

[Exec Summary](#)

As the 2010 Quadrennial Defense Review Report notes, “China is developing and fielding large numbers of advanced medium-range ballistic and cruise missiles, new attack submarines equipped with advanced weapons, increasingly capable long-range air defense systems, electronic warfare and computer network attack capabilities, advanced fighter aircraft, and **counter-space systems**.”

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page 4 **Air and Air Defense Forces.**

PLAAF Commander General Xu Qiliang said that the trend of military competition **extending to space is “inevitable”** and emphasized the transformation of the PLAAF from a homeland defense focus to one that **“integrates air and space.”** and that possesses both “offensive and defensive” capabilities.

Page 7 **DEVELOPMENTS IN CHINA’S SPACE AND CYBER CAPABILITIES**

**Space and Counterspace** Capabilities. China is expanding its **space-based** intelligence, surveillance, reconnaissance, navigation, and communications satellite constellations. In parallel, China is developing a multidimensional program to improve its capabilities to limit or prevent the use of **space-based** assets by potential adversaries during times of crisis or conflict. China’s **commercial space program** has utility for non-military research, but it also demonstrates **space launch and control** capabilities that have direct military application.

- Beijing launched a **navigation satellite** on April 15, 2009, and plans to have a full network to provide global positioning for military and civilian users by 2015–2020.
- China launched Yaogan-6 on February 22, 2009, the 6th in a series of new **reconnaissance satellites** orbited since 2006.
- Russia launched a **commercial communications satellite** (COMSAT), Asiasat-5, for China on September 11,

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China’s leaders have mentioned other “non-war military” activities including protecting sea lanes, cyber warfare, **security of space-based assets**, conducting military diplomacy, and preparing for unexpected conditions and events.

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**Space Warfare.** PLA strategists see **space** as central to enabling modern informatized warfare, but PLA doctrine does not appear to contemplate **space operations** as an operational “campaign” on its own; rather, **space operations** form an integral component of all campaigns. The PLA’s military theoretical journal China Military Science argues that “it is in **space** that information age warfare will come into its more intensive points.” Specifically, **space-based** communications, intelligence, and navigational systems are important to enable and coordinate joint operations and win modern wars. Accordingly, the PLA is acquiring technologies to improve China’s **space capabilities**. A PLA analysis of U.S. and Coalition military operations reinforced the importance of operations in **space** to enable informatized warfare, claiming that **“space is the commanding point for the information battlefield. Battlefield monitor and control, information communications, navigation and position, and precision guidance all rely on satellites and other sensors.”** Concurrently, China is developing the ability to attack an adversary’s **space assets**, accelerating the **militarization of space**. PLA writings emphasize the necessity of “destroying, damaging, and interfering with the enemy’s reconnaissance ... and communications **satellites**,” suggesting that such systems, as well as

navigation and early warning **satellites**, could be among initial targets of attack to “blind and deafen the enemy.” The same PLA analysis of U.S. and Coalition military operations also states that “destroying or capturing **satellites** and other sensors ... will deprive the opponents of initiatives on the battlefield and [make it difficult] for them to bring

Page 27 **ASYMMETRIC WARFIGHTING**

Examples include the heavy reliance on ballistic and cruise missiles, rather than stealth aircraft, to attack ground targets inside heavily defended airspace; an array of systems to attack intelligence, communications, and navigation **satellites**, seeking to neutralize the U.S. advantage in **space**; an approach to computer network exploitation that harvests huge volumes of data; an emphasis on offensive and defensive electronic warfare in recent years; and the “three warfares” doctrine.

**Chapter Three: Force Modernization Goals and Trends**

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**ANTI-ACCESS/AREA-DENIAL CAPABILITIES**

China is pursuing a variety of air, sea, undersea, **space and counterspace**, and information warfare systems and operational concepts to achieve this capability, moving toward an array of overlapping, multilayered offensive capabilities extending from China’s coast into the western Pacific. China’s 2008 Defense White Paper asserts, for example, that one of the priorities for the development of China’s armed forces is to “increase the country’s capabilities to maintain maritime, **space and electromagnetic space security**.”

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China’s “information blockade” likely envisions employment of military and non-military instruments of state power across the battlespace, including in **cyberspace and outer space**. China’s investments in advanced electronic warfare systems, **counter-space weapons**, and...

Page 34 **STRATEGIC CAPABILITIES**

China has made steady progress in recent years to develop offensive nuclear, **space**, and cyber warfare capabilities—the only aspects of China’s armed forces that currently could be used to pose a global threat.

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**Space and Counterspace.**

China’s **space activities** and capabilities, including **ASAT** programs, have significant implications for antiaccess/ area-denial in Taiwan Strait contingencies and beyond. Many of China’s **non-military space programs**, including the manned program and the planned **space station**, are run by the PLA.

**Reconnaissance:**

China is deploying imagery, reconnaissance, and Earth resource systems with military utility. Examples include the **Yaogan-1, -2, -3, -4, -5, and -6**, the **Haiyang-1B**, the **CBERS-2B satellite**, and the **Huanjing disaster/environmental monitoring satellite constellation**. China is planning eight satellites in the Huanjing program that are capable of visible, infrared, multi-spectral, and synthetic aperture radar imaging. In the next decade, even as Beijing fields a larger and more capable array of reconnaissance satellites, it probably will continue to employ commercial **satellite** imagery to supplement its coverage. China currently accesses high-resolution, electrooptical and synthetic aperture radar commercial imagery from all of the major providers including Spot Image (Europe), Infoterra (Europe), MDA (Canada), Antrix (India), GeoEye (United States), and Digital Globe (United States).

