The Business of Space: Our Vision and Roadmap

Taking advantage of changes in market trends and industry policies, NEC's Space Business is reinventing itself and transforming into a global solution provider. Leveraging a portfolio of technologies from miniaturization to sensors that have been honed to a cutting edge over the years, we are advancing solutions that fuse IT and network technologies with the aim of targeting this business at the global market with a focus on emerging nations. With our vision and roadmap for our Space Business serving as a compass, NEC is committed to unifying the company behind achieving this objective.

Associate Senior Vice President and
Senior General Manager,
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1 Preface

Currently the space business coming to a major turning point. In recent years, there have been dramatic changes in market trends and industry policies, and swift and appropriate response to the changes in the market environment will lead to carving out a superior competitive position.

Against this background, our space systems business formulated the NEC Space Business Vision and Space Business Roadmap in summer 2010 as an action plan that reorients the direction and objectives of our business, unifies the efforts of all employees related to this business, and accelerates change and reforms in our operations.

Sharing these objectives within the NEC Group, we have clearly declared to our customers how NEC will change and our commitment to making this happen.

2 Space System Business: Circumstances and Related Issues

2.1 State of the Market

In FY2008, the scale of the space-related market in Japan was approximately 7.2 trillion yen, growing at a steady annual rate of 5% (Source: The Society of Japanese Aerospace Companies, Research 2010). However, satellite communications and broadcast systems, car navigation systems and other products aimed at the general consumer accounted for over 95% of this market, and market scale of NEC's main business domain of "space systems manufacturing" only amounted to approximately 250 billion yen. Moreover, the government's space development budget accounts for a sizable presence in this manufacturing market, and this budget has come under severe pressure in the face of the severe fiscal condition of government finances. This same trend can be observed in countries around the world.

When viewed by market segment, the communications and broadcast sector which accounts for the majority of the market is already quite mature while the relatively young market of remote sensing is the focus of increasing attention. Forecasts point to further exploitation of the unique wide area and borderless attributes of space as a place, and the expansion of the practical utilization of space through the provision of systems and services such as global environment and disaster monitoring and geo-spatial intelligence services that combine GPS data and related information.

2.2 Changes in Industry Policy – Shift from Development to Utilization

The enactment of the Basic Space Law signaled a major shift

in the policy of Japan's space industry away from "development" and towards the "utilization" of space. The advance of space development and its utilization was further promoted by the "New Growth Strategy" issued by the Cabinet in 2010.

The government has clearly stated its intent to position the space industry as one of the strategic industries in the 21st century, and its pursuit of the following four approaches to bolster this industry's competitiveness in the global arena:

1) Promotion of sustainable space utilization projects that serve as social infrastructure;
2) "Space Diplomacy" - space development and utilization as a diplomatic means or objective;
3) Promotion of the utilization of space in the area of national security; and
4) Elevating the level of overall industry through cutting-edge research and development.

As a result of this change in government policy, while companies will be gaining support for the building of a space industry, there will be a strong demand for these same corporations to accelerate their response to these changes. Seizing these changes as an opportunity, the NEC Space Business Roadmap provides a compass for navigating the reinvention of NEC.

2.3 NEC Space Business Objectives

In order to realize NEC Group Vision V2017 "To be a leading global company leveraging the power of innovation to realize an information society friendly to humans and the earth," NEC's Space Business has given the following 3 management issues the highest priority.

1) Raise the topline

Double the scale of the space business to 100 billion yen in ten years through the expansion of the access market and business domains.

2) Increase cost competitiveness

Increase ratio of mass production and reduce costs through the promotion of product standardization.

3) Stabilize business

Build a business framework that supports sustainable investment and has reduced exposure to risks from market trends by escaping from the current state of the excessive reliance on few customers, expanding business globally, and broadening the scope of business activities including the field of space utilization.

The Space Business Vision and Roadmap both clarifies these business objectives and shows the way to achieving them. Here we would like to introduce this content as well as its relevance to the "Progress with the implementation of NEC's Roadmap" described in this special issue.

