

Outline of the Report of Study Group on Space Communications in the Ubiquitous Network Era (Excerpts)

**~ Toward the realization of
Ubiquitous Space-Net Program (USN Program) ~**

August 2005
Space Communications Policy Division
Ministry of Internal Affairs and Communications
JAPAN

Basic Principles for Space Communications in the Ubiquitous Network Society

The scope of this study

- Indicate the direction for how to use R&D of space communications to construct the ubiquitous network society
- Specify the future usage pattern of space communications to be realized and indicate the necessary direction for realizing the usage pattern
- Target Time: In 10 to 20 years
- Scope: Academia, industry, and government in Japan

The u-Japan Policy (Concept)

(December 2004 Ministry of Internal Affairs and Communications)

- Free from “network” restrictions
- Free from “terminal” restrictions
- Free from “service” and “content” restrictions

Realize a networked society that can be easily connected
“anytime, anywhere, by anything and anyone”

The Basic Strategy for Space Development and Utilization in Japan

(Significance of space development and utilization) (September 2004 Council for Science and Technology Policy, Cabinet Office)

- Importance of Nation's strategic technologies
- Contribute to the Nation's integrated security
- Sustainable development of the Earth and humankind

(Aim of space development and utilization)

- Secure the safety of all citizens
- Expand the growth of an economic society and improve the quality of people's lives
- Sustainable development of the creation for knowledge and humankind

Features of Space Communications

- (1) Advantages: Simultaneous reception capability, expanded service area, mobility, disaster prevention, etc.
- (2) Disadvantages: Time delay, maintenance, size of terminal, etc.

Basic Principles for Space Communications in the Ubiquitous Network Society

- Promote technical development and strategic usage utilizing the features of space communications toward the actual goals such as securing the safety of the Japanese people and improve the quality of people's lives in a real ubiquitous network society.
- Realize “ubiquitous ” networks in recognizing every space where humans can be active.

Anticipated 12 fields of utilizing space communications

- Summarize the opinions of the members of the study group regarding space communications in 2015 and 2025 and define anticipated 12 fields of utilizing space communications.

Ensure Security and Safety

1. Establish communications and broadcasting in cases of disasters

Provide communications to guarantee safety, security and disaster prevention

2. Collect and distribute disaster information

Construct a robust communications infrastructure

Provide a quick start temporary line to collect disaster information in cases of disasters
Speedy and steady delivery of vital information to any terminal at any time, anywhere, and to anyone

4. Earth observation (Improve accuracy, establish a system)

Implement an effective global Earth observation system that utilizes the features of satellite and on-site observation

Predict the magnitude of the disaster and grasp information on the disaster on a highly periodic basis using the global Earth observation satellite data In cases of disasters
Observe the global Earth environment, such as global warming and the water cycle, independently and successively as well as participate and contribute to GEOSS

3. Establish an Asian communications system

Establish a communications system with a high degree of value added services to regions in Asia that have no terrestrial infrastructure

Provide a broadcasting service that are not effected by the amount of information or the number of recipients in cases of emergencies such as disasters
Construct an alarm network that can promptly announce emergencies such as earthquakes and tsunami
Provide communications satellite networks and two-way services

5. Broadband environments for mobile communications and broadcasting

Construct a mobile broadband network using seamless terrestrial and satellite systems

Bridging the geographical digital divide (in rural areas, etc.)
Provide emergency communications systems in cases of disasters
Deliver images of unidentified vessels to secure maritime safety and carry out routine monitoring in wide areas

6. Measurement of space environment

Japan's participation in sharing high priority tasks in the space weather observation network

Carry out alarms and forecasts for solar flare particles

10. Space-time information service (Universal positioning)

Provide services in various areas such as disaster prevention and security by incorporating geographical information of positioning/time and content in real time

11. Integrate with sensor-net

Realize a sophisticated and hybrid communications system by combining the features of satellite systems such as expanded service area, simultaneous reception capability, delivering to multiple addresses with terrestrial systems

7. Bridge the geographical digital divide in communications and broadcasting

Construct a network that covers the whole of Japan, including remote islands without broadband infrastructures, with the use of satellites

Reduce communications and broadcasting costs that incorporates many users

8. Super high-definition television broadcasting

Realize super High-vision broadcasting with 21GHz band satellite broadcasting

Realize high realistic sensations and immersion
Provide broadcasting with ultra-flat light-weight personal screens

9. Seamless integrated terrestrial and extraterrestrial communications

Realize seamless automatic communications to geographical digital divide regions using satellite gateway stations
Construct communications networks with rural areas, mobile vessels such as ships and airplanes, and disaster areas

