



AUSA Background Brief

No. 89
November 2000



An Institute of Land Warfare Publication

Space and Missile Defense Challenges:

Space Capabilities—An Integral Part of Land Force Operations

(Third in a series of four Background Briefs based on information
obtained from U.S. Army Space and Missile Defense Command)

Full spectrum dominance implies that U.S. forces are able to conduct prompt, sustained, and synchronized operations with . . . access to and freedom to operate in all domains—space, sea, land, air and information.

Joint Vision 2020

Space is the high ground today, tomorrow, and in the future. If the Army is to maintain overmatch capabilities, space systems must be shaped and influenced to provide the information and support our forces require to conduct decisive operations across the full spectrum of conflict.

General John M. Keane, VCSA
Foreword to the Army Space Master Plan

Space and Military Operations

Space enhances all aspects of military operations. The conduct of military operations is no longer limited to the traditional dimensions of land, sea and air. The Army views space, the new high ground for military operations, as a vertical extension of the battlefield and an integral part of the battlespace. Space capabilities are key force multipliers for land force operations. As such, the Army leverages the force enhancement capabilities of space in communications; position, navigation and timing; weather, terrain and environmental monitoring; missile warning; and intelligence, surveillance and reconnaissance (ISR).

The integration of these space-enabled enhancements into military operations creates the ability to achieve the information superiority and full battlespace awareness necessary for full-spectrum dominance. Operationalizing space capabilities, protecting space assets and denying adversaries the ability to leverage space to their advantage are critical to our national security, the global economy and the Army's ability to conduct full-spectrum operations.

Space, Joint Operations and the Objective Force

Space is an essential enabler for joint operational concepts and the Objective Force. Space-based assets are essential to the operational capabilities in Joint Vision 2020 and the characteristics of the Objective Force described in the Army Vision: responsive, deployable, agile, versatile, lethal, survivable and sustainable. As advances in information technology inspire new concepts for conducting military

operations, the Army will become increasingly reliant on space capabilities to conduct operations across the contingency spectrum. Two of these emerging new concepts are at the very heart of the armed forces' ability to implement their visions—Network-Centric Warfare (NCW) and the Global Information Grid (GIG).

The idea behind NCW is that linking sensor networks, command and control (C²) networks and shooter networks can achieve efficiencies in all military operations from the synergy derived by simultaneously sharing information in a common operating environment. By linking these networks, the military will be able to collaboratively plan and execute operations, saving time and benefiting from the input of multiple “sensors”—both physical and human.

While NCW is the operational concept, the GIG, a major Defense transformation initiative, will provide the globally interconnected, end-to-end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating and managing information on demand to warfighters, policymakers and support personnel.

Space-based assets are at the core of translating these theories into reality and, in turn, achieving the service's missions. Because the Army will be increasingly reliant on the capabilities enabled by NCW and the GIG, it has a vested interest in assuring they provide for the full and seamless integration of space capabilities in support of land force operations.

The Army Space Operations Concept

The Army Space Operations Concept calls for full and seamless integration of space and land force operations, providing a “seamless, vertical continuum” in support of the land force commander. This includes:

- the use of all capable space systems to support land force operations, and
- the use of all capable land force systems to support space operations.

As the largest consumer of space products, the Army uses space capabilities in several functional areas to support land force operations.

- **Communications.** Space-based communications capability is the key to leveraging all other space capabilities. Satellite communications provide a robust, flexible and seamless surface-through-space network that extends terrestrial capabilities. Systems with embedded direct links provide a reachback communications capability that allows implementation of split-based command and control and logistics support concepts. These links also create the opportunity for interoperability with joint, coalition, commercial and civil communications networks.

As a result, the Army has reliable, on-demand, non-line-of-sight communications it can use to provide enhanced early warning, en route mission planning and rehearsal, and responsive combat service support (CSS) while maintaining a reduced footprint in theater. This sets the conditions for increased responsiveness, agility, versatility, survivability and sustainability. Over the next decade new Department of Defense (DoD) communication systems will replace the existing systems. These systems will be more capable and responsive to warfighter needs.

