

The United States Army

**Concept for Space Operations
in Support of the Objective Force**

11 April 2003

**U.S. Army Training and Doctrine Command
Fort Monroe, VA**

FOREWORD

In the 21st century, the battlefield will extend vertically into the region of space. This operational concept is intended to focus the Army's effort to exploit the high ground of space, and seamlessly integrate it into land force operations. Achieving space dominance will be critical to gaining and maintaining the information superiority required for the advanced full-spectrum operations described in the Army's Objective Force Concept. This publication describes the contribution space provides to land forces and what the Army will do to contribute to joint dominance of the dimension of space.

Army space operations will focus on five essential tasks to ensure that the Objective Force will successfully achieve decisive victory. These five essential space operations tasks are:

- Support increased deployability and reduced theater footprint.
- Achieve situational understanding (SU) “Off the Ramp” during entry operations.
- Support precision maneuver, fires, sustainment, and information.
- Enable continuous information and decision superiority.
- Protect the force during all phases of the operation.

Seamlessness will be the signature characteristic of well-integrated space and land force operations. From the user perspective, space support must be reliable and timely, and operational friction must be minimized. During operations at the tactical or operational level, undue delays or discontinuities will quickly make space support irrelevant. For this reason, the central thrust of Army space operations is to reduce technical and procedural seams in the system of systems. In effect, many of the actions outlined here will bridge, bypass, or remove seams that would otherwise lessen or nullify the effectiveness of space support to land force operations.

The Army has been, is, and will continue to be, a prominent player on the joint space team. Preparations are now underway to develop new Army contributions to the functions of space surveillance, and negation of space control operations. Army forces will also provide support to space forces, such as those conducting space satellite control operations. Some of this support will be tied to the Army's role in homeland security, with an emphasis on Army national missile defense operations.

This concept also touches on several advanced space operations for the near to mid terms. Space control capabilities to enhance information operations (IO) will continue to be a high priority. Procedures to enable direct tasking of satellites by tactical commanders, and expanded employment of direct downlinks from satellites to tactical users, will remain an ongoing initiative. In the far-term, this capability will be achieved through the Global Information Grid (GIG). The infusion of functional area (FA) 40 space operations officers, into existing headquarters, will ensure current and future space force enhancement tools and products are integrated into the Objective Force operations. Space awareness and analysis provide a combat multiplier required for achieving information superiority. Whether at home or abroad, near or far term, Army space operations will be consistent with the Army's responsibility to conduct prompt and sustained land combat, and win the nation's wars.

As the Army moves forward in its transformation, and achieves Objective Force qualities, we must, in all our mission areas, ensure that we are truly “transformational” and not just “reforming.” The words of J.F.C. Fuller, expressed in the early 1930's, should serve as a constant reminder: “Rather than refighting the last war, we should instead ask, ‘Given an emerging technology, how can we fight war more rationally?’”

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Military Operations
U.S. ARMY CONCEPT FOR SPACE OPERATIONS IN SUPPORT OF THE
OBJECTIVE FORCE

Summary. This pamphlet is the Army's holistic concept for integrating space and land force operations for the Objective Force. It views space as a vertical extension of the battlefield that provides the Army the critical "high ground" to achieve space dominance as essential to the information superiority required for advanced full-spectrum Army operations. The concept addresses Army contributions to joint space missions, and presents ideas on evolutionary and revolutionary capabilities leveraging the military advantages of space operations. This concept is the basis for developing doctrine, organizations, training, materiel, leadership and education, personnel, and facility (DOTMLPF) solutions.

Applicability. This concept applies to space operations support to the Army's Objective Force executing simultaneous tactical, operational, and strategic levels of warfare, in support of national, regional, and theater missions. National, international, and host-nation treaties and political agreements may restrict its application.

Suggested improvements. The proponent of this concept is the Force Development and Integration Center, United States Army Space and Missile Defense Command. Send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to Commander, U.S. Army Training and Doctrine Command (TRADOC), ATTN: ATDO-C, 20 Whistler Lane, Fort Monroe, VA 23651-1046.

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Chapter 1
Introduction

1-1. Purpose. This concept details space operational support to the Army’s Objective Force. Space support outlined in this concept discusses space products and services provided to, and integrated and synchronized within, the Objective Force to enable information superiority and full-spectrum dominance.

1-2. References. Appendix A contains required and related publications.

1-3. Explanation of abbreviations and terms. The glossary contains abbreviations and special terms used in this pamphlet.

Chapter 2 Overview

2-1. Why this concept is needed. This concept is needed to provide a basis for the modernization and transformation to the Army Objective Force, and to serve as a baseline for the development of space-related operational capabilities and requirements. Use of space systems and products must be transformed if the Objective Force is to operate effectively in the future operational environment, and fully support the policies and objectives articulated in the National Security Strategy, National Military Strategy, Defense Planning Guidance, the FY01 Quadrennial Defense Review, and other Objective Force guidance.

2-2. Operational environment.

a. The changing operational environment.

(1) Warfare in the past does not portend the conduct of future warfare. On current evidence, the United States (U.S.) in the next few decades will confront unstable, sometimes diverse, and highly uncertain geopolitical alignments that will generate major changes in adversaries' intent, force array, and strength. There will be increased global and regional interest in local matters that will place increased value in alliances and coalitions. Also, potential adversaries will apply lessons learned based on study of U.S. methods. New threats may emerge from aspiring great powers, new regional alignments, or transnational terrorist or criminal organizations. The global explosion in space-based communications and information technologies, together with continuing proliferation of military and commercial technologies, will allow even less wealthy states to enhance their ground combat command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) capabilities to a level once reserved for armies supported by fully industrialized and national economies.

(2) The physical characteristics of a future theater of war also are likely to prove more challenging. Continuing global urbanization increases the probability that U.S. forces will confront complex topography, even where nature itself does not impose it. Support systems and facilities will be more vulnerable to direct attack because of the proliferation of hostile communications; sensor, missile, and night vision capabilities; precision and kinetic energy munitions; and special operating forces, and insurgent/terrorist capabilities, together with a growing threat of weapons of mass effects use. These threats may even dictate that combat forces avoid prolonged occupation of detectable and targetable locations.

(3) Future operations will take place in the context of new and changing domains of conflict. As cyberspace expands globally, IO, whose effects may extend well beyond the theater battle, will supplant traditional interference with communications and psychological operations. Access to space-based capabilities is becoming universal, and the increasing difficulty of moving and positioning large military formations, without being detected, will affect our own operations, as much as the enemy's. Far more than in the past, future military operations will transpire in the glare of global media, with expanding access to independent information and communications systems.

b. Space operational environment.

(1) Space is populated by an ever-increasing number of military, civil, and commercial systems competing for orbital positions, bandwidth, and profit. Nations that have national space programs are rapidly increasing in number. Since the end of the Cold War, there has been an explosion of commercial space ventures. States, private organizations, and individuals can now purchase space products, or access space services (e.g., global positioning system (GPS) and satellite communications (SATCOM)) on the open market, at relatively low cost, and without having to build extensive space infrastructures.

(2) Space is a primary enabler of the information revolution. Space and information management capabilities are rapidly converging to the point of interdependence. Space systems are critical in moving high volumes of data at great speed, over vast distances (particularly between remote and/or non-fixed locations) to enable the formation of interactive global databases that provide support to industry, government, and military forces. The Army must identify its requirements in the development of these systems early, in order to leverage their capabilities in support of Army Objective Force operations.

(3) Advances in space technology continue to expand the wide menu of readily available space products. There are competing military and commercial requirements for space capabilities, such as secure wide-band communications, enhanced multi-spectral imagery, small mobile downlink terminals, and improved launch capabilities. Governmental controls, designed to limit or deny distribution of space-based products and services, will be increasingly difficult to implement when multinational consortia provide these products and services.

(4) Pressures to quicken the pace of space militarization will increase. Potential adversaries, states of concern, and terrorists will have access to a wide array of space products and services, as well as the potential to deny, disrupt, deceive, degrade, or destroy U.S. access to and use of space capabilities.

(5) On a national level, the rise of chemical, biological, radiological, nuclear, and enhanced high explosive (CBRNE) weapons threats will increase U.S. dependence on space systems for warning and defense against missile attacks. The protection of economically and militarily important space assets is a matter of national security.

(6) Strategically, the military's reliance on space capabilities, and its concern that its adversaries may use space effectively, will hasten the development of concepts, capabilities, and organizations that can guarantee space superiority. This superiority is critical in conducting full-spectrum military operations (much as the U.S. now relies on air superiority).

(7) Operationally, the battlespace will be crowded with friendly, neutral, and adversary space systems, offering great benefits and posing complex threats to the Objective Force. This environment challenges the Army's ability to plan for, and employ, space capabilities to achieve situational awareness (SA) and information superiority.

(8) Adversaries will attempt to use space for hostile purposes. Domestic and international commercial space organizations are expanding our capabilities, as well as those of our adversaries. The majority of new satellites will be communication systems, but new imaging satellites will also be in operation. As a result, states, transnational organizations, factions, or individuals will be able to buy militarily significant space products or services. In fact, 1-meter resolution imagery, sufficient for tactical targeting (if timely) is commercially available today. Other commercial products include radar imagery that penetrates clouds; positioning, velocity, navigation, and timing (PVNT) services; and a multitude of highly mobile, highly capable communication systems. Adversaries will not restrict themselves to the use of military satellites, but will use a combination of both military and commercial satellites. Therefore, Army operations must assume an adversary will have at least limited access to overhead observation capabilities and telecommunications satellites, capable of supporting operations in remote or undeveloped areas, as well as in urban environments. Finally, just as the Army Objective Force seeks space-based capabilities to be delivered directly to forces in the field, technology advances will also allow adversary forces to quickly receive space-based products in a mobile, tactical environment.