12. Foundation for communications networks in outer space

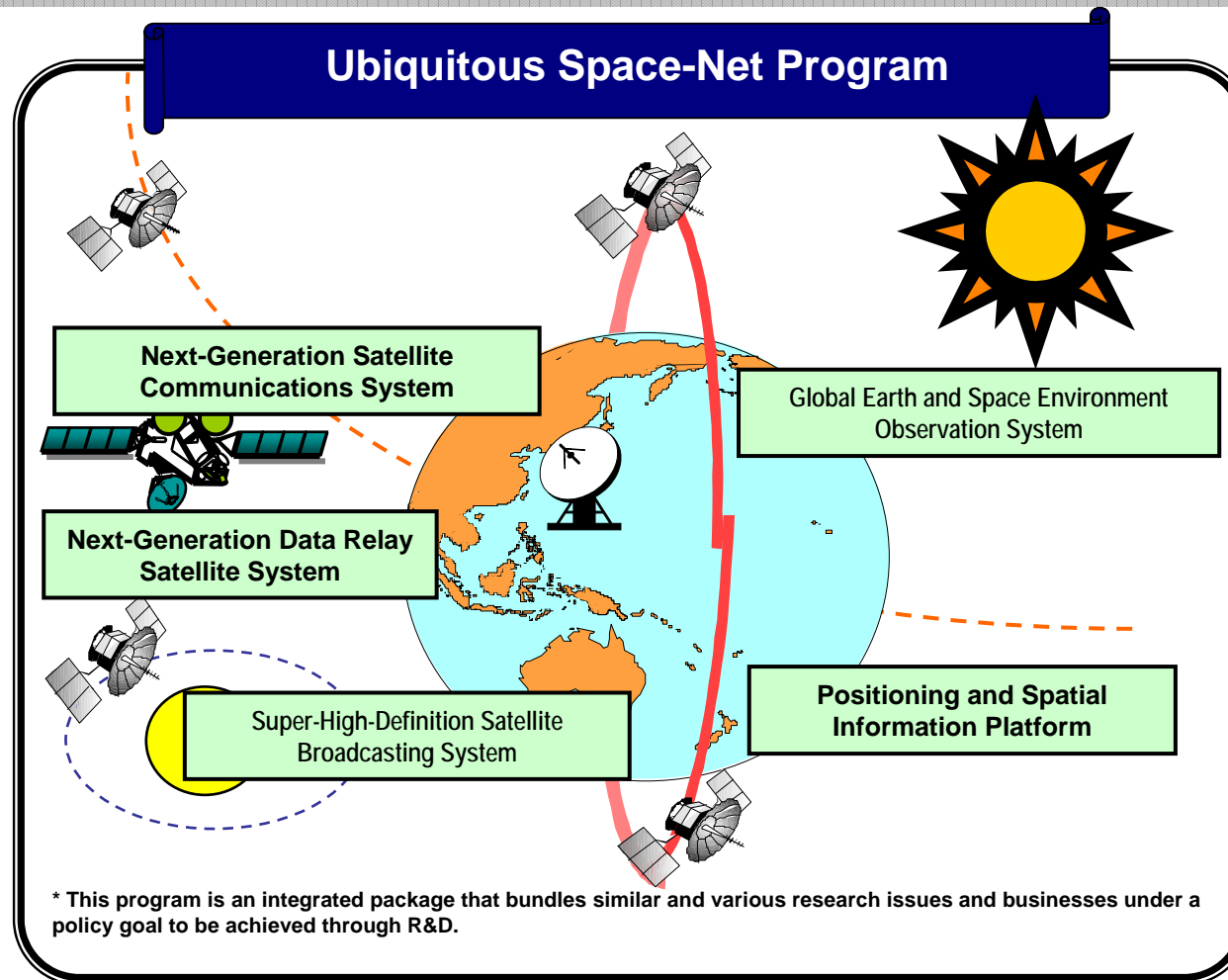
Realize the delivery of large capacity Global Earth Environmental observation data and ultra long distance high speed communications technology for explorations of the moon, planets and deep space

Realizing an information and communications environment free of geographical digital divide

Advancing the usage of outer space

Ubiquitous Space-Net Program

To realize a ubiquitous network society, it is necessary to promote the following five systems named “Ubiquitous Space-Net Program” that play various roles and have various expectations such as the development of an economic society, enjoying a ubiquitous network environment, and ensuring security and safety for humankind.



u-Japan Policy Package

“Developing the Ubiquitous Network” “Technological Strategies”