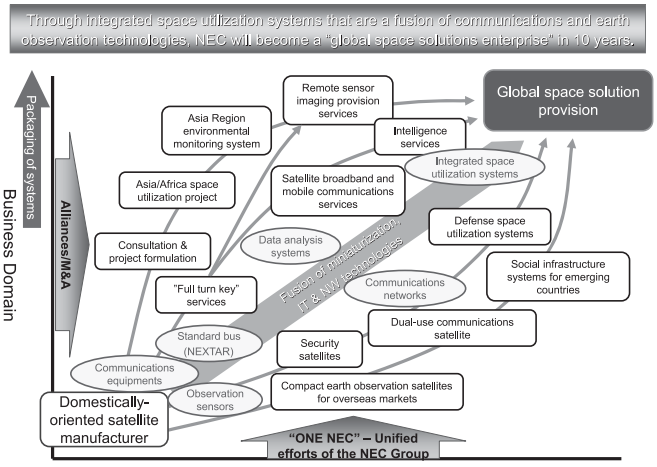

Fig. 1 NEC space business vision.

3 Space Business Vision

3.1 Reinvention as a Space Solution Company

NEC is committed to transforming from a domestic R&D-centric satellite manufacturer and reinventing itself as a solutions company that provides "global space solutions" (See **Fig. 1**).

For our action plan based on NEC's Group Vision V2017, our space business has set its sights on "global provision of a variety of solutions" that exploit the innovation tool called space.

In 10 years, NEC sees itself as a space solutions enterprise that provides "integrated space-utilization systems" that fuse communications and global observation technologies, and services that exploit those systems and apply the remote sensing data that they capture. By processing, analyzing and storing both the observation data acquired from space systems and various sensor data collected from terrestrial sources, we aim to provide information services that can provide "any" user with "any" information that they need "anytime" and "anywhere" (See **Fig. 2**).

The key to making these solutions a reality will be IT & Network technologies and miniaturization and sensor technologies in the space system segment - all fields in which NEC possesses an extensive record of achievements and high-level of technological expertise. Leveraging products and services basked by superior technological capabilities and vast experience, NEC will take its space business into global markets, aggressively pursue the expansion of our business domain in information services, and realize its transformation into a new and vital business.

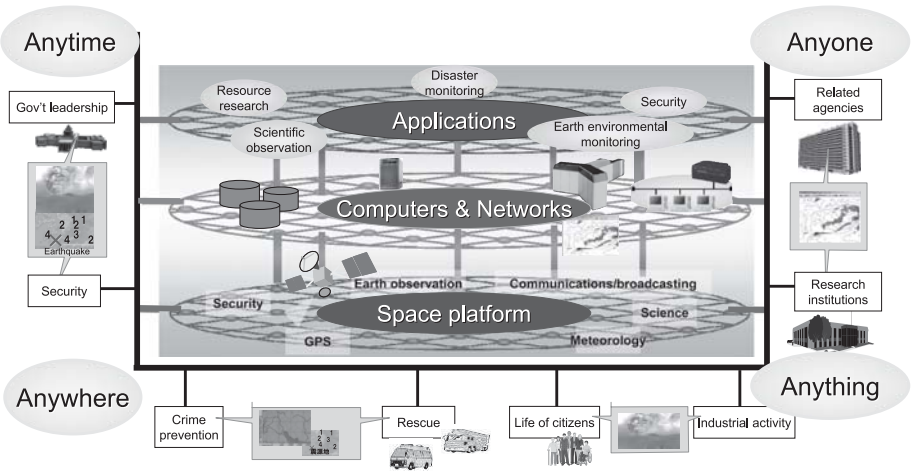

Fig. 2 Integrated space utilization systems.

3.2 Expansion into Global Markets

The key targets in NEC's global business expansion are the emerging Asian, African and Central/South American nations with a demand for space solutions. There are great needs in these countries for solutions to various social issues (environmental pollution, resource management, response to natural disasters) by using remote sensing data and for the promotion of the development of their industries through the acquisition of cutting-edge space-related technologies.

NEC believes that integrated space utilization systems based on compact earth observation satellites that both are relatively affordable and economical provide an optimum solution for the space utilization needs of developing countries. Packaging the "hardware" consisting of the systems that utilize the data and the essential "software" of technology transfer and human resource development, we aim to provide a key piece of the social infrastructure. With the development of small earth observation satellites serving as the nucleus of the system, Ministry of Economy, Trade and Industry (METI) is undertaking the Advanced Satellite with New System Architecture for Observation (ASNARO) Project. ASNARO will be the very latest in compact satellite engineering, incorporating both miniaturization and weight reduction technologies that we have honed over long years in this industry and the autonomous control technologies that were developed for and proven by the success of "HAYABUSA." While weighing under 500 kg, this advanced satellite delivers the observation performance of a 2 ton-class commercial earth observation satellite.

