

Space Security

Fact Sheet



Background

Space is the only global commons that borders every community, providing an unprecedented potential nexus for scientific achievement, economic prosperity, and strategic stability. Space-based assets are rapidly becoming part of our critical national and international infrastructure. They support our medical systems, our public services, our police forces, and our militaries. As our dependency on space assets has grown, so have legitimate concerns about the security of these assets, stimulating an important debate over the nature and direction of space security and how best to balance our civil, commercial, and military uses of space.

Defining Space Security

A good starting point is reaching a common understanding of Space Security. It can be defined as:

- The secure and sustainable access to, and use of, space and;
- The freedom from space-based threats.

The key elements of this definition are informed by a range of considerations including consistency with relevant major international legal instruments, United Nations General Assembly resolutions, the laws of armed conflict, as well as key elements of relevant multilateral treaties.

Understanding Space Security

Because of the multiple uses of space and wide range of space actors, a comprehensive and holistic outlook is necessary to achieve a reasonable understanding of space security.

1. The Space Environment

Some of the gravest threats to space security are environmental. Because of its extremely high speed in orbit, space debris can endanger space assets. The number of objects in Earth orbit has increased steadily. There are currently over 13,000 objects large enough to seriously damage or destroy spacecraft in orbit today – over 90 percent of which are space debris. Space surveillance capabilities to track debris and support collision avoidance are slowly improving. To carry out their functions in orbit, satellites also require an orbital slot and a portion of the radio frequency spectrum to ensure communication. The expansion of satellite applications is driving growing demand for scarce radio frequency spectrum. Similarly, the growing demand for orbital slots has resulted in increased competition between satellite operators.

2. Laws, Policies, and Doctrines

There has been a progressive development of the legal framework for outer space activities. At present there are five space-specific treaties in effect. However, there exists no legal instrument barring the use of conventional weapons in and from space. Furthermore, the Conference on Disarmament, the principal international institution mandated to discuss space security issues, has been deadlocked since 1998. The policies of space-faring nations, on the one hand, consistently emphasize international cooperation and the peaceful uses of outer space. On the other hand, growing dependence on space assets has led several of these states to view these assets as national security critical infrastructure and to focus on the security uses of outer space.

3. Civil Space Programs and Global Utilities

Civil space programs are central to the sustainable access to, and use of, space. The number of actors with access to space is on the rise: in 2006, there were 10 actors with an independent orbital launch capacity, and 47 states with indirect space access. International cooperation has been the hallmark of civil space programs, exemplified in the International Space Station. There has also been a dramatic growth in global utilities, such as the Global Positioning System, which generated sales revenue of \$6.2 billion in 1999. Global space-based utilities also help save lives by taking the “search” out of “search and rescue” efforts and by providing crucial meteorological data.

www.spacesecurity.org

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4. Commercial Space

Commercial space is a growing industry with increasing relevance in our daily lives. Space manufacturing, launch services, space products, and operating insurance accounted for an estimated \$2.1 billion in revenues in 1980, multiplying to over \$100-billion today. Commercial space also accounts for roughly one-third of all space launches. The growth in the industry has been linked to decreasing costs for space access. For example, the price of sending a satellite into geostationary orbit dropped from \$40,000/kilogram to \$26,000/kilogram between 1990 and 2000. Governments continue to play an important role in the commercial space sector through subsidies and export controls.

5. Space Support for Terrestrial Military Operations

Space systems provide key support for an ever-widening array of military function such as: communications, navigation, early-warning, reconnaissance, surveillance, imaging, and remote-sensing. These systems allow advanced militaries to carry out operations with speed, precision, and economy of force while limiting collateral damage. The US and Russia lead in the development of military space systems, with the US accounting for some 90 percent of world military space spending. In the past decades, more states, such as Canada, China, France, Germany, India, Israel, Italy, Spain, and the UK, have been developing military space capabilities, particularly in the area of surveillance.

6. Space Systems Protection

The ability to detect, to withstand, and to recover from attacks against Earth-based or space-based segments of a space system are crucial to their protection. The US and Russia lead in general capabilities to detect rocket launches, while the US leads in the development of advanced technologies to detect direct attacks on satellites. While protection of satellite communications links is poor but improving, protection of vulnerable satellite ground stations remains a concern. Protection of satellites against some direct threats is improving, largely through radiation hardening, system redundancy, and greater use of higher orbits. Russia and the US are leading in the development of capabilities to rapidly rebuild space systems following a direct attack on satellites.

7. Space Systems Negation

Space systems can be negated by means of deception, denial, disruption, degradation, and destruction by electronic, explosive, kinetic, or directed energy weapons. Capabilities to attack ground stations and communications links are increasingly available to a broad range of actors. Direct attacks on satellites require sophisticated capabilities not widely available. Enabling technologies for space-based negation capabilities are being pursued by several states in the context of civil and military programs. The US leads in the development of space situational awareness, an essential tool to support space negation.

8. Space-based Strike Capability

Space-based strike capabilities can target objects on Earth or traveling through space through the projection of mass or energy. No such capabilities have yet been tested or deployed. However, the US continues to develop a space-based interceptor for its missile defence system and a growing number of actors are developing enabling technologies outside of dedicated weapons programs.

The Space Security Index

The Space Security Index is the first and only annual, comprehensive, and integrated assessment of space security. It provides background information and in-depth analysis on the key space security trends and developments of eight indicators of space security. The Space Security Index is informed by the views of over 130 space experts from 17 countries in the civil, commercial, and military space sectors. It can be accessed at www.spacesecurity.org.