UNS Strategic Program

“Ubiquitous Mobility”
“Sensing Ubiquitous Space-time infrastructure”¹

Cooperate to ensure consistency

1. Next-Generation Satellite Communications System

--A satellite communications system that realizes various applications covering both fixed and mobile communications, regardless of time or place--

Necessity

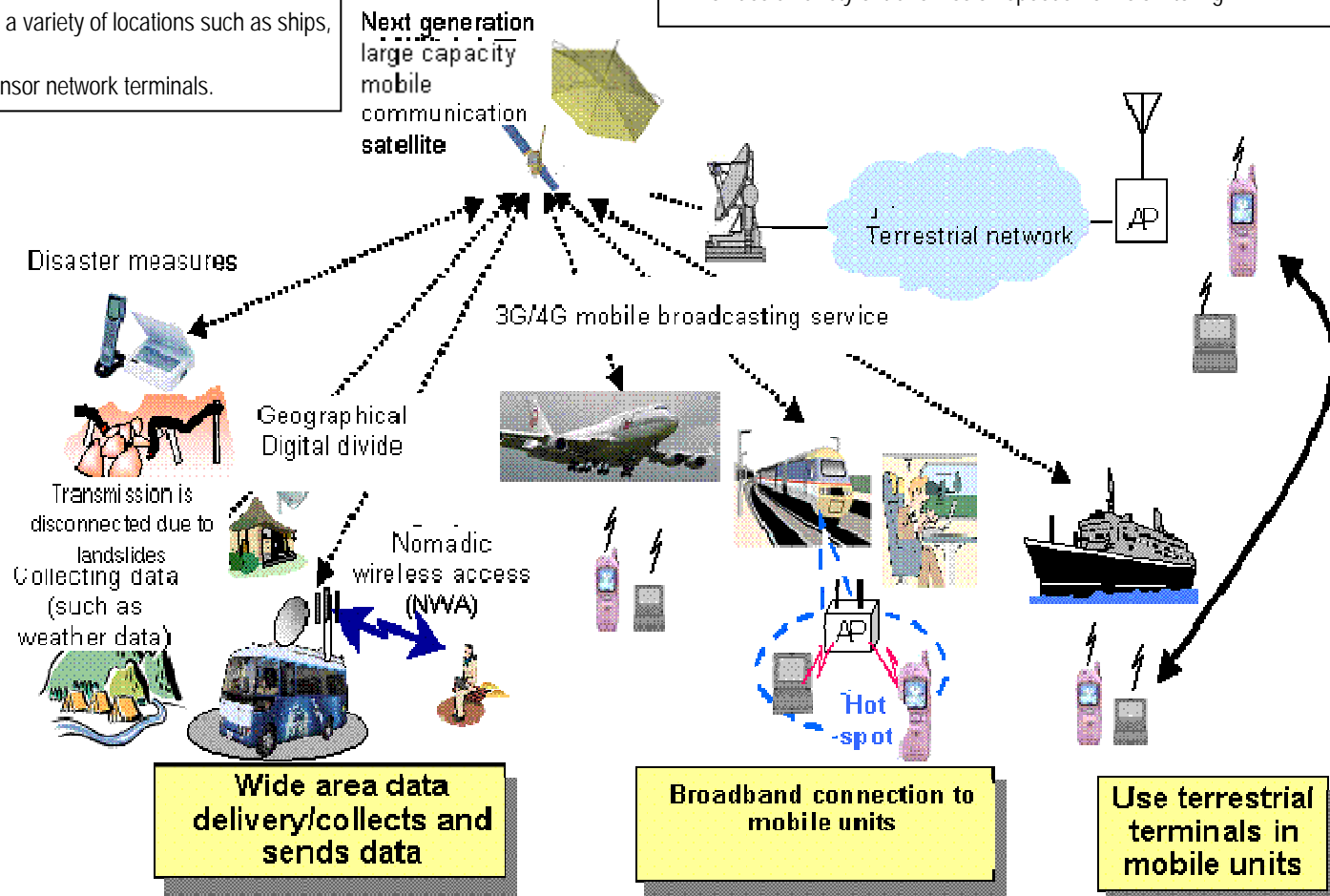
This is a system to realize multipurpose roles expected in a variety of applications such as disaster measures and the geographical digital divide solution by applying space communications. Establish seamless communications with terrestrial networks.

Examples of usage

- Realize broadband services, bridging geographical digital divide, disaster measures, and environmental monitoring through communications and broadcasting.
- Provide a broadband environment to a variety of locations such as ships, airplanes, and space ships.
- Contains an enormous number of sensor network terminals.