With this small satellite as the heart of our business, NEC Group will provide attractive solutions made possible by the fusion of the rich diversity of our IT applications, and launch the

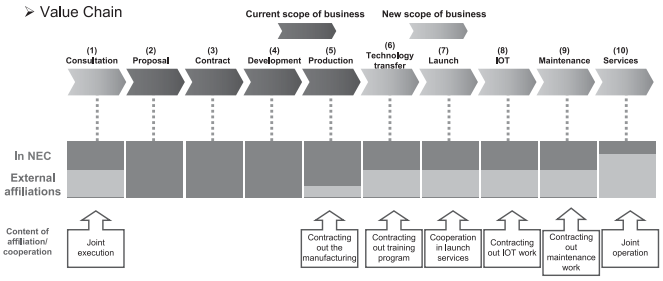

Fig. 3 Enhancing the value chain.

globalization of our space business by exploiting our overseas business networks and the "One NEC" initiative which aims at encouraging greater cooperation and cross-leveraging among our subsidiaries and business units.

3.3 Expansion of Business Domains

In order to expand our revenue sources from the current product development to the provision of utilization systems and services, we are aiming at promoting product standardization and improving our "full turn key" project implementation capabilities.

In the area of standardization, we have developed the standard satellite bus NEXTAR (NEC Next Generation Star) based on the results of ASNARO technological development, and are improving the lineup in combination with satellite-borne observation sensors. In parallel with this work, NEC is also moving forward the standardization with ground station systems (tracking and control station, data reception and processing facility) and developing a solution menu.

Also in order to improve overall execution of operations in the value chain of the solutions provided by NEC (from consultation to serving services), we are seeking to accelerate our business through aggressive exploitation of collaboration and cooperation with external parties (Alliances and M&A). (See **Fig. 3**).

4 Space Business Roadmap

4.1 2–Phase Approach to Becoming the Company We Envision

In order to double the scale of the current levels of our space-related business by 2020, NEC will pour its efforts into the growth sectors of overseas business (commercial equipment/devices + small satellites) and space utilization for domestic safety and security applications. As a result, NEC aims to transform our space business with a more stable business framework supported by 3 pillars: our ongoing R&D-centric business plus overseas-targeted commercial space business and domestic-oriented safety/security solutions.

This process of transformation will be divided into two phases: "Seeding" and "Harvesting" (See **Fig. 4**).

In the seeding phase, the priority will be on enhancing our solutions business capabilities with the aim of improving our lineup of standard products and building a robust structure of affiliations and collaboration with companies outside of the NEC Group. Also NEC Group's internal business structure will be reevaluated with an eye on improving operational efficiencies and strengthening our ability to respond to the new environment and needs of the market. By approaching emerging countries in tandem with ODA and other intergovernmental cooperation schemes, NEC aims to enter the global market. As preparation for the expansion of our business domain into the area of solutions, we will be devoting efforts to the construction of a business structure that includes collaboration with specialized business operators, and creating mechanisms and systems (information platforms) that will enable simple end-user access to remote sensing data.

In the area of space utilization for safety/security applications, NEC will realize a robust business structure by promoting close cooperation among all Group safety/security-related assets and by proactive cooperation with assets and affiliations outside the Group.

In the "Harvest" phase, we will exploit the business capabilities fostered in the previous phase and further expand the access market/business. This phase will also mark the construction of the integrated space utilization systems envisioned by NEC and the full-scale launch of our data utilization/provision service business. In step with the expansion of our business scale and scope of our domain, NEC will undertake the reconstruction of