(9) Adversaries will attempt to undermine the national will to conduct operations, and fracture the cohesion of coalitions and alliances. This approach is now enabled by the worldwide proliferation of space-based telecommunications and information technology. Moreover, this undermining effort will evolve in new directions, stemming from reliance on computer systems for processing and storing sensitive information. Space systems allow the U.S. intelligence community to monitor and report on global activities by observing early indications of crises; provide planning information; reduce many uncertainties in conflict situations; and support information sharing with partners and allies. Because information dominance (IS) is crucial to Objective Force operations in the 21st Century, the linkage between IO and space operations is vital. Elements of space systems will be targets of information attack operations, to include computer network operations. Left unprotected, links will be jammed, spoofed, monitored, or pirated by adversaries. Protection of this friendly center of gravity will be a major objective of space control operations. The information “line of communications” must be protected if the Army is to succeed.

(10) Adversaries may alter the space operations environment by affecting spacecraft, communication links, ground stations, terminals, or the associated information infrastructure. Adversaries may employ a variety of antisatellite (ASAT) techniques. Enemy special or conventional forces, theater missiles, electronic warfare means, cyber-attack, and terrorists all pose a threat to vulnerable ground stations, control facilities, and terminals. Adversaries may also attack spacecraft industrial facilities, launch sites, and even space vehicles during their ascent. The various “bottlenecks” associated with space systems will make unique space vehicle integration and launch facilities, and control and downlink facilities particularly valuable targets. Electronic attacks will aim to degrade satellite communications; telemetry, tracking, and commanding (TT&C) links; and ground stations. Low power signals, such as those emitted by GPS, are particularly susceptible to localized interference.

(11) Remote sensing capabilities may allow the enemy to “see” the battlefield, as well as the U.S. forces commander. Imagery, provided in time to support the strategic, operational, or

tactical decision (spectral and radar) will be available to potential adversaries through a number of commercial and foreign government-supplied vendors. While these capabilities at present do not replicate U.S. government imagery, in terms of timeliness and quality of resolution, commercial remote sensing has the potential of providing a potential adversary the information required to make timely and effective decisions which meet their requirements.

(12) The proliferation of GPS jammers will give adversaries the ability to block/degrade U.S. satellite signals that provide PVNT data. The ability of such jammers, to interfere with positioning and timing data, has critical impacts. Many networked computer and communication systems are already dependent on GPS timing signals. This dependence will increase in the future. In addition, PVNT data will be increasingly available to adversaries. Commercial and civil use of GPS is increasing exponentially, and the trend is toward equal resolution for government (defense) and commercial users of GPS.

(13) Weather data collected from satellites will be available to adversaries through any number of commercial and foreign government vendors. Moreover, the remote sensing systems mentioned previously will allow adversaries access to terrain and environmental reports and analyses. This kind of information will enable enemy's warfighting capabilities during periods of bad weather.

2-3. Army Capstone Concept. The concept for Objective Force space operations supports/enables the Army's vision of future capabilities as described in the Army's Objective Force Concept. Vertical integration of this concept with the Objective Force Concept is through the subordinate integrating concepts of Objective Force unit of action (UA), unit of employment (UE), Battle Command, maneuver support, and maneuver sustainment. Horizontal integration will occur through subordinate integrating concepts, such as force projection, and homeland security. The Objective Force Concept addresses employment of national, civil, commercial, joint, and Army space capabilities, across the full spectrum of military operations, as an integral part of an Army and joint, interagency, and multinational force. It describes capabilities that will enable the Army Objective Force to *see first, understand first, act first, and finish decisively*.

2-4. Joint concepts. This concept supports the emerging Joint Vision and Joint Operational Concept. It promotes enhanced warfighting capabilities through integration of joint, interagency, and multinational space resources.

2-5. Other concepts. This concept supports several other concept related documents: Army Vision; Field Manual (FM) 1-0; FM 3-0; Joint Publication (JP) 3-0; JP 3-31; and JP 3-14.

2-6. Assumptions.

a. Force structure will be designed and redesigned to provide space capabilities and products to the warfighter.

b. Treaty implications will not constrain the evolution and development of space control capabilities, or placing weapons on spacecraft.

- c. National and Army space policy will support the development and exploitation of space control technologies.
 - d. Army will acquire and field space capabilities to support strategic through tactical objectives.
 - e. The Army will plan and employ ground-based space control forces to execute continuous military space control operations throughout the spectrum of conflict.
 - f. Army tactical commanders will receive tactically relevant information in a timely manner.
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Chapter 3

Concept

3-1. Introduction.

a. Joint Publication 3-14 specifies four space mission areas: force enhancement, space support, space control, and force application (figure 3-1). Force application is a potential mission of the future that would involve attacking objects or forces on Earth from space. Army and joint science and technology efforts are underway to prepare such capabilities, should they be required. Space support involves actions to sustain and maintain our space-based constellations, such as space lift, surveillance of systems in space, and the day-to-day TT&C support needed for optimal performance and health of capabilities. Space control involves active and passive means to ensure friendly forces retain the space capabilities they need while, when appropriate, denying those capabilities to adversaries. The last space mission area is force enhancement. Force enhancement embodies what warfighters think of as “support from space,” to include:

(1) The SATCOM links that insure connectivity between systems, leaders, networks, and even individual soldiers, when the terrestrial command, control, and communications infrastructure is not available, and organic communication system range limits have been reached.

(2) The space-based and space-enabled surveillance and reconnaissance systems whose global access provides enhanced, and, at times, unique information vital to maintaining warfighter SA.

(3) The space-based PVNT system that enables maneuver forces, weapon platforms, and munitions to use precise location capabilities, and to synchronize complex independent automated processes.

(4) The space-related weather, terrain, and environmental monitoring (WTEM) systems that enable battlespace visualization through timely terrestrial and space weather information, as well as detailed terrain and geospatial data.

(5) The space-derived missile warning information that warns those under direct missile attack, cues missile defense systems, and provides the launch data necessary for counterattack operations.

b. Force enhancement capabilities are critical; friendly forces must be assured of their continued availability, and to the extent possible, adversarial forces must be denied their benefit. This is done through the exercise of space control.

Space Operations Missions

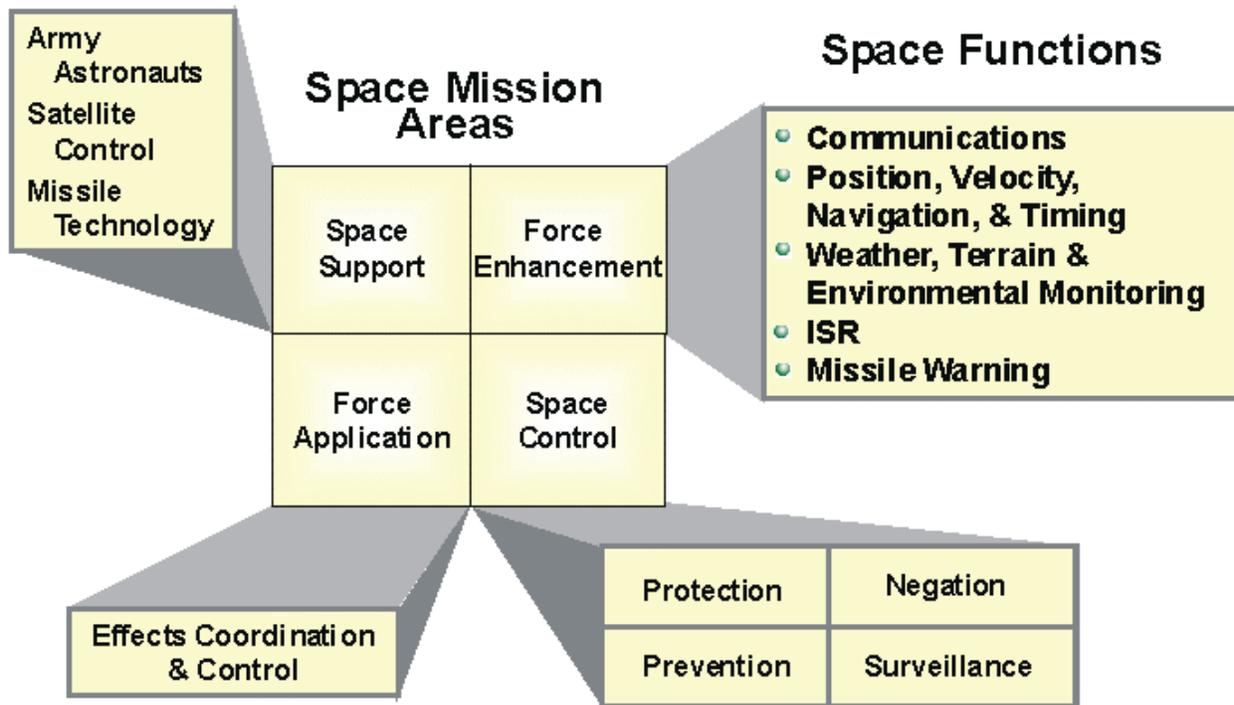


Figure 3-1. Alignment of mission areas and space missions

Note: In this document, the term “space support” will be used in a traditional manner, as in “fire support” or “air support,” unless otherwise noted.

c. As a space-enabled force, the Objective Force will routinely exploit the overhead constellation of national military and civilian space platforms for intelligence, focused surveillance, and area reconnaissance; long-haul communications; early warning; positioning, timing, and navigation; missile defense; and access to the GIG. The layered redundancy and improved capabilities provided through space will sharply improve development of SA at all levels, and help resolve many current operational challenges. Space support will extend from national, to the UE/UA at the operational and tactical level, and prove particularly indispensable

in immature theaters. Space support provides an environment, which supports operational requirements in full spectrum operations. It is a force multiplier.