System performance

- Same transmission speed as the terrestrial services in 10 years.
- Mobile terminals and PC's can be shared with terrestrial and space networks
- Provides a variety of transmission speeds from slow to high.



2. Super-High-Definition Satellite Broadcasting System

--A system that offers highly realistic broadcasting nationwide at a low cost regardless of time or place --

Necessity

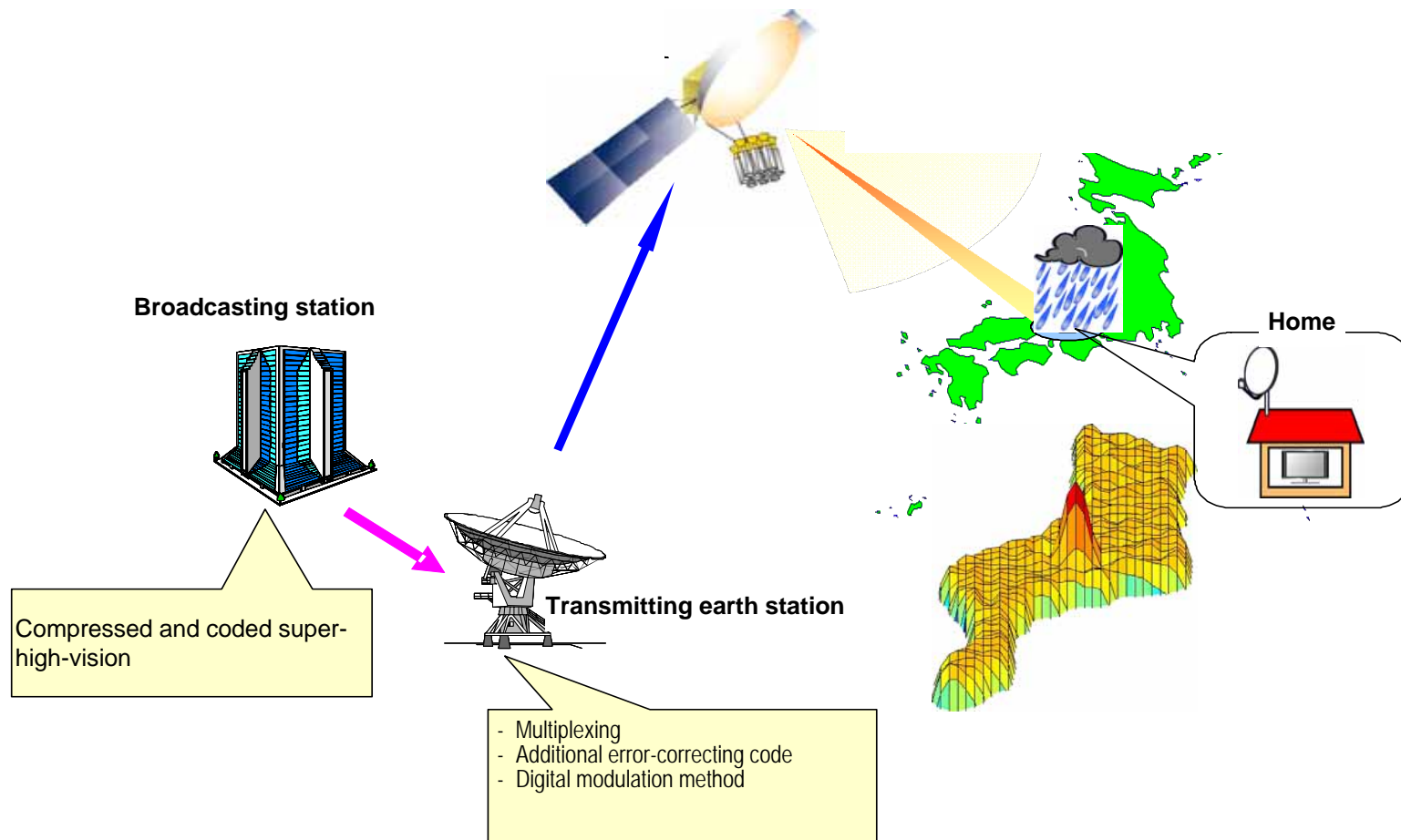
As a future broadcasting service, there is great demand in super-high-definition broadcasting that offers a realistic feeling and immersion exceeding the current High-vision.