**Manned Space:**

China’s most recent manned mission, Shenzhou-7, launched on September 25, 2008, and successfully conducted China’s first **spacewalk**. China will continue its **manned space program**, including both manned

and unmanned docking, with the final goal of a permanently **manned space station** by 2020.

**Navigation and Timing:**

China is pursuing several avenues to reduce its dependence on any single foreign-owned **satellite** navigation system. Currently, the PRC uses the U.S. global positioning system (GPS), Russia's GLONASS, and its own **BeiDou-1** system for navigation. The **BeiDou-1** consists of three satellites and serves both civil and military purposes, but its orbital configuration covers only the East Asian region. The **BeiDou-1** system will be replaced by a more capable, but still regionally constrained, **BeiDou-2** system that is expected to become operational in 2011. The initial **BeiDou-2** constellation will become part of a more advanced **BeiDou-2/Compass** system with global coverage, expected in the 2015-2020 timeframe.

**Communications:**

China uses communications **satellites** for both regional and international telecommunications in support of civil and military users, including **satellite** television, internet, and telephony. China also maintains a single data-relay **satellite** launched in mid-2008, the **TianLian-1**. Along with regional development of related technologies, China has recently entered the world market by exporting **satellites** and infrastructure to Venezuela and Nigeria. Although the **satellite** built and launched for Nigeria failed, China continues to market its services worldwide, to customers such as Pakistan, Bolivia, Laos, and Vietnam.

**ASAT Weapons:**

In January 2007, China successfully tested a direct-ascent **ASAT** weapon against a PRC weather **satellite**, demonstrating its ability to attack **satellites** in low-Earth orbit. China continues to develop and refine this system, which is one component of a multi-dimensional program to limit or prevent the use of **space-based assets** by potential adversaries during times of crisis or conflict. China's nuclear arsenal has long provided Beijing with an inherent **ASAT** capability, although a nuclear explosion in **space** would also damage China's rapidly multiplying **space assets**, along with those of whomever it was trying to target. Foreign and indigenous systems give China the capability to jam common **satellite** communications bands and GPS receivers. In addition to the direct-ascent **ASAT** program, China is developing other technologies and concepts for kinetic and directed-energy (e.g., lasers, high-powered microwave, and particle beam) weapons for **ASAT** missions. Citing the requirements of its manned and lunar **space programs**, China is improving its ability to track and identify **satellites**—a prerequisite for effective, precise **counterspace** operations.

Page 37 **POWER PROJECTION—MODERNIZATION BEYOND TAIWAN**

Over the long term, improvements in China's C4ISR, including **space-based** and over-the-horizon sensors, could enable Beijing to identify, track, and target military activities deep into the western Pacific Ocean.

**Chapter Four:**

Page 44 **Sector-by-Sector Analysis.**

Production trends and resource allocation appear to favor **missile and space systems**,

**Missile and Space Industry:**

China's **space launch vehicle industry** is expanding to support **satellite** launch services and the **manned space program**.

Page 46 **Foreign Technology Acquisition.**

Additionally, Russia cooperates with China on technical, design, and material support for numerous weapons and **space systems**.

The DSS report described China's science and technology collection priorities as: guidance and control systems, advanced energy technologies, nanotechnology, **space and counterspace systems**, nuclear forces, innovative materials, aeronautics and astronautic mechanisms, computer-aided manufacturing and design,

and information technologies.

The U.S. Department of Commerce’s Bureau of Industry and Security and the Department of Justice identified at least 26 major cases since 2006 linking China to the acquisition of technologies and applications cited above, as well as to current and future warship technology, electronic propulsion systems, controlled power amplifiers with military applications, **space launch technical data and services**, C-17 aircraft, Delta IV rockets, infrared cameras, information related to cruise missile design, and military-grade accelerometers.

Additional technologies cited in these cases consisted of microwave integrated circuits; weapons scopes; restricted night-vision equipment and data; **satellite**/missile thermal insulation blankets; controlled electronic components; traveling wave tubes used with **satellite** and radar systems; microwave amplifiers with radar applications; export controlled technical data related to plasma technology for UAVs; carbon fiber material for aircraft, rockets, **spacecraft**, and the uranium enrichment process; and, extended range programmable logic devices.

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**Key Fields and Priority Subjects.**

Specifically, China’s defense industries are pursuing advanced manufacturing, information technology, and defense technologies. Examples include radar, **counterspace** capabilities, secure C4ISR, smart materials, and low-observable technologies.

**Major Special Items.**

These include core electronic components; high-end universal chips and operating system software; very large-scale integrated circuit manufacturing; next-generation broadband wireless mobile communications; high-grade numerically controlled machine tools; large aircraft; high-resolution **satellites**; manned **spaceflight**; and **lunar exploration**.

**Chapter Five:**

**Force Modernization and Security in the Taiwan Strait**

**OVERVIEW**

Beijing’s decision to not oppose Taiwan’s meaningful participation in certain international organizations that do not require statehood for membership, such as the World Health Assembly, addressed in limited terms Taiwan’s expressed desire for greater **international space**.

Page 51 **BEIJING’S COURSES OF ACTION AGAINST TAIWAN**

**Air and Missile Campaign.**

Limited SRBM attacks and precision strikes against air defense systems, including air bases, radar sites, missiles, **space assets**, and communications facilities, could be conducted in an attempt to degrade Taiwan’s defenses, neutralize Taiwan’s leadership, or break the Taiwan people’s will to fight.

Page 55 **OPPORTUNITIES AND CHALLENGES IN U.S.–CHINA MILITARY–TOMILITARY RELATIONS**

Additional opportunities to improve institutional understanding exist in the area of policy and strategy for nuclear, **space**, and cyber-security issues.