d. Joint Publication 3-0 states: “To achieve our national security objectives, our armed forces must be able to deter or defeat enemy forces on land, in space, in the air, or at sea, whether by unified or joint action.” FM 1-0 states that the Army must be capable of conducting air and missile defense, space and space control operations, and joint amphibious and airborne operations. Army space forces will organize for, and conduct, operations to provide professional and competent space knowledgeable personnel, field a family of ground-based space control systems capable of defeating enemy space systems, and integrate space-based capabilities into Army global operations as part of the joint space force, in order to ensure Objective Force decisive operations and victory.

e. In the context of this concept, *space* capabilities are derived from a grouping of systems. This characterization will continue during the next 20 years and beyond. Space systems, consisting of the ground, downlink, and space platform elements, are diverse in terms of ownership, control, and capabilities. Those systems used by, and relevant to, land forces may be under civil, commercial, military, or international consortium control. International consortia, in fact, will control many of the commercial systems. Also, national-level authorities will continue to control selected national intelligence systems. Security considerations may limit dissemination of some products and services. The Army will also participate in monitoring and controlling an adversary's use of space for hostile purposes.

f. Increasingly, space operations will ensure that the specific needs of Army forces at the operational and tactical levels are met with a goal of fielding full-spectrum space capabilities. Space-based intelligence, surveillance, and reconnaissance (ISR) capabilities will directly support theater commanders and Service components according to their priorities. Theater commanders will have access to measures that selectively deny position, navigation, and timing services within an area of operations. SATCOM, commercial and military, will increasingly support in-theater operations down to the lowest levels of command. SATCOM will be an essential part of sustainment and combat service support (CSS) operations. Army space operations will influence the continuous migration of military capabilities onto the extended battlefield of space, and prepare Army forces to fully exploit this evolving and diverse grouping of systems.

3-2. Concept.

a. As a space-empowered force, UE and UA will routinely exploit the overhead constellation of military and civilian space platforms for intelligence, focused surveillance, area reconnaissance, long-haul communications, non-line of sight (NLOS) communications, early warning, PVNT, integrated tactical warning and attack assessment, WTEM, precision engagement, combat identification, and dynamic tasking and retasking of space platforms, with direct downlink and access to the GIG. The layered redundancy, and improved capabilities provided through military and commercial space, will sharply improve development of SA at all levels; help resolve operational challenges (e.g., fleeting target engagement, or limits on range and mobility of terrestrial communications); and strengthen the commander's confidence in this

knowledge backbone of support. Deployment of capability, to cross-cue intelligence and nonintelligence platforms, will lead to more responsive and comprehensive targeting information. Space support will extend from national to tactical level (space to mud) and prove particularly indispensable in immature theaters, where existing communications infrastructure (e.g., absence of fiber optic cable networks) may be insufficient, unreliable, or vulnerable. Overall, space-based capabilities are critical enablers for implementation of the fundamental principles of the UE concept, particularly with respect to achieving information superiority, creating SA, and operating within the high-tempo, noncontiguous, simultaneous framework of distributed operations.

b. At the tactical level, Objective Force units *see first, understand first, act first, and finish decisively as the means to tactical success*. Operations will be characterized by developing situations out of contact; maneuvering to positions of advantage; engaging enemy forces beyond the range of their weapons; destroying them with precision fires; and, as required, by tactical assault at times and places of our choosing. Commanders will accomplish this by maneuvering dispersed tactical formations of Future Combat Systems units linked by net-centric C4ISR capabilities for common situational dominance. With these capabilities, the Objective Force will master the transitions at all levels of operations. Space systems provide critical support to the Objective Force “Quality of Firsts”:

(1) **See First:** National technical means, Missile Warning, Space-based ISR, Space Control (in-theater negation and surveillance), satellite communications.

(2) **Understand First:** Satellite communications, combat identification (ID), in-transit visibility, IO, space control, PVNT.

(3) **Act First:** Space Control, combat ID, in-transit visibility, PVNT, satellite communications, dynamic tasking and retasking.

(4) **Finish decisively:** Space control, PVNT, precision engagement, ISR, continuous battle damage assessment (BDA).

c. Superior knowledge will enable all phases of the land campaign, beginning with the reliable identification of key enemy forces and capabilities, and permit the UE and its subordinate elements to:

(1) Characterize, differentiate and prioritize enemy forces, capabilities, and targets for attack, enabling the UE to conduct dominant, precision maneuver against those objectives that will have the most overpowering effects on the enemy’s forces, capabilities, and integrity, and lead more rapidly to their disintegration and defeat.

(2) Conduct precise, continuous BDA.

(3) Sequence, weight, and apportion supporting assets more effectively with respect to communications, ISR, fires/effects, maneuver support, and maneuver sustainment.

(4) Conduct highly synchronized, precise sustaining operations.

(5) Identify threats and means that must be neutralized to support operational maneuver by ground or air.

(6) Fully synchronize dominant maneuver with organic and external precision fires.

(7) Enhance force protection at all levels.

(8) Enhance ability to know and use terrain and weather.

(9) Support embedded, robust, all-weather, 24 hours a day/7 days a week ISR ability.

(10) Assist in detection of standoff mines and CBRNE effects.

d. The medium of space is the “High Ground” for the Objective Force. As such, our joint space forces must “seize the High Ground” if we are to dominate the terrestrial battlespace. Army space operations will focus on five essential tasks to enable the Objective Force mission. Unless achieved, Objective Forces will be impaired, or possibly, unsuccessful. These five essential space operations tasks are:

(1) *Support increased deployability and reduced in-theater footprint.* Space provides many resources that support increased deployability, and reduce in-theater footprint. Some of those resources include space-based communications that provide global access, and space-based ISR that enhances SA. Space control capabilities enable our ability to see the enemy first, by denying the adversary the same capability. Global reach to the home station operations center and home station support nodes is critical when conducting operational maneuver from strategic distances.

(2) *Support SU “Off the Ramp”.*

(a) Understanding all aspects of the battlespace environment becomes increasingly difficult when the threat has the “home-court” advantage. The threat’s intimate knowledge of urban areas, infrastructure, cultural and political areas, and complex terrain are critical enablers to threat operations. The effects of weather on the physical environment, forces, and sensors may further enhance these operations.

(b) Continuous SU of the battlespace is the key enabler to offset the enemy’s home-court advantage. The information supporting this understanding must be available in real-time, actionable and tailored to meet commanders’ unique needs at all echelons, and create for objective forces the level of understanding to enable them to gain the information initiative. Objective Force commanders must be able to foresee the enemy’s action, and take away any home-court advantage by using the advanced SU to shape the environment, and achieve the intent of the decisive maneuver.

(c) In order to see, understand, and act first, the commander requires information at the right time and place. Dynamic retasking and direct downlink capabilities must be coordinated with the joint provider to ensure immediate access to information.

(3) *Support information and decision superiority.*

(a) A continental United States (CONUS)-based Army must have theater access to project combat power. Deployments may be into areas with poor infrastructure, limited ports of entry, and little host-nation support. Objective Force entry operations will create “gray space” in which Objective Force commanders will be able to maneuver freely, to fully develop multiple ports of debarkation. Threat forces will attempt to deny access by applying a wide range of antiaccess strategies, to include indirect attacks by asymmetric means, and direct attacks using special purpose and terrorist forces. Threat forces will attempt to determine what forces will be deployed, and when and where they will enter.

(b) Superior SU of the battlespace environment, prior to deployment, enables Objective Force commanders to deploy the right force mix to establish multiple entry points. The employment of space control systems will enable us to preclude the adversary from determining these points of entry. Space control systems will ensure that the deploying force can be protected from observation, from the time it prepares for deployment, until the time it arrives in theater. Once the force arrives in theater, mobile space control systems will continue to ensure the adversary is denied information on friendly force operations.

(c) From home station to engagement with the enemy—and all points between—the networked battle command system must be seamless, to ensure the right information gets to the right place, at the right time. **Superior SU, based on advanced C4ISR capabilities at all levels, will enable ground commanders to operate on their terms, at the time, place, and method of their choosing.**

(d) Space-based systems and products significantly **reduce the fog, friction, and uncertainty of warfare**. Forces will be able to rapidly see, hear, and exploit the environment, when space capabilities are properly integrated into the warfighting plan. This results in **improved SA, reduced response time, and a considerably more transparent battlespace** to provide the commander dominant battlespace awareness.

(4) *Support precision maneuver, fires, sustainment, and information.*

(a) Adversarial forces will be more difficult to target as they conduct dispersed operations, and use asymmetric responses to achieve operational intent. They will also migrate to urban and complex terrain for hiding and shielding, disrupting command and control (C2), and reducing the impact of Objective Force standoff SA.

(b) To increase friendly force advantage, the Objective Force commander must be able to leverage ISR and PVNT resources to maneuver decisively, and bring effective fires to bear on threat forces. Timely and continuous, jam-resistant PVNT is key to target acquisition, and providing precision munitions on target. One-meter accuracy is the accuracy requirement. As

during every phase of an operation, combat ID and timely, accurate, and responsive information is a firm requirement to ensure that sustainment operations are conducted when needed, and at the exact time and place.