Examples of usage

- Super-High-vision broadcasting
- Multi-channel High-vision
- Ultra-high-precision images and data delivery based on users' needs

System performance

- Super-High-definition broadcasting with 4,000 scanning lines
- Realize home reception with a 45-cm diameter antenna
- Compensation for rainfall attenuation based on rain distribution



3. Global Earth and Space Environment Observation System

-- An observation system that grasps spatial phenomena, and the condition of the earth's surface, rainfall, and the atmosphere with high precision --

Necessity

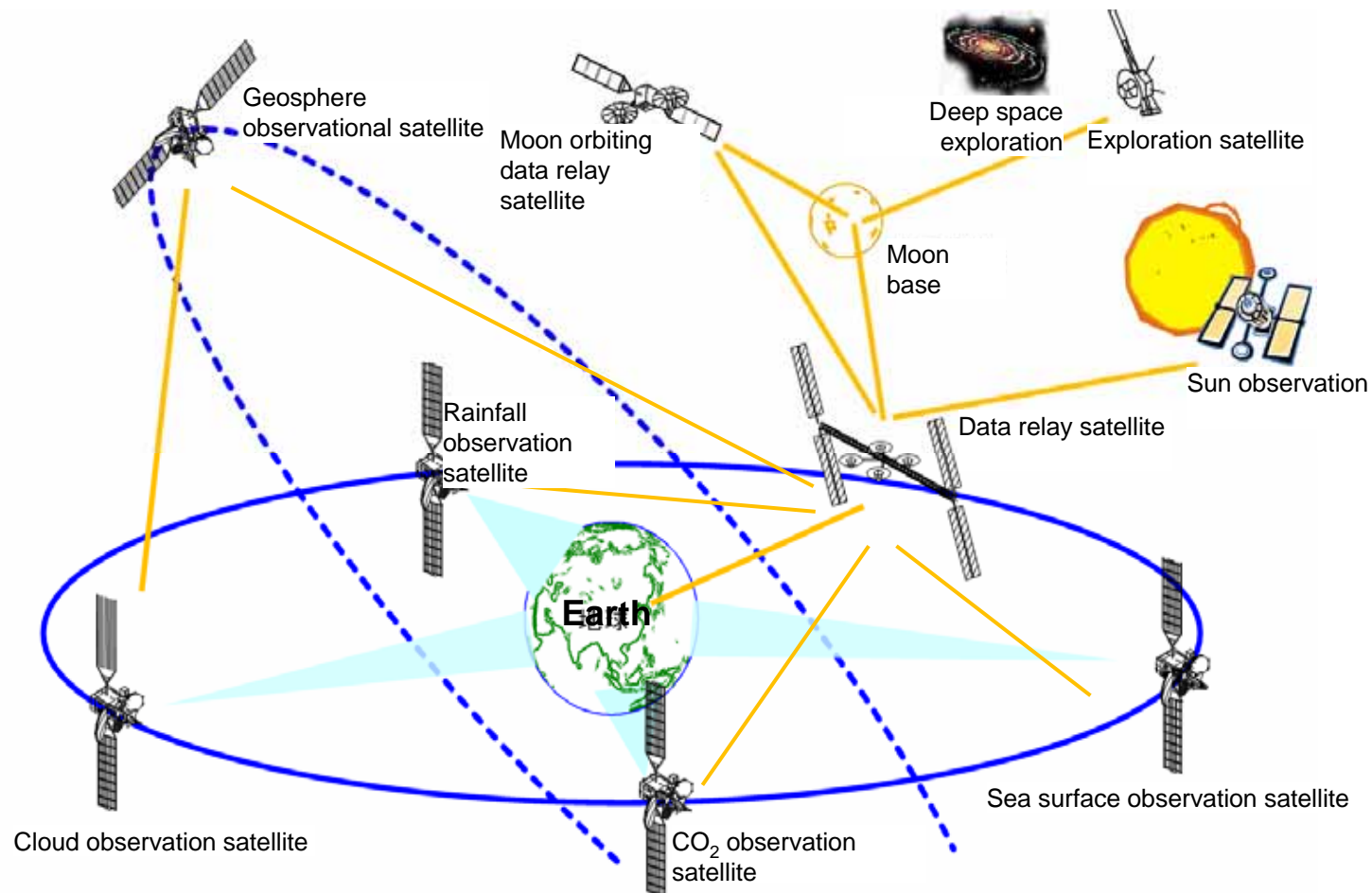
High precision environmental information that offers environmental variations on a global scale, space observation and clarification of various mechanisms, security, and solutions for large-scale disasters is in great demand. This system offers an integrated collection and analysis of various information and is expected to contribute to a wide area that cannot be provided by other ICTs.

