

## Section 4 Outer Space and Security

### 1 Outer Space and Security

Nearly 60 years have passed since a satellite was launched into space for the first time in the history of mankind. Technology leveraging outer space has recently been applied into different areas. Regarding outer space, no state is allowed to own and freely available for all nations, which prompts major countries to aggressively work on leveraging space<sup>1</sup>. For example, meteorological and observation satellites are used to observe weather as well as land and waters; communication and broadcasting satellites are used for the Internet and broadcasting; and positioning satellites are used to navigate aircrafts and ships. These satellites have widely prevailed in social, economic, scientific, and other areas as essential infrastructure for the public and private sectors.

In major countries also allow their armed forces are actively involved in outer space activities and utilize a variety of satellites. There is no concept of national borders in outer space, meaning that the utilization of satellites enables them to observe, communicate to, and position any area on Earth. Thus, major countries make efforts to enhance the capabilities of a variety of satellites and launch them for the purpose of enhancing C<sup>4</sup>ISR functions<sup>2</sup>, among others. Such satellites include image reconnaissance satellites reconnoitering military facilities and targets, satellites gathering radio wave information for military communications and radio wave gathering, communication satellites for military communication, and positioning satellites for navigating naval vessels and aircraft and enhancing the precision of weapons systems.

On the other hand, in January 2007, China conducted an Anti-Satellite (ASAT) test to destroy its aging satellite with a missile launched from the Earth's surface. The resulting space debris<sup>3</sup> was spread across the satellite's orbit, which was noted as a threat against space assets such as satellites owned by countries. Since existing frameworks, including the "Outer Space Treaty"

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<sup>1</sup> The Outer Space Treaty that came into force in October 1967 (The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies) defines such matters as the freedom of exploration and use in outer space, the prohibition of territorial ownership, and principles of the peaceful use of outer space. However, no clear international agreement has been reached on the definition of outer space, though it is generally considered as space located 100 km or further away from the Earth's surface.

<sup>2</sup> The term "C<sup>4</sup>ISR" stands for command, control, communication, computer, intelligence, surveillance, and reconnaissance. The 1991 Gulf War is defined as "the first high-tech war conducted in outer space in the history of mankind."

<sup>3</sup> Unnecessary artifacts orbiting around the Earth, including satellites no longer in use, upper stages of rockets, parts, and fragments

that prescribed the peaceful use of outer space, do not have provisions on avoiding the destruction of space objects and actions triggering debris, among others, international efforts have been under way recently for the creation of the “International Code of Conduct for Outer Space Activities”<sup>4</sup> proposed by the European Union (EU) and the guidelines for “Long-term Sustainability of Outer Space Activities”<sup>5</sup> of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) which address such matters. In addition, countries are working on the Space Situational Awareness (SSA)<sup>6</sup> by monitoring the impact of accelerated solar activity on satellites and electronic equipment on Earth and threats caused by meteors reaching the Earth, in addition to threats posed by anti-satellite weapons and space debris on space assets.

All of this shows that the risk toward the stable use of outer space has become one of the critical security challenges facing countries.

*See ▶ Part III, Chapter 1, Section 1-4 (Responses in Airspace)*

## **2 Trends in the Use of Space by Countries for Security Objectives**

### **1 United States**

The United States launched its first satellite, Explorer 1, in January 1958, following the former Soviet Union. The country has since then proceeded with a variety of space activities in fields including military, science, and resource exploration, such as launching the world’s first reconnaissance satellite and landing on the Moon, reaching the status of No. 1 superpower for space activities today. Its activities cover a wide spectrum of areas including military, social, and economic aspects, benefiting the United States as well as the entire world<sup>7</sup>. In addition, U.S. forces clearly recognize the importance of outer space in their actions, aggressively utilizing outer space for security purposes.

In June 2010, the United States published the “National Space Policy” defining the country’s basic guidelines for space policy, including its objectives and principles. It specified basic

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<sup>4</sup> In 2008, the EU formulated a draft and started bilateral discussions with major countries. Discussions have been made multilateral since 2012, targeting adoption

<sup>5</sup> In 2007, the chairperson for the United Nations Committee on the Peaceful Uses of Outer Space (U.N.COPUOS) proposed to discuss “the long-term sustainability of outer space activities” in relation to civil space activities, for the purpose of defining the risk reduction for long-term sustainable activities and equal access to outer space. This enabled the Scientific and Technical Subcommittee of U.N. COPUOS to set up a working group, which currently continues discussions for defining guidelines

<sup>6</sup> In May 2014, Gen. William L. Shelton, Commander of the U.S. Air Force Space Command, stated, “Currently, we track more than 23,000 objects in space—10 centimeters in size and larger. However, our sensors cannot see the estimated 500,000 pieces of debris between 1 and 10 centimeters in size,” and contends that space monitoring capabilities need to be strengthened.