(5) *Protect the force during all phases of the operation.* Space capabilities play key roles in protecting the force during all operational phases. By attacking the adversary's space systems, we deny them the information needed to detect and attack our forces. Satellite warning systems will cue missile defense systems with the location of missile launch, and trigger passive and active defense reactions.

e. Successful transformation to the Objective Force is a key to the Army's ability to sustain battlefield dominance in the 21st Century and provide the best possible support to the Theater and Joint Force Commander (JFC). Space-based systems are essential for intelligence and communications connectivity, as well as other vital functions from navigation to targeting. Today's space capabilities make unique and essential contributions to our land force dominance. Through robust beyond line of sight (BLOS) connectivity, and their ultimate high-ground perspective, space systems are essential to providing joint warfighters timely SA of force composition and disposition (red and blue), detailed knowledge of battlespace and associated environment, the status of support and sustainment efforts, and the linkages military leaders require to plan, execute, and sustain dynamic military operations.

f. The significant contributions space systems already make in the near term will be continuously improved in the mid and far term as the Army continues transformation. Army space equities can be categorized in two major mission areas: force enhancement, and space control. These two areas directly support the transformation of the Army to the Objective Force and enable Army operations in all phases of conflict in support of the JFC.

g. Force enhancement embodies the joint warfighter's use of space. It is value added to battlefield functions that enables the land force to accomplish its terrestrial mission. As Objective Force requirements mature, the Army, within established joint processes, will ensure upgrades to force enhancement capabilities address Objective Force requirements. Technologically enhanced space capabilities are key to Objective Force capabilities. Force enhancement capabilities include BLOS communications; ISR; positioning, navigation, and timing; WTEM; and missile warning.

h. As the Army grows more reliant on force enhancement capabilities, U.S. force vulnerability also increases. Rapid growth in commercial and international space capabilities increases the ability of potential adversaries to monitor U.S. forces, and potentially negate U.S. advantages in space. Space control takes on increased significance for land forces by ensuring dominant access to space capabilities. Space control is the means by which space superiority is gained and maintained to ensure friendly forces use of space, while denying it to the enemy.

i. Space operations and capabilities are inextricably linked with, and dependent upon, supporting infrastructure. The maintenance and upgrade of space operations infrastructure includes improvements to fixed site facilities, such as permanent satellite communications ground stations, the Blue Force Tracking Mission Management Center, and the Regional

SATCOM Support Centers. This infrastructure supports tactical to strategic force enhancement mission areas of SATCOM; ISR; theater missile warning; WTEM; and position, navigation, and timing. This infrastructure also supports the space control mission areas of negation, surveillance, protection, and prevention, and ensures the capability to control space, while denying its use to the enemy. Supporting infrastructure is not made up of fixed sites alone. The supporting space infrastructure has to include the ground segment, the space segment, and the user segment down to the “last tactical mile,” and the warfighter on the ground. All of these segments/elements must be assessed in the space-supporting infrastructure.

j. The Objective Force is designed to play a decisive role in joint and multinational military operations, and offensive, defensive, stability, and support operations. The goal is to increase strategic responsiveness, while ensuring full-spectrum dominance across the range of military operations. This approach requires that all capabilities be reconciled into a technologically advanced general-purpose force that is complemented by special purpose forces. The general-purpose quality of this force will ensure its long-term relevance to adaptive, sophisticated threats, and its ability to meet often-unexpected requirements of the geopolitical alignment, and emerging operational environment. The Objective Force will be an offensively oriented, versatile, and combined arms space-air-ground task force, capable of operating across the full spectrum of operations. During the past decade, the Army has been engaged in a deliberate and sweeping effort to adapt its organizations, soldiers, equipment, and methods of operation to the mission requirements of a rapidly changing strategic and tactical landscape. A key challenge for future commanders is to leverage the strategic capabilities available and define what operational and tactical support can be provided.

k.. Homeland Operations will require an ISR architecture that ensures unity of purpose for all sensors. Human and technical, manned and unmanned, terrestrial, and space-based capabilities will be needed to sense the operational environment, and detect, identify and track threats. Advanced sensor capabilities, integrated vertically and horizontally, from strategic to tactical level, and sensor networking, will provide holistic SA. These could, for example, link monitoring and control of environmental issues, and reaction to an incident.

l. The Army must be able to take advantage of superior information converted to superior knowledge to achieve “decision superiority.” This will result in better decisions arrived at, and implemented, faster than an opponent can react, or in a noncombatant situation, at a tempo that allows the force to shape the situation, or react to changes, and accomplish its mission.

m. Space support to the Joint Task Force Commander’s Campaign involves:

(1) Operational maneuver from strategic distances.

(a) The Objective Force, in support of the JFC, will conduct rapid strategic response and maneuver across the full operational spectrum—from homeland security, through operations other than war and major conflicts, to strategic crisis/conflict.

(b) Space-based assets are a part of the larger overall U.S. intelligence community and U.S. ISR capabilities. Space-based ISR capabilities will most often be the first “eyes on target.”

From the first intelligence preparation of the battlespace (IPB) assessment, to final updates on aerial ports and seaports of debarkation, to a deep look at support operations in depth, space systems provide critical ISR products and targeting information. En route mission planning and rehearsal, C2 of distributed operations over extended distances, and reach to in-theater and out of theater forces require overhead (high altitude and space) communication assets.

(c) The far term inherent capabilities of the Objective Force consist of lighter, but highly lethal, mobile, and survivable formations, that arrive in an area of operations fully synchronized with other elements of the joint force, and ready to fight. In addition to advanced lift capabilities and prepositioned assets, predeployed space assets speed deployment, and lighten the load of deploying forces. Space systems assist achieving strategic responsiveness by providing timely and accurate SA, assured global communications, and the capabilities to counter adversary antiaccess capabilities. These capabilities provide immediate global communications, timely and accurate surveillance, and en route mission planning and rehearsal capabilities for deploying forces. In the far term, integrated computer network operations, and space negation capabilities, work together in countering adversary antiaccess strategies and space ISR capabilities.

(2) Entry operations.

(a) Operational deployments, to areas with limited forward-deployed forces, or in situations where an adversary has achieved some success in denying access to U.S. and friendly forces, may require forced entry operations, followed by a seamless transition to offensive operations.

(b) Commanders require space-based communications and intelligence capabilities as they move from CONUS installations to the theater of operations. During the movement to the theater of operations, employment of counter-reconnaissance capabilities will be critical, to ensure friendly forces are free from observation by threat forces during the deployment process. Arrival in theater increases the joint warfighter's reliance on space-based capabilities, to include reach for strategic C2, logistics support, air traffic control operations, database query, precision strike support, and ISR support, for efficient use of reconnaissance, intelligence, surveillance, and target acquisition assets, and deep operations.

(c) Objective Force capabilities, to conduct forcible entry operations by dismounted and mounted forces simultaneously in multiple locations, demand real-time battlespace awareness and assured communications, as well as the ability to counter specific adversary antiaccess capabilities. Internetted, overhead (high altitude and space) communications, and ISR far-term capabilities, and the means to protect them, are critical to provide the essential communications, timely and accurate surveillance, and en route mission planning and rehearsal capabilities for deploying forces.

(3) Decisive operations.

(a) For war to be decisive, its outcomes must be conclusive. This preeminence translates into the ability to dominate land operations, the decisive component to air, sea, and space operations. Space support extends from the strategic to the tactical level, and strengthens the

commander's confidence in the SA and information superiority infrastructure that provides support. The Objective Force exploits superior SU, and integrates fires, movement, and assault, to win the close combat fight. As a space-empowered force, the Objective Force uses overhead constellations of military and civilian space platforms for ISR; communications; early warning; positioning, navigation, and timing; and WTEM. The operational simultaneity, SU, precise and tactically responsive ISR, and assured communications implicit in this concept, rely heavily on mid- and far-term overhead architectures, systems, and platforms. The goal of our joint internettted space-air-ground C4ISR systems is to provide SU "off-the-ramp" to the Objective Force commander.

(b) The Objective Force conducts simultaneous operations that are distributed across the entire joint operations area (JOA). It places a premium on superior SU as the key enabler, to allow ground forces to operate simultaneously in a distributed, nonlinear fashion, that masses effects, not forces.

(c) Simultaneous engagement and distributed operations are significantly enhanced by high-altitude and space-based capabilities. Comprehensive SU, and a common relevant operational picture (CROP) throughout the force, demand a far-term, fully integrated and internettted plug and play C4ISR architecture that includes ground, air, sea, and space systems and platforms.

(d) In the near term, global positioning, velocity, navigation, and timing capabilities, provided by the GPS constellation, are our sole method of providing force-wide common location and timing essential for simultaneous, distributed operations (knowing where you are, where your buddy is, and where the adversary is). GPS provides the "common grid" for precision engagement and maneuver, and a mechanism for effective BLOS blue force tracking to land forces. Mid- and far-term upgrades of the GPS system must include antijam and antispoof modes to safeguard this capability.

(e) The Defense Support Program satellites in the near term, and the fielding of the space-based infrared system (SBIRS) in the mid term provide critical, time-sensitive, early warning. Data provided includes launch points and predicted trajectories. The SBIRS also provides infrared information that will provide greater battlefield resolution. Far-term capabilities provided by the space-based radar (SBR) include moving target indications from space to track adversary vehicles. The near- to far-term capability of a direct downlink process will make timely, assured receipt of this and other information available to the appropriate level tactical commander, where and when needed.

(f) Joint simultaneous attacks against enemy decisive points and centers of gravity, require the Objective Force to conduct simultaneous engagement, to perform operational maneuver, vertical envelopment, and mobile strike operations throughout the JOA. These operations require superior SU and a CROP to focus forces against critical enemy capabilities; timely imagery to detect and locate identified decisive points; accurate targeting data necessary for attack; and responsive BLOS communications for effective C2. The physical range and field-of-view limitations of terrestrial-based C4ISR systems mean that the tactical force will

continue to rely on the enhanced mid- to far-term capabilities provided by space and overhead platforms.