- **Position, navigation and timing (PNT).** Embedding global, real-time PNT in our maneuver systems, command and control systems, and support systems contributes to enhanced situational awareness, lethality, agility and survivability for the warfighter. The ability to locate and identify friendly forces on a common, relevant operational picture of the battlespace, for example, greatly reduces the chances for fratricide during decisive operations. Precision guidance and timing

capabilities have enhanced lethality and effects for long-range munitions. Over the next decade enhancements to the Global Positioning System (GPS) will make its use more secure from jamming and spoofing while maintaining the precision critical to so many military activities.

- **Weather, terrain and environmental monitoring.** Access to real-time and predicted “tactical” weather through organic small weather satellite terminals enhances planning and decisionmaking for ground commanders. Combined with terrain and environmental data from space sensors, such monitoring allows warfighters to determine weather effects on munitions and obscurants; assess trafficability; and determine changes to terrain or infrastructure that may constitute obstacles to maneuver. Exciting developments are taking place now in the use of spectral imaging data from newly launched satellites to significantly increase the ability to identify surface materials—including vegetation, soils and man-made features.

Not well known is the impact space weather (sunspots, solar flares) can have on military operations. A knowledgeable space operations officer, knowing that there are periods of increasing solar activity that will affect certain communications capabilities or that GPS availability will be degraded, contributes immensely to enhanced operational planning.

- **Missile warning.** The operational value of missile warning from space was proven in Operation Desert Storm. Since then early warning to deployed forces has been improved by the fielding of the Joint Tactical Ground Station (JTAGS), which provides an in-theater processing capability for data from Defense Support Program (DSP) surveillance satellites. This improved warning enhances the active defense, passive defense and attack operations elements of theater missile defense by providing improved launch-site location and impact-point predictions. The next generation of missile detection satellites, the Space-Based Infrared System (SBIRS), and the Multi-Mission Mobile Processor upgrade to JTAGS will further enhance the ability to detect and predict the flight of theater ballistic missiles.
- **Intelligence, surveillance and reconnaissance (ISR).** Many space systems contribute to the collection, processing, dissemination and use of battlefield data and tactical information. The Army’s Tactical Exploitation of National Capabilities (TENCAP) program has successfully exploited national intelligence data and delivered it to tactical commanders for more than 25 years. To assure the delivery of timely, relevant and accurate information to tactical commanders, Army doctrine often dictates the use of direct downlinks from ISR assets to tactical processors in theater. ISR assets also provide the ability to track friendly as well as enemy forces. The Army also has programs that use the capabilities of civil, commercial and allied space ISR capabilities. In conjunction with the Air Force, demonstrations are underway to utilize spectral imaging satellites for improved detection of targets and to make countermeasures less effective.

The Use of Army Forces to Support Space Operations

The Army makes key contributions to U.S. forces’ space capabilities in the areas of global communications, ISR, missile warning, and position, navigation and timing. Additionally, because space capabilities are so important to the warfighter, the Army also makes significant contributions to assuring access to space through its contributions to space control.

One of the Army’s primary contributions to space capabilities is defining land force requirements for products and services that space-based/reliant capabilities must provide. The Army Space and Missile Defense Command (SMDC), through its Force Development and Integration Center, integrates these requirements for the Army and plays a key role in the development and testing of these capabilities, to include Doctrine, Training, Leader Development, Organizations, Materiel and Soldier (DTLOMS) development.

The Army also provides operational space forces and capabilities. The 1st Satellite Control Battalion of Army Space Command (ARSPACE) operates Defense Satellite Communications System ground terminals and control centers around the world. These centers are essential for the global and reachback communications necessary for a responsive, deployable contingency force.

To provide deployed forces with access to many satellite-based capabilities, ARSPACE provides Army Space Support Teams from its Space Support Company. These teams bring organic equipment and expertise to provide land component forces critical data on space communications, weather, imagery and other related space capabilities.