<sup>7</sup> For example, the United States offers its GPS to the public sector.

principles for security, civil use, commercial use, and international cooperation; among others. The country also published the “National Security Space Strategy” (NSSS) as the security guideline regarding outer space in February 2011, explaining that current and future space environments include three trends, such as (1) the congestion of artificial objects including satellites, (2) the challenges contested by potential adversaries, and (3) accelerated competitions with other countries. Based on this understanding, the strategic objectives of the United States in outer space are (1) safety, stability, and security in space, (2) maintaining and enhancing the strategic national security advantages afforded to the United States by space, and (3) energizing the space industrial base that support U.S. national security. To meet these objectives, the NSSS states that the country will pursue strategic approaches of (1) promoting responsible, peaceful, and safe use of outer space, (2) providing improved U.S. space capabilities, (3) partnering with responsible nations, international organizations, and commercial firms, (4) preventing and deterring aggression against space infrastructure that supports U.S. national security, and (5) preparing to defeat attacks and to operate in a degraded environment.

From an organizational perspective, the National Aeronautics and Space Administration (NASA) shoulders non-military space development for the United States, while the U.S. Department of Defense works on space development from a national security perspective. Recently, NASA and the U.S. Air Force announced that they will work together to design aircraft and develop materials, among others.

Major satellites used for military purposes are used for multiple operations, including image reconnaissance, early warning, electronic reconnaissance, communication, and navigation and positioning.

## 2 Russia

Russia’s space activities have been continuing since the Soviet Union era. The former Soviet Union successively launched multiple satellites after it had launched the first satellite in the history of mankind, “Sputnik 1,” in October 1957, and had the largest number of launched satellites in the world by the end of the collapse of the former Soviet Union. Many military satellites were included, which enabled the country to compete against the U.S. for military expansion in outer space. Russia’s space activities have declined since the former Soviet Union collapsed in 1991. However, the country has recently started to expand its activities once again in the backdrop of its economic recovery.

Regarding the country’s trends in security, “the Russian Federation’s National Security Strategy

to 2020,” approved in May 2009, states that threats against its military security include policies by developed countries aiming for the militarization of outer space, interference with Russia’s space control systems, and others. “The Military Doctrine of the Russian Federation,” a document created in February 2010 to specifically define the principles of the “National Security Strategy” in the military field, says that ensuring superiority in outer space is one of the critical factors allowing its armed forces to achieve their objectives. It also refers to the necessity in a military mission to alert the Supreme Commander-in-Chief of the Armed Forces of the Russian Federation in a timely manner in case of aerospace attacks, and deploying and maintaining space systems supporting the activities of Russian forces, as well as establishing aerospace defense organizations.

From an organizational perspective, the Russian Federal Space Agency (FSA, commonly called “Roscosmos”) works on space activities related to Russia’s scientific and economic areas, while the Russian Ministry of Defense is involved in space activities for security purposes, and the Russian Aerospace Defense Forces conduct actual space activities for military purposes, manage facilities for launching satellites, and other activities.

Major satellites launched by Russia include satellites for image reconnaissance, early warnings, electronic reconnaissance, communication, and positioning, all of which are presumed to be used for security purposes.

### 3 Europe

Regarding European space activities, France and the United Kingdom succeeded in launching their own satellites for the first time in 1965 and 1971 respectively, following the former Soviet Union and the U.S., and Italy and Germany used rockets developed by the U.S. to own satellites in December 1964 and July 1965, respectively. On the other hand, the European Space Agency (ESA)<sup>8</sup> Convention signed in April 1975 established the ESA, which launched a satellite in 1979.

In Europe, the EU, the ESA, and European countries are promoting their own unique space activities and are also helping each other to implement space activities<sup>9</sup>.