(g) The Objective Force creates an operational tempo, achieved through continuous operations, with no significant pauses, to overwhelm the adversary's ability to respond effectively. The Objective Force relies on continuous and immediate updates to SA, a CROP across the force, and assured communications across the operational area. A portion of this capability will be provided by overhead (high-altitude and space) C4ISR platforms.

(h) Space and terrestrial architectures cannot be stand-alone or stove-piped architectures. They must be fully integrated with other surveillance architectures, to provide the Objective Force commander with complete battlespace awareness, and enable the Army to provide dominant land power support to the JFC. Given the short timelines of a tactical battlespace, the cycle time required, from tasking to dissemination and receipt of all-source, integrated products, must be in near real time. Additionally, development of a mid- to far-term capability to cross-cue intelligence and nonintelligence platforms will lead to more responsive and comprehensive targeting information.

(4) Decisive tactical combat.

(a) Army Objective Force decisive operations, in support of the JFC, are ultimately based on tactical success in close combat. The ability of the Objective Force to close with and destroy enemy forces, and to seize and control terrain, will rely on a robust space-based capability, integrated with a seamless C4ISR structure, in this phase of the operation. National technical means (NTM), coupled with tactical surveillance, theater reconnaissance, and wide area surveillance, provide this robust capability to the Objective Force commander. Space-based, mid- to far-term capabilities enable friendly forces to see the enemy first, understand the threat's intent, and then attack. Space-based capabilities also reduce the theater footprint, resulting from the employment of tactical surveillance and reconnaissance systems. The Objective Force's primary mission of closing with, and destroying, the enemy is cast in terms of a combined arms air-space-ground task force UE and UA. Mid- and far-term space capabilities enable a seamless ISR capability, that influences shaping actions from the immediate objective area, to objective areas extending beyond the reach of tactical ISR capabilities.

(b) Objective Force units exploit situationally aware combat soldiers, and revolutionary technologies, to provide overwhelming momentum to offensive operations. Objective Force close combat operations are characterized by our capability to see first, understand first, act first, then finish decisively, through fire and maneuver and tactical assault, augmented with space-enhanced precision engagement weapons. Space-based force enhancement capabilities are now, and will increasingly be, significant contributors to the ability of U.S. forces to see the environment first from standoff ranges; distribute information; and ensure freedom of maneuver through superior IS.

(c) Developing the situation out of contact is a key aspect of operations, before forces are directly engaged in battle. While out of contact, NTM and theater-wide area surveillance are used to see and understand the enemy situation; WTEM capabilities provide understanding of the

environment; and positioning, navigation, and timing systems facilitate deployment of joint and Army standoff fires.

(d) Once forces are joined in contact, space-based capabilities continue to provide SA to facilitate adjustment by the air-space-ground task force to the changing situation during the fight. Superior knowledge enables the joint task force to attack at the right place, at the right time, with overwhelming power; while synchronized Army space control negation and surveillance denies this capability to the enemy.

(e) The potential for future adversaries to exploit urban and complex terrain require the Objective Force to see, know, and act effectively in all four aspects, or domains, of this environment: vertical, horizontal, interior, and subterranean. While an urban and complex environment may demand extensive manpower (dismounted), the Objective Force will apply capabilities and tactics to achieve rapid decision, while discriminating between friend, foe, and noncombatants, and avoiding collateral damage. Essential near- through far-term force enhancement space capabilities in this environment include: BLOS communications, discrete imaging and targeting data, and continuous GPS coverage for force positioning, navigation, and timing.

(5) Transition to post-conflict.

(a) Information superiority remains a critical requirement during post-conflict operations. Assured access to national and strategic space-based capabilities ensures that the ground force commander, as well as civilian and nongovernmental organizations, have continuous access to weather, updated terrain data, enemy disposition, global communications, friendly force locations, and updates to the enemy force space order of battle.

(b) Space capabilities will enable the JFC to transition from a warfighting environment to one in which forces are redeployed, and sustainment operations are conducted in coordination with a coalition and nongovernmental organizations.

(c) Space-based communications and capabilities will enable the maneuver support, and maneuver sustainment support (MSS) forces, to effectively orchestrate the deployment of forces, and assist in the establishment of base support operations, if requested, for sustainment operations.

n. Space control plays an important role in the preparations for decisive tactical combat. The elements of space control capabilities, some of which operate in the near term and will continue to be refined and upgraded in the mid- and far term, are surveillance, negation, protection, and prevention. Space control negation methods are further categorized as denial, disruption, deception, degradation, and destruction. The Army will develop the capabilities with temporary, reversible effects, to counter an adversary's use of satellite systems and services for hostile purposes, to prepare for individual or collective self-defense; to contribute to the deterrence or dissuasion of threats to U.S. national security interests; and enhance the operators' security and protection of U.S. forces. All of these methods are currently being developed in the near term, and all will continue to be refined as technology advances.

(1) The contribution of space control to the Army's Objective Force, and ultimately to the JFC, cannot be overemphasized. The Objective Force will employ far more sophisticated space control capabilities to negate adversary benefit from valuable space-derived and space-reliant information. Through electronic, kinetic, or directed energy means, and other capabilities under development, the adversary's military decision process will be degraded. The inherent expectation in the reliance on space assets is assured access to these capabilities across the full spectrum of operations, and the protection of key points of vulnerability—most significantly, ground segments/stations. The Objective Force must rely on far-term joint capabilities for assured access to space segments, while providing protection of key ground segments/stations. Conversely, potential adversaries have similar space capabilities (particularly C4ISR capabilities) and a growing ability to interfere with U.S. access to, and use of, space capabilities. Lack of effective space control capabilities will place joint and Army forces at risk in a future conflict. The Objective Force operational concept must address the emerging space control requirements for 21st Century military operations.

(2) Space control capabilities, in the far term, will be a major contributor to uninterrupted, assured access to space-based capabilities, while denying the enemy the same capability. Denial and disruption of adversary ISR and communications will be accomplished with a suite of space surveillance and negation systems. Far-term space control weapons protect the force from enemy space ISR, and deny the use of space capabilities to our adversaries. This far-term capability mitigates risk, while providing the following benefits to the Army's Objective Force commander in support of the JFC:

(a) Protection against adversary space-based ISR during staging, embarkation, and debarkation in the theater of operations.

(b) Denial of adversary capability to observe blue actions from space.

(c) Denial of adversary C2 capability, which in turn:

- Reduces adversary responsiveness.
- Reduces adversary lethality.
- Reduces blue casualties and loss of equipment.
- Maintains friendly SA advantage.

(d) In-theater SA of red and gray satellites that could support adversary plans and operations (location, activity, surveillance).

(e) Maintaining the element of surprise through superior assured access to ISR and communications, all of which in turn enhance blue and coalition force freedom of maneuver.

o. The Objective Force must fulfill a variety of strategic, operational, and tactical purposes, while interacting with various political and military actors within the U.S. interagency process, and the international community. The Army must maintain some mix of functional competencies at all levels. Many force echelon factors must be addressed, including the

challenges of span of control, the increasing complexity of operations at each level of effort, the expanding battlespace geometry, the differences in tasks and purpose that occur at each echelon, and the human capabilities (and limitations) of future leaders and staffs. Army space forces will be part of the UE echelon, and provide reach to the UA. Joint, national, civil, and commercial organizations will provide space support to each echelon.

(1) Joint, national, civil, and commercial space support.

(a) Space operations play a critical role in providing the relevant and timely information needed to successfully see, shape, and dominate the battlespace. Space support to the force is inherently joint and reliant on national, civil, and commercial space systems. The explosive growth of space technology has resulted in a global proliferation of space systems, and more importantly, space-derived information. Planners routinely integrate national intelligence, commercially derived high-resolution imagery, and national and civil PVNT and weather data (transmitted over military space-based communication links) into the conduct of land operations. The Army is increasingly reliant on its ability to access and leverage such space systems to plan and execute land operations. Currently, robust organizational structures exist within the national, civil, and commercial sectors. All of these sectors provide responsive and valuable data to land forces, and some even provide on-site space expertise (e.g., joint space support teams, and national intelligence support teams) in support of operational commands.

(b) To fully integrate the range of space capabilities into the Objective Force, the UE and UA headquarters will need streamlined and agile Army space organizations that can provide enhanced and tailored access to space-derived information, while integrating and synchronizing the military, national, civil, and commercial sectors. In addition, these Army space organizations will plan for the attainment of space superiority throughout the operational environment.

(2). Component/Army-level space support.

(a) The Army space component provides dedicated support to the joint force. This support includes enhanced space expertise with its Army space support teams; space surveillance and missile warning; and a focal point for space analysis, and for access to service, joint, and national information systems through the Space Operations Center, located at the Army space component.

(b) Army space forces should be embedded, throughout the Army force structure, to ensure assured space support to the Objective Force. These space forces may consist of personnel and equipment assigned to both peacetime and wartime organizations.

(3) Organic space expertise. Army Space Support Element (SSE), composed of qualified space operations officers (FA 40s), will be located throughout the Objective Force, and will be the primary focal point for leveraging space capabilities. The SSE integrates and synchronizes space assets in support of operations; coordinates the enhanced access to joint, national, civil, and commercial space systems; provides space input and recommendations to UE planning activities; and coordinates the protection of friendly space capabilities, and the negation of enemy space capabilities. As a special staff element, the SSE maintains active communications

and data links with several space-related organizations within the theater or JOA. These links vary depending upon the role of the organization. Augmented space expertise is available to the force, primarily through the Army space component, to maintain full-time support to the unit.