Examples of usage

- Urgent solutions such as prompt understanding of disasters in cases of emergency.
- Constant high-precision observation of various environmental data such as global environmental issues.
- Safe operation of satellites based on the observation data of solar flare particles.

System performance

- Observational technologies of the earth's surface at a resolution of 10 m or better
- Rainfall observation on a global basis every 3 hours
- High-precision observation technologies of CO₂, the global warming gas



4. Positioning and Spatial Information Platform

-- An information platform that realizes various applications by combining geographic information system (GIS), positioning information given by quasi-zenith satellites and GPS, and time information--

Necessity

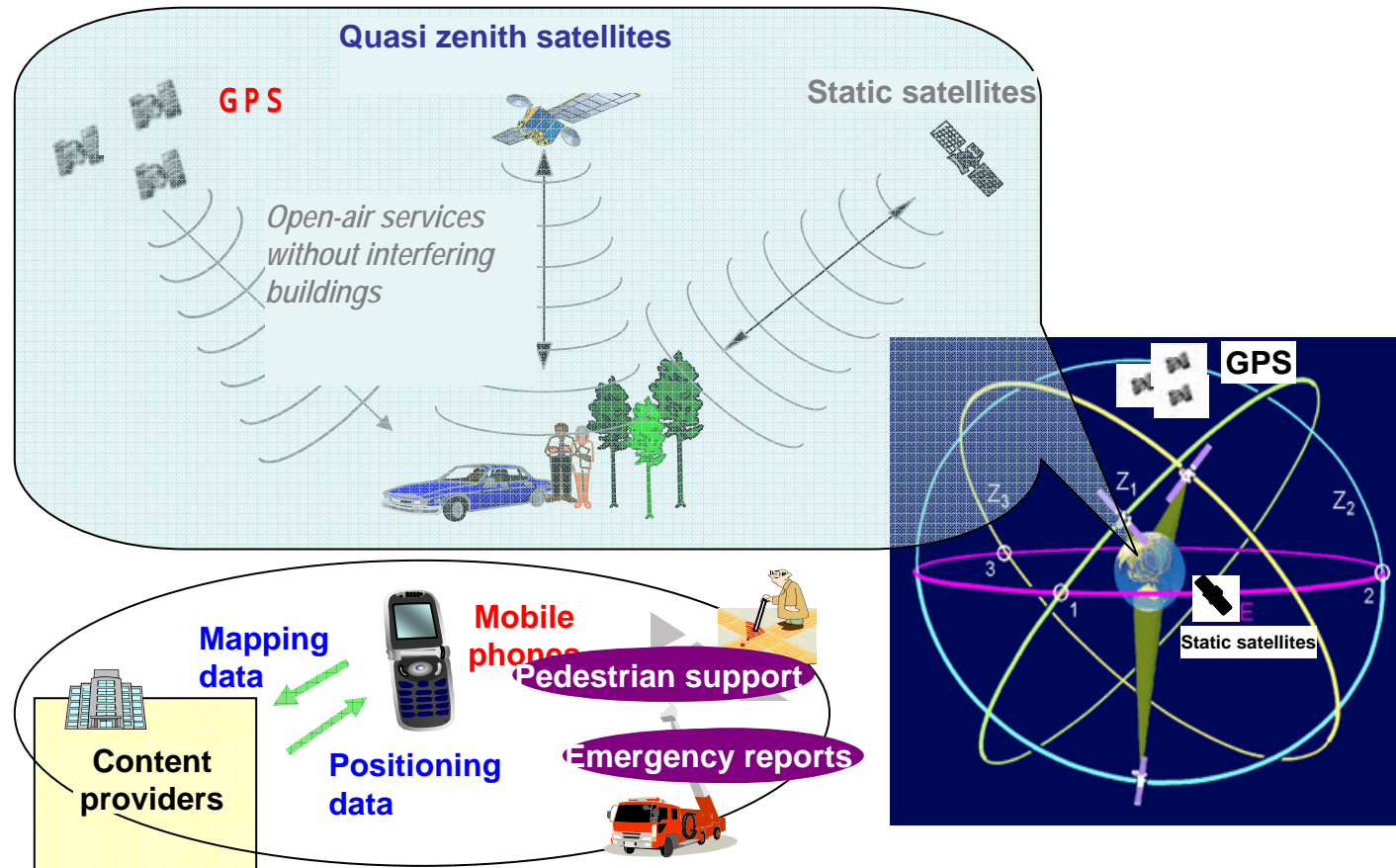
To date there are great demands in applying high-precision positioning information to automobile and pedestrian ITS, and robots. Furthermore, preparing highly precise spatial information as the country's platform is highly expected.

