③Space RAN (Radio Access Network):

Space communication infrastructure looking ahead to Beyond5G/6G

① Space sensing project

Capture the earth from the micro and macro perspectives, which may lead to catch the signs of a crisis

Functions to be implemented

① Enable broadband wireless communication using world-first low earth orbit satellite MIMO

② Connect IoT devices anywhere in the world, including Radio quiet zones, to the network via satellite

③ Collect observation data not visible to conventional optical radar satellites

Technologies to be used

Optical wireless communication technology

Leading-edge device technology

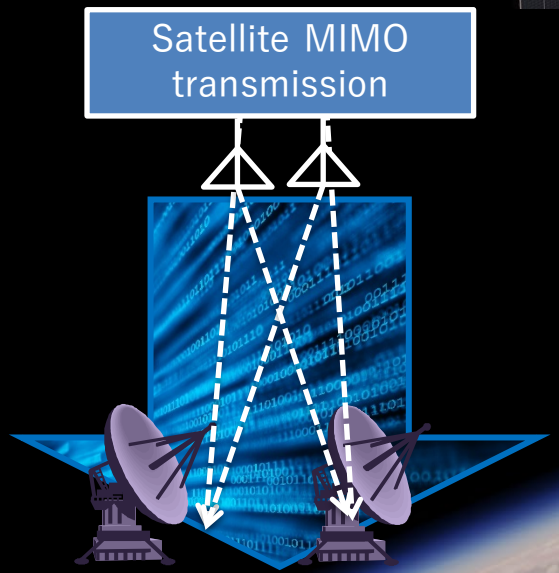
① Space sensing project

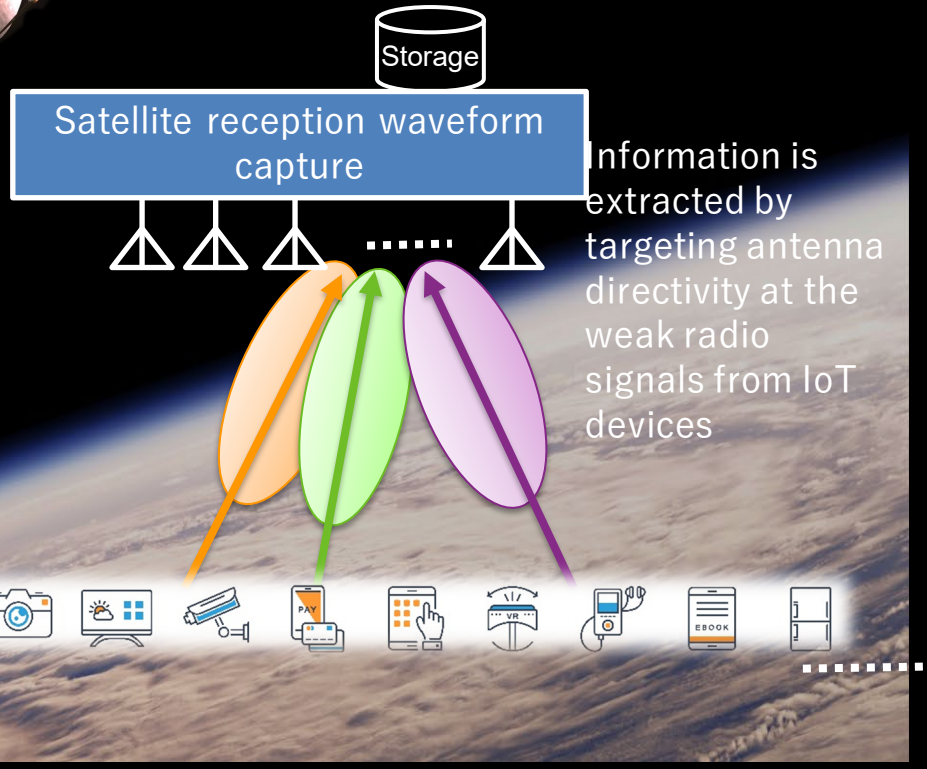
JAXA's satellite no. 3 will be used to demonstrate innovative satellite technologies.