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<sup>8</sup> The ESA was established in April 1975 based on the ESA Convention targeting to establish a single European space organization focusing on the peaceful use of space research, technology, and application areas. The organization was formally established in October 1981

<sup>9</sup> In the past, the European Commission (EC) and the ESA created the European Space Strategy in September 2000 to progress Europe’s integrated, effective space activities. The strategy specified that the EC makes political and strategic decisions on space policies and that the ESA functions as an implementation organization, among other directions.

The ESA signed a “framework agreement” with the EU in May 2004 to specify that they will collaborate to proceed with space development and hold regular minister-level council meetings. The joint council meeting held by the ESA and the EU in May 2007 approved the “European Space Policy” to improve synergy effects between civil and defense space activities, implement space activities based on coordinated efforts among member states, and ensure an internationally-competitive space industry.

The ESA has so far focused on Earth observation satellites used mainly for civil purposes, among others, based on the contribution of funds made by ESA member states. France also provided a launch site for rockets to the ESA.

On the other hand, European countries including France, Germany, Italy, and the U.K. have their own outer space policy and space development organizations to launch their unique reconnaissance and communication satellites for security purposes.

It is thought that in the future, “Galileo,” a satellite positioning system planned by the EU and the ESA; “Copernicus,” a global-level environment and security monitoring program; and the Multinational Space-based Imaging System (MUSIS)<sup>10</sup>, a reconnaissance satellite project implemented by the European Defence Agency<sup>11</sup>, will be utilized for security in Europe.

#### 4 China

China began work on space development since the 1950s. In April 1970, the country launched its first satellite “Dong Fang Hong I,” mounted on the transportation rocket “Long March 1,” using technology enhanced through its missile development.

China has so far has conducted manned spaceflight and launched satellites orbiting around the Moon<sup>12</sup>. China’s space development is said to intend to realize manned spaceflight and develop

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<sup>10</sup> The MUSIS was started by Belgium, Germany, Greece, France, Italy, and Spain. The organization was joined later by Poland in December 2010. This is a joint project succeeding such projects as Helios 2 (a French military reconnaissance satellite), Pleiades (a French Earth imaging satellite used for military and civilian purposes), SAR-Lupe (a German group of military radar satellites), and COSMO-SkyMed (an Italian constellation of Earth observation satellites)

<sup>11</sup> The EDA was established in 2004 to improve Europe’s defense capabilities for crisis management purposes and to execute and maintain security and defense policies

<sup>12</sup> China recently launched “Tiangong-1,” a space laboratory, in September 2011 and succeeded in docking it with an unmanned spacecraft, “Shenzhou 8” in November 2011; and manned spacecraft “Shenzhou 9” and “Shenzhou 10” in June 2012 and June 2013 respectively. This shows how the country is promoting its plan with a view to constructing a space station in the future. In addition, the BeiDou Navigation Satellite System officially started its services targeting most of the Asia-Pacific region in

space resources.

China's space development is also referred to in "China's Five-Year Plan for National Economic and Social Development"<sup>13</sup> to be reviewed every five years. The latest "12th Five-Year Plan" mentions enhanced military-civilian collaboration in the aviation and space area. In addition, "the National Medium- and Long-Term Program for Science and Technology Development" published by the State Council positions manned spaceflight, moon exploration, high-resolution Earth observation systems as specific critical projects in the aerospace area. Along with these medium- and long-term plans, "China's Space Activities in 2011," a space white paper published by China in December 2011, clarifies the country's major challenges, policies, and international cooperation projects for the coming five years and emphasizes the peaceful use of space.

From an organizational perspective, the State Administration for Science, Technology and Industry for National Defense, under the Ministry of Industry and Information Technology of the State Council, oversees industries related to space, nuclear technology, aviation, ships, and weapons. The China National Space Administration enforces the administrative control of the space area for civil and commercial purposes and represents the Chinese Government externally.

On the other hand, it is presumed that China also uses space for information gathering, communication, and navigation for military purposes. Several Chinese Air Force officials recently mentioned that the Air Force plans to aggressively work on the use of space<sup>14</sup>, and "China's National Defense in 2010," a national defense white paper published by China in March 2011, specifies that the country protects its security interests in outer space in addition to its marine interests and electromagnetic space, developing its aviation and spaceflight areas as a peaceful use of military industry technology.