Examples of usage

Use in pedestrian ITS (Japanese version E911), automobile ITS (automatic drive), robots (automatic operation), surveys, and providing disaster prevention information

System performance

- Navigation that can differentiate individual vehicles
- Precise positioning with several cm accuracy
- A large-scale GIS database of highly precise positioning information



5. Next-Generation Data Relay Satellite System

-- A satellite system that offers a secure communications environment for human space activities and Earth and space environment observation by connecting space ships and earth stations with high-speed and flexible communications links--

Necessity

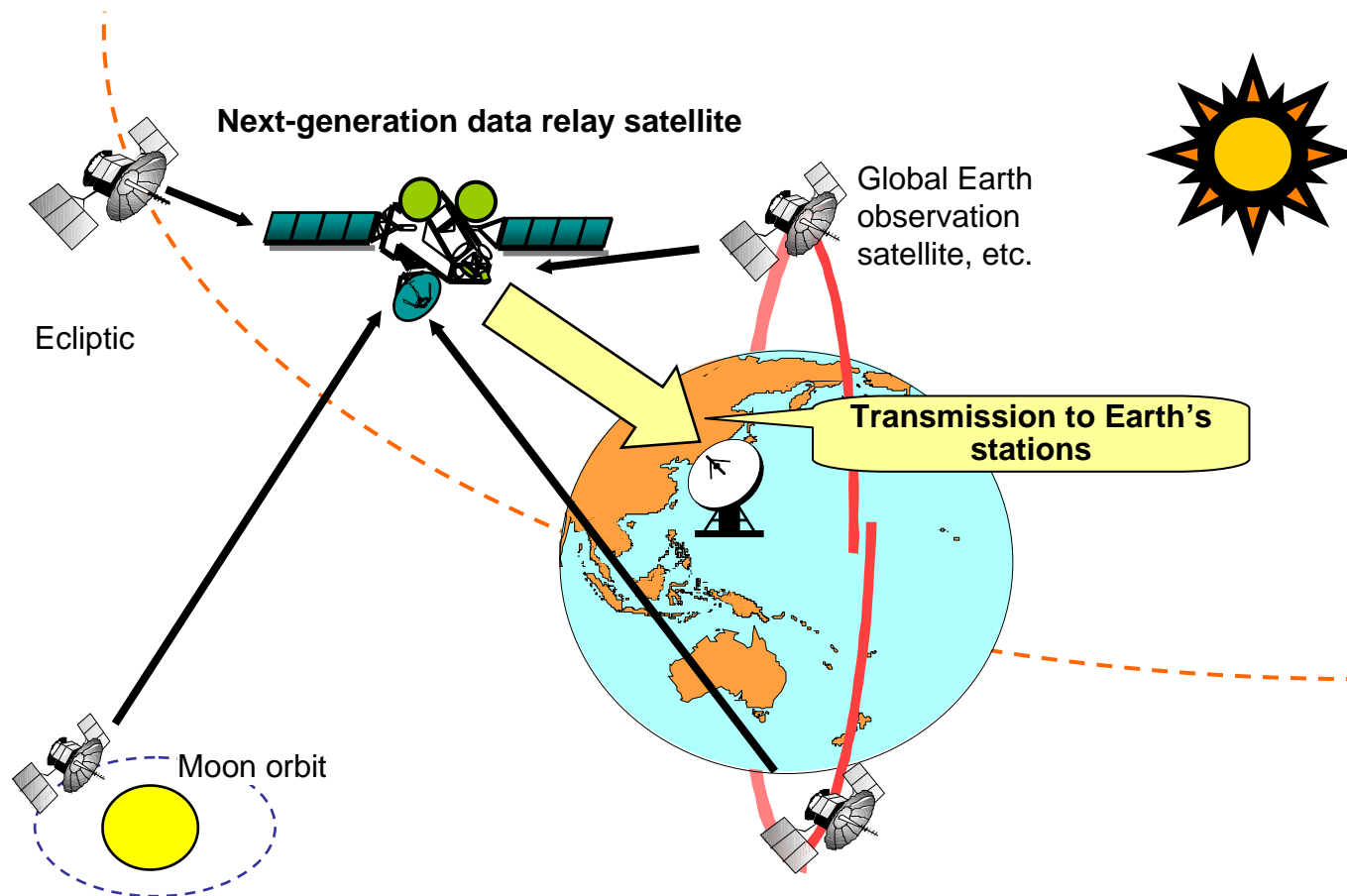
Secure accurate communications measures for human space activities.
Transmit high-precision data collected by global Earth observation satellites, etc. to wide areas and in real time as much as possible.