(4) Command, control, and communications.

(a) Space operations and space control operations are inherently joint. The Army component to U.S. Strategic Command (STRATCOM) is charged with providing Army space force augmentation to the Objective Force. These forces will provide space and space control capabilities for both the joint and Army command structure.

(b) Space C2 nodes will have embedded, fully integrated capabilities to support missions across the full spectrum of operations. Space C2 must have inherent capabilities that facilitate these important tasks: controlling the Army joint battlespace; integrating with theater, regional, and national C2 architectures; and controlling space control systems.

(c) Command and control will be designed to allow centralized planning and decentralized operations, and direct sensor-to-shooter dissemination of targeting information. Information-age processors and high data rate communication systems will be integrated with sensors, shooters, and command, control, communication, and computer systems, allowing critical information to be exchanged in near-real time. Command and control nodes will integrate with other joint force elements involved in space operations, and be interoperable with multinational forces.

(d) Command and control elements will be equipped with C2 systems that integrate all battlefield functional areas, down to platform or weapon systems level. Command and control functionality will be configurable to a variety of operational roles at different levels of command. The space C2 elements will also have the capability to store and display "smart" database maps with multiple three-dimensional scales. Maps and imagery will be integrated to the common tactical picture display for use in planning, decisionmaking, mission rehearsal, navigation, and operations. The C2 and planning processes will be further supported by accessible, distributed databases. Virtual staff, through electronic linkages to organic and nonorganic centers of expertise, and decision support tools, will also provide support.

(5) The GIG is the interconnected, end-to-end set of information capabilities and associated processes for collecting, processing, storing, disseminating, and managing information. The GIG includes all owned and leased communications and computing systems and services, software (including applications), data, security services, and other associated services necessary to achieve information superiority. It supports all Department of Defense (DOD), national security, and related intelligence community missions and functions in war, and in peace. Capabilities are provided from all operating locations (knowledge centers, bases, posts, camps, stations, facilities, mobile platforms, and deployed sites). The GIG will provide interface to coalition, allied, and non-DOD users and systems. For the Army, the Distributed Common Ground Station-Army will be a key component of the GIG, and connect the UA with the UE, joint, and national capabilities, providing the bridge between the various virtual networks enabled by the GIG.

(6) Advanced C2 capabilities are key enablers to space operations. Central to these are space planning, information fusion, reach back, and SA.

(a) Army space forces must have the capability to participate in collaborative planning with the Army, joint, and multinational forces. Collaborative planning will allow planning cells at widely distributed locations to use common planning automated systems to exchange concepts, overlays, and analyses of options. It will enable planners at all echelons to contribute to the planning process, thus ensuring a holistic unity of effort.

(b) En route planning provides the opportunity to conduct rehearsals and receive updates of the area of interest. Units can then make last minute revisions to plans and adjustments to methods of deployment, or the manner in which the force is arrayed for combat to assist in knowledge based planning and readiness, to immediately conduct offensive operations.

(c) The availability of the single integrated air picture, CROP, common tactical picture, the joint data network, and other integrated networks provide commanders and their staffs timely and accurate SA that provides a clear picture of the operational environment. This increased awareness enables better planning, extended range engagements, and focused early warning.

3-3. Space support to battlefield functions.

a. *Battle Command.* A responsive, integrated, and interoperable system that collects, processes, and disseminates information in a timely manner is critical to success on future battlefields. Space systems and space surrogate systems (e.g., high-altitude unmanned aerial vehicles and potentially aerostats) enable a wide range of leadership/C2 activities, to include:

(1) Command—through robust line of sight, BLOS, and NLOS communications (data, voice, and video) from factory to foxhole, that will assure battlespace visualization, and enable the commander to maintain connectivity with the widely dispersed units in-theater and out-of-theater, control their activities, and orchestrate the commander's combat power.

(2) Staff activities—to include operations and planning; ISR; fires and effects; combat support and CSS. The SSE (augmented, as required) will integrate the wide range of space capabilities available to the commander. This element, working with the traditional staff sections, will analyze, plan, and execute space operations for the force. The SSE will provide input to the planning process concerning the capability, availability, and effects of blue, red, and gray forces from a space perspective. The SSE will optimize and synchronize space-based assets and products in support of ground operations and the commander's intent.

(3) Communications—space-enabled digital, voice, and video transmissions will provide the essential foundation for such critical capabilities as en route mission planning and rehearsal, range extension, reach, split basing, and total asset visibility. Communications provided by space systems will enable seamless global connectivity, within the theater of operations and between theaters of operations, CONUS, and reaching to other critical locations throughout the world.

(4) Weather, terrain, and environmental monitoring—accurate and tailorable data required to continuously update operational planning, display, maps, and images necessary to achieve and maintain SA.

(5) Positioning, navigation, and timing—will provide precise geolocation, navigation, and timing data that enable synchronized operations.

(6) Friendly force tracking—through an integrated system for transmitting and displaying unit status and locations.

(7) Accessing ISR systems—within conventional Army intelligence lines (e.g., national systems, signals intelligence) and beyond conventional Army intelligence lines (e.g., worldwide access to commercial imagery). Army commanders must be provided direct downlinks capabilities and dynamic retasking authority of satellite payloads, based on operational needs.

(8) Force protection—timely and accurate input to the common operating picture (COP), and warning that enables rapid active defense, passive force protection, and responsive attack operations.

(9) Space surveillance—continuous access to the global space surveillance network, possibly augmented by in-theater capabilities, that directly contributes to an accurate space IPB.

b. *Intelligence, surveillance, and reconnaissance* is the combination and integration of capabilities and tasks that include planning and directing, collection, processing, and production phases of the intelligence process, as well as the common functions of analyze, disseminate, and assess. Intelligence, surveillance, and reconnaissance operations provide input to the COP of the operational environment in all of its dimensions: political, cultural, economic, and demographic, as well as military. The COP is a single identical display of relevant information shared by more than one command. A COP facilitates collaborative planning, and assists all echelons to achieve SA. The COP is a fused picture containing timely, relevant information about the enemy, the environment, and friendly forces. The information and intelligence obtained through ISR operations protect the force, and preserve the commander's freedom to maneuver, and ability to shape the battlefield. The multidimensional task of building knowledge in complex environments, which include nontraditional adversaries and asymmetric warfare, is highly enhanced by leveraging space-based systems.

(1) National and commercial space-based systems provide a significant level of input to the COP. High-resolution commercial imagery provides unclassified products to support the ISR operations of multinational forces. These systems assist in identifying enemy dispositions, obstacles, and minefields. Using space-based systems, planners can combine and manipulate imagery and highly accurate terrain elevation data into three-dimensional products that provide field of view, ingress and egress routes, and enable three-dimensional visualization and rehearsal of Objective Force operations.

(2) Space-based intelligence collection systems provide timely updates of enemy emitters at all echelons. Satellite communications are key to maintaining C2 among widely dispersed

elements, or electronically isolated elements in urban canyons. These links are also vital to quickly transmit new information across the battlefield, and to maintain the COP with tools like friendly force tracking. The GPS provides key navigation and timing capabilities to ISR operations that enable the force to pinpoint enemy locations for targeting, and warn friendly forces for security operations. Space-based weather provides highly accurate forecast data that enables the Objective Force to use the optimal timing in its intelligence gathering, and operations planning processes.

(3) As the Army proceeds towards the Objective Force, additional space-based systems will come on-line to contribute to the ISR mission. Space-based radar systems will enable continuous tracking of moving targets. Multi-spectral and hyper-spectral sensors will enhance the space-based capabilities of detecting enemy dispositions, targets, and avenues of advance.

c. *Maneuver.* Rapid deployment of the maneuver force to undeveloped theaters initially will rely heavily on national, joint, and theater assets, and will require self-reliant C4ISR structure embedded in Objective Force units. While en route, deploying units must have connectivity with higher, adjacent, and subordinate elements, and joint forces, as required, to answer the commander's critical information requirements in support of entry and shaping operations, including analysis, direction of collection assets from all echelons, and continuous knowledge of the enemy terrain and weather. These efforts will permit Objective Force units to immediately enter combat operations upon arrival in theater. Objective Force elements, with embedded, multi-path linkages, will effectively extend network connectivity with them as they deploy, and immediately employ. The Objective Force will be capable of executing maneuver in open, complex, and urban terrain. Space operations enable line of sight, NLOS, and BLOS SA to support the high-speed, dispersed maneuver of these organizations and the synchronized application of firepower necessary to achieve positional advantage in the battlespace. Space systems directly facilitate maneuver in the areas of position, navigation, and timing; SA; communications; maneuver planning; mission rehearsal; force protection; and intelligence, terrain, and environmental analysis.

d. *Fires and Effects.* The Objective Force requires lethal fires from a combination of responsive air and ground means, to engage complex and multiple target sets simultaneously and continuously, in all terrain and weather.

(1) Timing to conduct precision engagement and target acquisition functions is enhanced by PVNT capabilities afforded by GPS, near-real-time ISR by space-based sensors, as well as the capability to access high-volume digitized information via SATCOM, global broadcasting systems (GBS) and national intelligence systems. Linkage of sensor information to the shooter in time to support the mission is critical. Future forces may have target designator capabilities that will enable extended-range target designation, when used in conjunction with sensor-shooter terminals. Embedded receivers on weapons platforms will support these extended range engagements. Additionally, space-based weather and radar-imaging systems provide critical environmental data to enhance the accuracy of fires, when directly observed surface information is unavailable.