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December 2012, and it is reported that the BeiDou system started to be mounted on navy vessels, government vessels belonging to maritime law enforcement agencies, and fishing boats, among others. BeiDou offers navigation services as well as interactive short message features. It is thought that these features make it possible to centrally capture and share in real time the position and other data related to vessels from other countries that were confirmed by Chinese navy vessels, and improve information gathering capabilities on the ocean and other areas. Furthermore, the State Administration for Science, Technology and Industry for National Defense succeeded in having "Chang'e 3," a lunar exploration satellite, land on the Moon in December 2013.

<sup>13</sup> The latest plan is the 12th Five-Year Plan targeting the period between 2011 and 2015 (published in March 2011)

<sup>14</sup> For example, Xu Qiliang, then-commander of the Chinese Air Force, reportedly stated, "The Chinese Air Force has established its air force strategy combining aviation and space capabilities, and enabling both offensive and defense operations."

In addition, transportation rockets, including the “Long March” series and other equipment, are developed and manufactured by Chinese state-owned corporations, which are also thought to develop and manufacture ballistic missiles. Thus, it is believed that China works on space development through close collaboration between the government, military, and private sectors.

China also continues to develop anti-satellite weapons. The country conducted a test in January 2007 to destroy one of its satellites using ballistic missile technology. It is also pointed out that the country is developing equipment that interferes with satellites capable of using lasers.

## 5 India

India’s space development promotes space programs targeting its social and economic development in line with its 5-year national plan. The country’s latest 12th Five-Year Plan<sup>15</sup> focuses on non-military projects including communication, positioning, Earth observation (e.g. disaster monitoring, resource exploration, and weather observation), transportation systems, space science, and spinoff promotions.

The Indian Space Commission (ISC) determines the country’s space policy under the leadership of the Prime Minister and shoulders the responsibilities of preparing for space development budgets and implementing space development programs. The Department of Space, managed by the ISC, oversees the Indian Space Research Organisation (ISRO), which implements space development policy, develops and launches rockets, and develops and manufactures satellites.

It has been pointed out that India is launching remote sensing<sup>16</sup> satellites for security purposes as well. The country also plans to launch positioning satellites, implement planetary explorations targeting the Moon and the Mars, and conduct manned spaceflight.

## 6 Republic of Korea (ROK)

The Republic of Korea is considered to have started full-scale space development by creating the first “Mid- and Long-Term Basic Plan for Space Development (1996-2015)” in 1996. The country has recently been promoting its space development projects through the Space Development Promotion Act (enacted in May 2005)<sup>17</sup>. In January 2013, the country succeeded

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<sup>15</sup> The 12th Five-Year Plan covers the period between April 2012 and March 2017

<sup>16</sup> Technology enabling the observation of the size, shape, and quality of targets from a distance without directly touching them

<sup>17</sup> The Act stipulates that the country creates a mid- and long-term basic plan every five years and an execution plan for each fiscal year, and establishes the National Space Committee. Based on this Act, the

in launching “Naro (KSVL-1),” a rocket developed through a technology cooperation agreement signed with Russia. In November 2013, the country also created three key plans, including the “Mid- and Long-Term Plan for Space Development (2014-2040)”<sup>18</sup>, which plans to move up the first launch of rockets manufactured by the ROK to June 2020; the “Space Technology Industrialization Strategy,” which prompts the whole industry to lead space development; and the “Modification of Korean-made rocket development plan,” which leverages Korean-made rockets and develops planetary and space exploration satellites and high orbit satellites on its own.

Regarding the country’s trends in security, the ROK published a national defense white paper in December 2012 to state that it plans to secure space monitoring systems and other mechanisms allowing its Air Force to develop into the Aerospace Force and to create satellite monitoring control troops in order to ensure its capabilities to conduct aerospace operations.

From an organizational perspective, the ROK has put in place the National Space Committee, which deliberates major issues related to space development under the leadership of the President; and the Korea Aerospace Research Institute, which leads research and development as an implementation agency. Furthermore, the Korea Agency for Defense Development is engaged in the development and use of various satellites.

Major satellites launched by the country include image reconnaissance and communication satellites by using foreign rockets.

*See ▶ Part III, Chapter 1, Section 1-4*

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country stipulated the “1st Basic Space Development Promotion Plan” and the “2nd Basic Space Development Promotion Plan” in June 2007 and December 2011, respectively

<sup>18</sup> This is the modified version of the “2nd Basic Space Development Promotion Plan”