Examples of usage

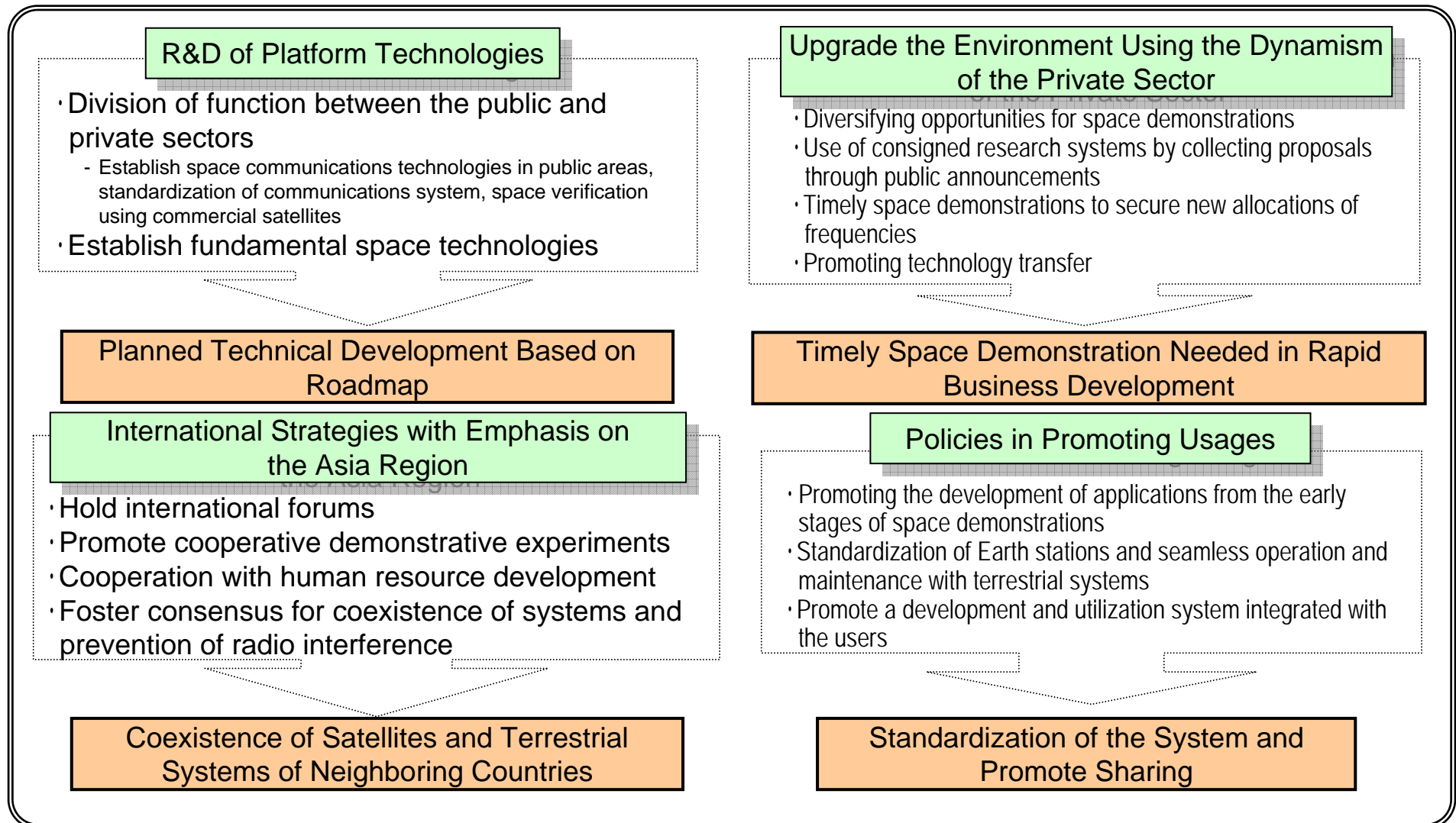
-Construct communications networks as the platform for human space activities, etc.
-Transmit large-capacity data from global Earth and exploration satellites to the Earth in real time.

System performance

-Transmit several Gbps class observation data
-Deliver data to users (transport factor: 99%, quantity of information: several Mb, transport time: within 3 hours)



Promotional Policies to Realize the Ubiquitous Space-Net Program



An Integrated and Planned Realization of the Ubiquitous Space-Net Program