ARSPACE also provides in-theater missile-warning capabilities through the deployment of JTAGS to the theater of operations. These teams are part of ARSPACE's Theater Missile Warning Company. There are teams located in Korea, Europe, Colorado Springs, Colorado, and Fort Bliss, Texas.

As part of SMDC's Space and Missile Defense Acquisition Center, the Army Space Program Office, located at Fort Belvoir, Virginia, determines the intelligence needs of operational and tactical commanders and identifies national capabilities that help meet the commanders' needs. TENCAP systems leverage national- and theater-level assets to provide intelligence products directly to tactical commanders. They do this by fielding the evolving set of TENCAP equipment and procedures. The Army's newest TENCAP system, the Tactical Exploitation System (TES), provides commanders with near-real time correlated imagery and signals intelligence products from national and theater sensors. TES operators can redirect specific sensors to provide commanders with unprecedented ability to see and effect the battle space. With TENCAP systems, tactical commanders have the communications and processors needed to receive and use the intelligence in near-real time.

The Army's clear and stated objective to achieve the full and seamless integration of space and land force operations is for the land force commander to have assured direct access to space capabilities and to control the effects generated from space-based and aerial platforms.

Space Control

Space control is critical. U.S. dominance in the dimension of space is not guaranteed. Adversaries understand the advantages of operating from space. Some forty nations have space programs, and the array of commercial systems is growing daily. Many of those systems have military applications such as targeting, intelligence and communications. Adversaries will probe our space systems for vulnerabilities, or they might alter the space environment to disrupt or deny our space operations. They might gain access to our systems and tamper with data or exploit it for hostile purposes, or they might turn to third parties to buy services and products of military significance without making the huge investment of resources to develop their own space program. Each of these approaches has unacceptable implications for our land forces. Space control, a mission shared by all services, includes combat and combat support operations to ensure freedom of action in space for the United States and its allies, and, when directed, actions to deny an adversary freedom of action in space. The space control mission area includes the elements of prevention, surveillance, protection and negation. The Army contributes in many ways to the space control capabilities of the Commander in Chief, U.S. Space Command (USCINCSpace) and the theater commanders in chief (CINCs).

- Through strict operational security measures and adherence to national laws and policies on technology transfer, the Army contributes to the **prevention** of adversaries' developing and/or exploiting space capabilities.
- The U.S. Army Kwajalein Atoll provides unique space **surveillance** capabilities. There, the Army provides powerful ground-based space surveillance systems that assist CINCSpace in identifying

and characterizing potential adversary space capabilities. This contributes to the land component commander's situational awareness of the entire battlespace.

- The Army develops technologies to **protect** our space systems (space, ground and communications link segments) from electronic warfare and other potential denial, disruption or destruction. The High Energy Laser Systems Test Facility (HELSTF) at White Sands Missile Range, New Mexico, helped determine the vulnerability of satellites to laser weapons by the actual employment of ground-based directed energy against a low-orbiting U.S. satellite. The Army Space and Missile Defense Technical Center in Huntsville, Alabama, is assuring space access for our Objective Force by conducting research on hardening and electromagnetic pulse (EMP) that will enhance the survivability of our space systems. The Technical Center is also analyzing a tactical laser communications system that has the potential to provide increased capacity for communications satellites while lowering vulnerability to interception and jamming.
- The Army has always been the lead in ground-based air and missile defense and the enabling technology. Today those efforts include development of technology to **negate**, both temporarily and permanently, an adversary's space capability. This will be a key capability in future conflicts and a strong deterrent to potential adversaries.

Conclusion

It is clear the Army is, and must continue to be, an active participant in the design and development of space architectures and capabilities. Military use of space is inherently joint and increasingly critical to land force operations. Terrestrial systems alone will not enable full-spectrum dominance. Commanders at all levels (strategic, operational and tactical) must have assured, direct access to the full range of space capabilities, and they must be able to protect that access while denying access to any adversary. The Army equity protected by maintaining space dominance is nothing less than achieving the Transformation.