Wireless (MIMO) communication technology

Wireless (IoT) communication technology

-JAXA sat no.3 is to be launched in 2022.
-High speed and huge capacity are available by MIMO technology, which transmits data from multiple antennas simultaneously.
-Waveforms received by a satellite are transferred to the ground without modification.





② Space data center project

Use the unlimited expanse of space to obtain the required energy, store data generated in space, and derive value from the data

Functions to be implemented

① Achieve low power consumption and high resistance to cosmic rays
② Build an integrated optical network by combining space and terrestrial networks
③ Use distributed computing to enable edge processing of a huge volume of data in space
④ Build secure space data centers

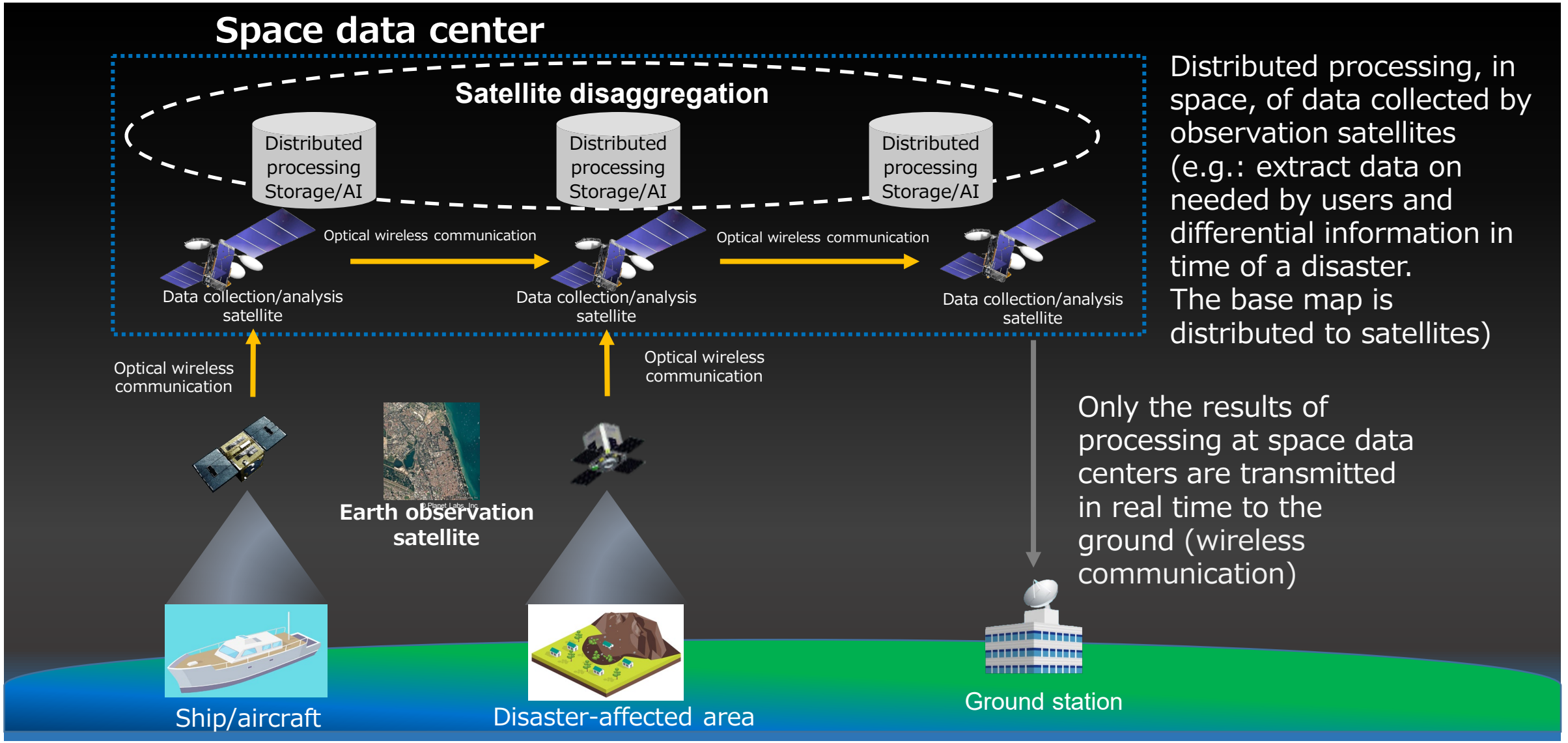
Technologies to be used

Photonics-Electronics Convergence Technology

Computing Technology

Optical Wireless Communication Technology

② Space data center project



Distributed processing, in space, of data collected by observation satellites (e.g.: extract data on needed by users and differential information in time of a disaster.
The base map is distributed to satellites)

Only the results of processing at space data centers are transmitted in real time to the ground (wireless communication)

③ Space RAN (Radio Access Network) project

NTT × SKY Perfect JSAT Group

Build a new network with wide-area coverage, high speed, and high reliability, which were difficult to realize in the past.