(2) Space-based systems and associated ground-based nodes are integral elements of the Objective Force’s real-time connectivity, from sensor to shooter, that enables accurate target acquisition, precision engagement and timely BDA. The integration of fires and effects can be enhanced through a wide range of space control measures to deny, disrupt, deceive, degrade, or destroy enemy space capabilities, at the desired time and place.

e. *Maneuver Support.* Space systems are critical enablers of maneuver support to the Objective Force. National, joint, civil, and commercial systems will provide the capability to:

- (1) Detect and characterize precise geographic areas of nuclear, biological, chemical (NBC) contamination.
- (2) Detect obscurants and differentiate between dust, smoke, smog, oil mist, etc.
- (3) See through foliage.
- (4) Detect soil moisture to a 6-inch depth at 10-kilometer resolution.
- (5) Collect and access remote weather observations.
- (6) Obtain direct readout of meteorological satellite cloud imagery and profiles.
- (7) Obtain demand data lines of communications and obstacles.

f. *Maneuver Sustainment Support.*

(1) The Objective Force will employ the latest advances in C2, SU, and MSS processes to enhance their capability to support operations of varying intensity and tempo. The MSS force package will be tailored for each contingency with the twin goals of optimizing the use of MSS resources (through MSS understanding), and minimizing the operational and MSS footprint in the area of operations. MSS will stress:

- (a) Split basing—highly deployable MSS assets positioned to rapidly enter and depart the area of operations.
- (b) Austerity—a lean MSS structure with increased deployability and agility.
- (c) Total visibility of assets and infrastructure capability.

(2) Satellite communications, augmented by commercial space communications, will enable distributed logistics management by widely dispersed staffs. Beyond line of sight communications provide the capability to exchange and update large databases almost immediately, which makes a significant contribution to “just in time” logistics. The ability to precisely track supplies in transit significantly enhances total asset visibility and, thus, reduces the logistical stockpiles required in theater. Space capabilities enable logistical operations to become more agile and responsive to the warfighter. Space-based communications will also

enable global reach for support services, such as reach to medical expertise (telemedicine), responsive personnel management, and many morale, welfare, and recreational opportunities. The GBS will provide a means to maintain current SA, and theater specific information that will further enable anticipatory logistical support. Space capabilities, such as weather and terrain analysis, also enhance the logistician's capabilities to maintain internal lines of communications, determine traffic ability, maximize throughput, and identify threats to rear area security. Space capabilities are especially valuable during extended deployments, ranging from humanitarian assistance missions, to major conflicts.

(3) Combat service support commanders will anticipate support requirements, tailor support packages, and maximize battlefield distribution to form a seamless pipeline of support to the Objective Force.

g. Force Protection. Objective Forces, responding rapidly to a crisis situation, may evoke asymmetrical adversarial responses to our overmatch capability—particularly in an early entry situation. Robust and integrated missile defense (IMD) will be essential to counter a wide range of threats, including many capable of carrying weapons of mass destruction (WMD). Space-based missile warning, communications, PVNT, and ISR satellites will be critical to the C4ISR connectivity required to execute effective missile defense operations. These space-based capabilities enable the timely synchronization of all IMD operational elements.

(1) During the operational planning, space-based sensors, such as SBR, will support the IMD IPB process. A thorough IMD IPB will assist the synchronization of active defense, passive defense, attack operations, and battle management command, control, communications, computers, and intelligence capability with the phases of the campaign plan. During the deployment, space-based capabilities will provide timely and continuous warning, SA, and engagement entry operations. As the theater matures, space-based capabilities continue to provide vital IMD support for the Objective Force, and other designated theater elements.

(2) Surveillance satellite information will enable C4ISR nodes to plan, monitor, direct, coordinate, and integrate the Army and/or joint force capabilities required to conduct and link passive defense, active defense, and attack operations. Surveillance satellites will increase the accuracy and the timeliness of launch-point estimation, and impact point prediction data. Timely and accurate warning enables the likelihood of a successful engagement, and the implementation of passive defense measures, to enable at-risk elements to take appropriate actions. Accurate launch-point information enables both intelligence planning, and time-sensitive attack operations on the enemy's launch infrastructure.

(3) Weather and terrain data are vital to improving attack and active defense capabilities. Passive defense is also enhanced through an improved ability to predict WMD effects and avoidance of contamination.

h. Information Superiority. The Objective Force will conduct IO, including computer network operations, to achieve information superiority. Information operations comprise a wide variety of integrated actions, such as computer network attack (applying both lethal and nonlethal capabilities), information assurance, psychological operations, and deception.

Situational understanding and information superiority enable the force to avoid surprise, develop rapid decisions, control the time and place to engage the enemy, conduct precision maneuver, shape the battlespace with precision fires and effects, and achieve decisive “overmatch,” even though it may lack weapon platform or system overmatch in some areas. Space capabilities are essential and provide critical enablers to the IO process.

(1) Space operations enable development of the COP through rapid, assured communications, PVNT data, and the surveillance and reconnaissance capabilities of overhead space systems. Space systems are essential in the collection, processing, and dissemination of relevant information, and are integral to information management.

(2) As potential adversaries gain access to space surveillance data, the need to control space increases. The Army needs unimpeded access to space surveillance data. Future Army space control operations and equipment will enable information superiority methods that exploit or deny an adversary’s space capabilities, and protect friendly forces from space-based observation. As space control capabilities and concepts evolve, space superiority will become more critical to land force information superiority.

3-4. Force Operating Capabilities (FOCs). Force Operating Capabilities provide focus to the Army’s warfighting experimentation program, and the science and technology program. The following FOCs support the achievement of full and seamless space and land force integration.

a. **FOC-02-01: Deployability.** The Objective Force will require an enhanced ability to conduct joint logistics over the shore, to permit operations where deep-water seaports are not available, and to counter an enemy’s antiaccess strategy. En Route Mission Planning and Rehearsal System (EMPRS) will support the Objective Force to develop SA, conduct planning, prepare and disseminate mission orders, conduct rehearsals at multiple levels, and adjust plans and orders as the situation changes, from alert, through deployment, to employment. The EMPRS will enable the Objective Force to integrate into gaining theater C2 systems during movement by air, land, and sea. The Objective Force must have an embedded joint in-transit visibility systems lash-up for movement planning and tracking. Space-based capabilities will enhance both of the above capabilities.

b. **FOC-03-01: Command and Control.** The C4ISR architecture includes networked communications, sensor, C2, and distributed information management and training. The communications architecture is a layered (terrestrial, near-terrestrial, airborne, space-borne) self-forming, self-healing, heterogeneous, mobile ad-hoc network. Sensors provide persistent surveillance through a series of layers of individual soldier systems, vehicle warning and defensive aids, organic unmanned aerial vehicles (UAVs), Unmanned Ground Sensors, and external sensors from the UE, Army, theater, national, and joint assets. The UE attains organic, higher-level Army, joint, and coalition effects to set conditions to enter battle on our terms, seize the initiative before contact, and employ our strengths against enemy weaknesses.

c. **FOC-03-02: Army Client to the Global Information Grid.**

(1) Establish the architecture for a single integrated tactical network, with universal, worldwide accessibility to the GIG, that links soldiers, units, sensors, weapons, and systems with communications that are unconstrained by terrain. Such a system will provide C2 on the move, achieve IS, and facilitate the exchange of information between joint, allied, and coalition forces.

(2) Support the warfighter with integrated and reliable, real time access to the GIG, anywhere in the world. The Objective Force will be integrated into the GIG by a highly mobile, self-organizing, self-healing, multilevel secure, resilient network that transports multiple forms of information among corps, division and lower tactical echelons within the UA. It supports C2, SA, sensor-to-shooter, and CSS applications. The network can rapidly deploy, to support a highly mobile force, and facilitates the conduct of en route mission planning and rehearsal. Access through global systems provides use of key information systems (INFOSYS) to the warfighter, immediately upon arrival in theater. This network can operate in all potential environments, while maneuver platforms, and in some cases, the supporting architecture itself, are on the move.

d. **FOC-03-03: Advanced Collection, Processing, Analysis, Management and Sharing of Information.** A network of advanced sensors that sense in multiple domains (e.g., radio frequency, thermal, acoustical, electro-optical, infrared, seismic) and operate independently, or as components of other systems/platforms, including dismounted soldiers, manned/unmanned ground vehicles (UGVs), manned/UAVs, satellites, and even cyber-based platforms. Networked ISR is linked to all shooters. Soldiers and leaders will be empowered with timely, accurate information about terrain and weather, and will receive accurate, timely, up-to-date digital map information of the battlefield. Units will be able to receive and disseminate terrain and weather information immediately throughout the AO, even while en route, to gain the advantage at all times.

e. **FOC-03-04: Network Operations.** Network operations consists of communications, and the means to effectively protect and manage the flow of information, through prevention, monitoring, detection and dynamic prioritization, allocation, and response. Network operations must integrate, direct, and prioritize the information flow between units, decisionmakers, sensors, and shooters. It allows seamless operations across, while integrating the full capability of, the GIG. Communications will consist of multiple tiers or layers, including terrestrial, airborne, and space. The Objective Force network must be interoperable. Network components in each layer are interconnected to form a survivable, self-configuring, self-healing backbone. Layered redundancy also ensures there is no single point of failure. Reliance on multiple layers also reduces technological and programmatic risks incurred by over-dependence on communications assets in any single layer. These layers will be combined to operate as a single integrated network, fully integrated with the GIG.

f. **FOC-03-06: Situational Understanding.** The key enabler of the UA concept is the enhanced SA that leads to actionable SU. This is achieved by fusing information obtained through a layered network of soldiers, sensors, and collection platforms, with information on friendly forces, enemy forces, and the environment, to obtain a COP that is shared across the force.