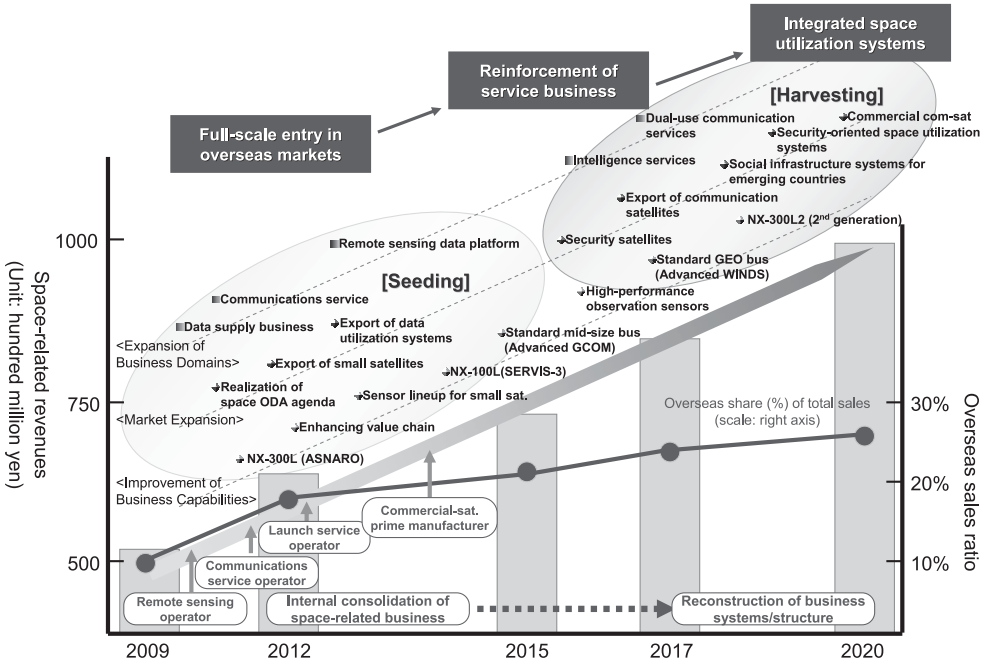

Fig. 4 Space business roadmap.

our business structure. As our objectives in market expansion, we will shift to full-scale export of social infrastructure systems for emerging nations, provide space utilization systems for safety-security applications, and enter the commercial communications satellites market.

4.2 Business Structural Reform

The preceding sections have provided an overview of the NEC's Space Business Vision and Roadmap, but for the efficient execution of the roadmap, it will be very important to clarify the respective roles and responsibilities of the Strategic Business Units (SBU) which are organized by the markets of "Communications/Broadcasting/GPS," "Earth Observation," "Future Large Scale Systems," "Rocket-borne Equipment" "Satellites for Safety/Security," "Satellites for Scientific/Technology" and "Commercial Equipment." These SBUs are broadly positioned into two categories "Platform Business" and "Solution Business" as shown in **Fig. 5** .

In field of Platform Business are the "Safety/Security," "Scientific/Technology" and "Commercial Equipment" SBUs. By securing stability of revenues from these business units and the development of new technologies that are the seeds of the future, NEC aims to make our Platform Business into a solid foundation for our space business.

The Solution Business category is comprised of the "Communications/Broadcasting/GPS" and "Earth Observation" SBUs. NEC has assigned this category with the role of driving the growth of our space business by serving as the nucleus for our integrated space utilization systems and services.

Regarding SBU included in neither category, the "Future Large Scale Systems" SBU sets a course for the long-term formation of a business that will be a key pillar of NEC's space business in 20 years, while the "Rocket-borne Equipment" will contribute to the space business growth through sound and steady business execution.

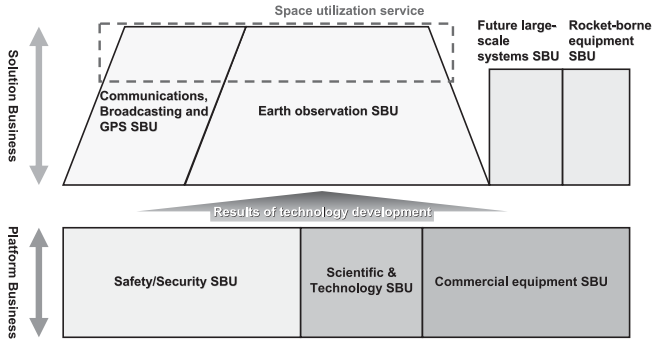

Fig. 5 Space business framework.

The latter half of this special issue will introduce the various technologies and products that will help NEC achieve each milestone and reach the destination of our roadmap.

5 Conclusion

With our Space Business Vision and Roadmap serving as our compass, NEC has set new objectives and has set out to meet their challenge.

We shall leverage the advanced technological strengths and rich experience gained over the years as Japan's pioneer in space development, and synergistically integrate group-wide IT and network technologies to contribute to realization of NEC's Group Vision of "an information society friendly to humans and the earth."

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