Functions to be implemented

① Space-terrestrial mutual network between Satellites (GEO/ LEO) and HAPS.
② Autonomous control (Network routing optimization, etc.)

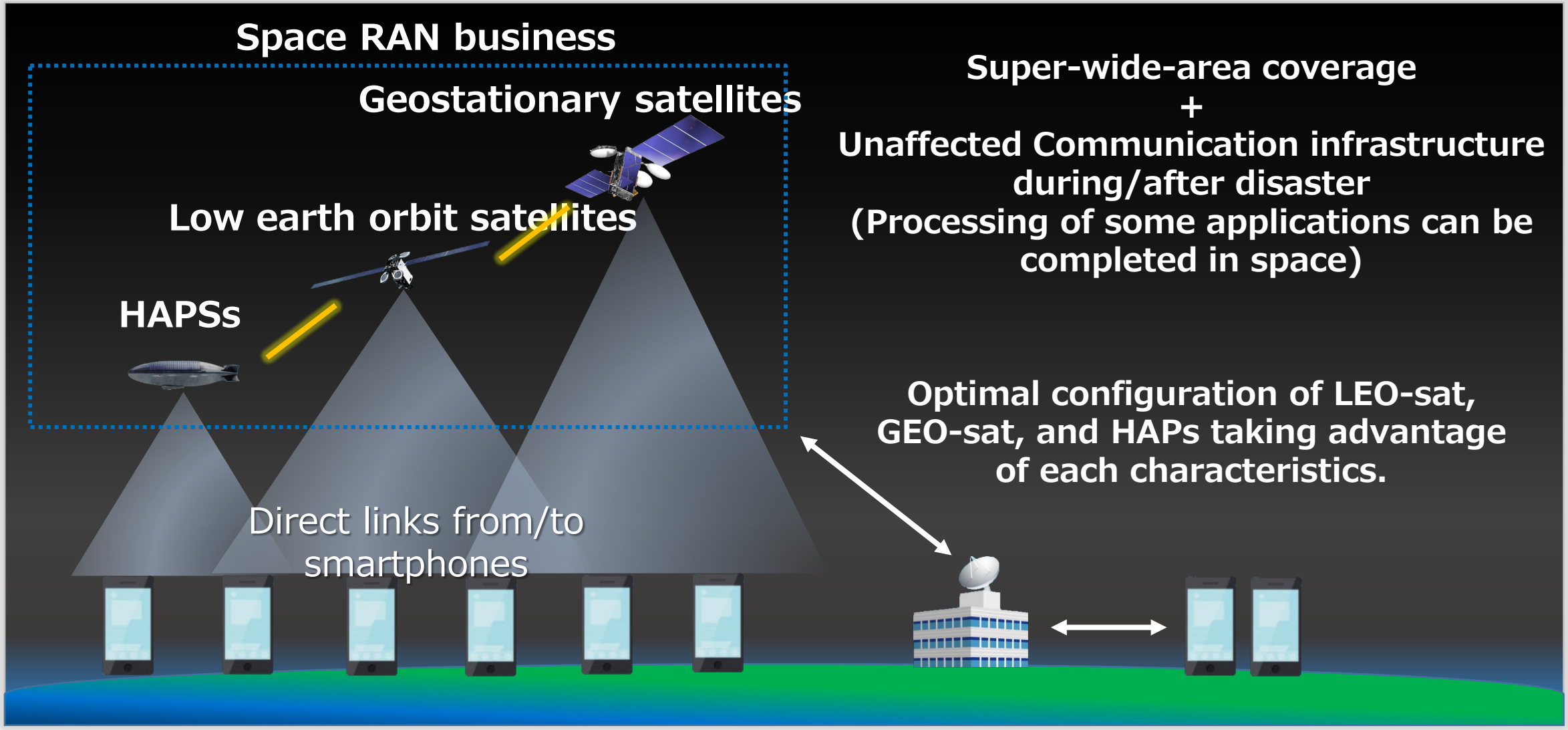
Technologies to be used

Optical Wireless Communication Technology

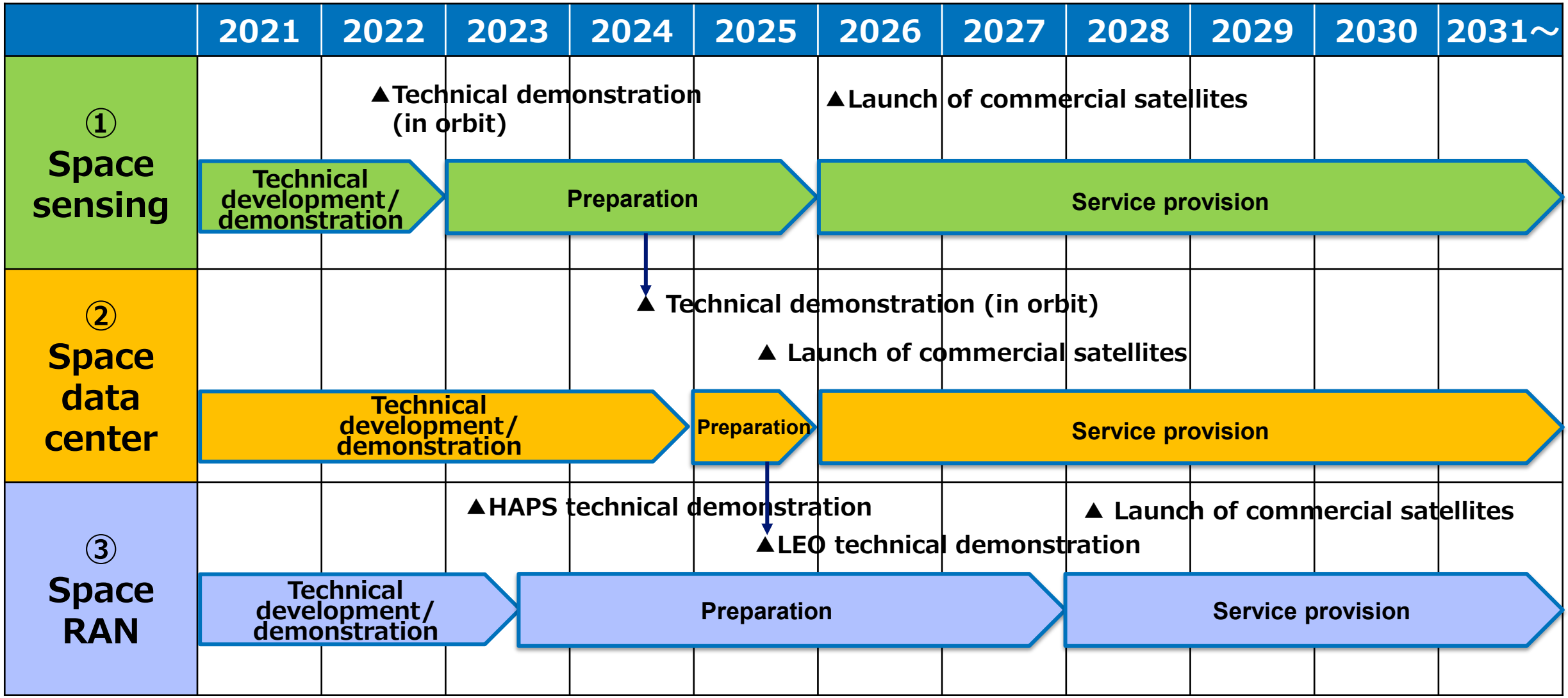
Disaggregated Computing Technology

Network Function Virtualization Technology

③ Space RAN (Radio Access Network) project



Tentative timeline for service provision



【作業中ファイル】

Constructing an integrated computing network in space to support a sustainable society.

NTT

SKY Perfect JSAT Group