g. **FOC-03-08: Information Operations**. Information dominance is a core competency of the UE that provides comprehensive SU, and generates a strategic-to-tactical infosphere. Information operations provides the Objective Force with the capability to degrade, delay, deceive, disrupt, destroy, exploit, and/or deny an adversary's and other's information and INFOSYS; while protecting friendly information and INFOSYS. This enables the force to shape other's perceptions, reduce the effectiveness of an adversary's combat capability, reduce the ability of others to influence the success of military operations, and protect friendly and supporting C4ISR and IO systems, and the information that they provide. Space control plays an important role in the preparations for decisive tactical combat. The elements of space control capabilities are surveillance, negation, protection, and prevention. Space control negation methods are further categorized as denial, disruption, deception, degradation, and destruction. The Objective Force will employ far more sophisticated space control capabilities to negate adversary benefit from valuable space-derived and space-reliant information. Through electronics, kinetic or directed energy means, and other capabilities under development, the adversary's military decision process will be degraded.

h. **FOC-04-01: Sensor Fusion**. Fusion is the process in which data generated by multiple sources is correlated to create information and knowledge. The chain of command decides what information is required for tactical operations. There are several requirements for fusion. First is to gather information. The fusion process, operating over integrated communications networks, includes accepting data from all ISR sources, organic and external. Sensors include combat platforms and soldiers, organic manned and unmanned reconnaissance and surveillance platforms, and external constellations. The second requirement is to draw relationships between source inputs. Fusion ensures that information is not stove-piped, but is fully exploitable, across the entire force. The final requirement of fusion is to provide meaning to the information that has been acquired. This—the most important function of fusion—ensures that information gets converted as quickly as possible into actionable information. Intelligence, surveillance and reconnaissance/tactical (ISR/TA) sensors see the full range of operational variables—terrain, weather, friendly, and enemy force noncombatants, and detect threat actions in all environments. Manned and unmanned ground, air, and space means extend vision BLOS to gain timely combat information, through passive and aggressive reconnaissance, surveillance, and target acquisition (RSTA), networked into an integrated COP, for unprecedented SA and SU. This requires the ability to perform automated pattern analysis to detect, locate, and identify enemy combatants and systems. Network of ISR/TA sensors eliminates unique single-point ground control, and fusion stations.

i. **FOC-05-01: Mounted/Dismounted Maneuver**. The defining capability of the Objective Force is strategic, operational, and tactical maneuver. Capabilities are required for precise, decisive maneuver, horizontal and vertical, day and night, in all terrain and weather conditions, synchronized with Army and joint fires, and RSTA. In future operations, decisive maneuver will be central to entering the fight on our terms, seizing and retaining the initiative, and finishing rapidly. Advanced ground and air mobility systems, coupled with space-based systems, will enhance movement, and provide agile forces and systems ready to fight, immediately upon arrival in theater.

j. **FOC-05-03: Operations in Urban and Complex Terrain.** The employment of UAV/UGV, as well as spaced-based assets, is used in urban and complex terrain operations, to assist with deep reconnaissance within the objective area(s). These systems will also be utilized to reconnaissance complex terrain, and map high-risk areas, such as subterranean complexes, toxic industrial material locations, and minefields. Manned surveillance elements will remain on the periphery of the urban area, and collect intelligence through the insertion of unmanned systems. A wide array of sensors will “fill gaps” during large urban area operations. This capability will help to conserve Objective Forces, by allowing the commander(s) to “monitor and control” areas they choose not to physically occupy. These systems will be linked to precision fires (lethal and nonlethal) that will provide for rapid response to enemy actions. Decisive operations require the ability to communicate effectively in real-time, across the entire force, regardless of terrain, environmental conditions, organization, or operational distance.

k. **FOC-06-02: Non-Line of Sight Lethality.** Teaming by ISR and indirect fire systems dispersed throughout the battlespace, and by small tactical units fully integrated with maneuver, is critical. A system-of-systems framework must achieve the requirements for such a capability. It is critical that an enabling, integrated networked fires system-of-systems solution, leveraging a wider set of capabilities, including sensors, C2, and attack means from Army, joint and multinational forces, be pursued to provide the operational capability required today, and in the future.

l. **FOC-10-01: Understand the Battlespace Environment.** The battlespace environment includes physical, informational, and human dimensions. All of these are dynamic—they change over time, often in difficult to predict ways. Understand the Battlespace Environment is real-time understanding of the environment (space, air, water, land, and subterranean), including terrain, weather, infrastructure, hazards, populations, and their interaction, impact on operations, and options to leverage or mitigate effects, tailored to the commander’s needs. The five basic functions required to fully understand the battlespace environment are: Data Acquisition, Data Exploitation, Data Management, Data Representation, and Data Dissemination. In order to achieve unprecedented momentum and freedom of maneuver, the Objective Force must *see* the complete picture of the operating environment in all of its aspects. Further, the Objective Force must have an *understanding* of this picture that allows it to take away the enemy’s “home-court advantage,” and give our leaders a better understanding of the environment than our adversaries. Objective Force units will *see first* by detecting, identifying, and tracking the individual components of enemy units. Advanced technologies that lead to unprecedented ISR capabilities, coupled with other ground, air, and space sensors, are networked to provide a common integrated operational picture that will enable us to see the enemy, both in whole and in part, as a complex, adaptive organization.

m. **FOC-11-01: Sustainability.** The Army’s unique contribution to national security is prompt sustained land dominance, across the range of military operations, and the spectrum of conflict. The Objective Force must retain the Army’s capability for sustained ground combat, enabling the joint force to achieve decisive outcomes. At the same time, Objective Forces must be unburdened of significant deployment and sustainment tonnage. Sharp reductions are required in sustainment demand, with significant improvements in reliability, split-based operations, and refined capabilities for accelerated throughput, battlefield distribution, and

mission staging. The Army will aggressively reduce its logistics footprint and replenishment demand. This means that the Objective Force will deploy fewer vehicles, and leverage CSS reach capabilities that allow commanders to reduce stockpiles in theater, while relying on technology to provide sustained velocity management, and real-time tracking of supplies and equipment. The Objective Force will use reach capabilities, to include physical and informational resources. Hospital ships, air evacuation, and similar joint or coalition assets represent the former; and the latter is represented by “report-back” of logistical status and needs, such as telemedicine/consultation and telemaintenance.

Chapter 4 Implications

4-1. Doctrine. The Objective Force Concept focuses doctrinal development on information superiority, rapid projection of mission-tailored lethal forces, enhanced force projection through revolutionized sustainment/combat service support, enhanced training, leader development, and development of multifunctional soldiers. Additionally, the capstone concept calls common understanding of the battlespace the cornerstone of doctrine. Space doctrine must guide a seamless Army in joint, interagency, and multinational operations, and address operations in urban and complex terrain. Army space doctrine development will focus on bridging and bypassing gaps in the system of space systems that support the Army, as well as the Army’s support of joint space operations.

4-2. Organizations. The normal design will be mission-tailored combined arms organizations, drawn from a pool of hybrid organizations and geographically dispersed locations, which function as an integral part of a joint force. Units must be built around an internetted system-of-systems that achieves the fundamental capabilities of strategic deployability, operational agility, precision lethality, and enabling and responsive sustainability and survivability in its basic unit design. Expandability and cohesiveness will be additional core capabilities. The integration of space support element positions (table of organization and equipment, and table of distribution and allowance, Active and Reserve Components), into units and staffs, will be conducted as required. Additionally, a review of U.S. Army Space and Missile Defense Command’s organization, to include the space brigade and battalion, to serve as the Army component to STRATCOM, will be conducted. End-to-end fielding strategy must ensure organizations (e.g., knowledge centers), in CONUS sustaining base, are equipped to execute reach or split-based functions that assume their participation.

4-3. Training. Advanced full-spectrum operations require multifunctional units that are agile, lethal, cohesive, and adaptive. They will be mission tailored, and drawn from geographically dispersed Active and Reserve Components, joint/Army, and special operations forces/conventional units. Training will incorporate a balance of live, virtual, and constructive training. Training initiatives will continue to focus on qualification of FA 40 Space Officers, and development of a space professional military education curriculum at Army service schools.

4-4. Materiel. The Objective Force Concept describes a balanced transformation, from an Industrial Age to an Information Age orientation and capability. Materiel value will be assessed

using a system-of-systems approach, recognizing that individual items of equipment are components of larger information-enabled systems. Other materiel characteristics will include strategic deployability and operational agility, increased durability, and built-in growth capacity. Additionally, system maintainability, supportability, reliability, survivability, and safety must be considered. Acquisition will be characterized by linkage among materiel development, fielding, and advanced experimentation. Materiel related initiatives will focus on developing requirements for space control systems, and participating in joint requirements development initiatives directed by the Space Executive Agent and Air Force.

4-5. Leadership and Education. Leaders must recognize how political, cultural, economic, and ethical factors affect military operations. They must be current on tactics and technical aspects of the full spectrum of missions; and they must be effective as teachers and team builders. Leader development will include mentoring, advanced training, and hands-on experience. A thorough, methodical examination of how adaptive technologies integrated into space-based communications and sensor systems can support mental agility and accelerated decisionmaking in tactical, operational, and strategic operations. Full integration of relevant space topics into the Army professional military education program, at all leadership levels, is required in the near-term.

4-6. Personnel. The Army will require high-quality, multifunctional soldiers and Department of the Army civilians who are highly confident, capable, enabled, and not encumbered by technology. Soldiers must be physically, mentally, and morally prepared for the stresses of sustained lethal operations in urban and complex terrain. They must not only be multifunctional warfighters, but also disciplined ambassadors of the American way of life. They will use embedded training systems, deployable simulators, and simulations. They will develop within the triad of institutional training, unit training (operational experience), and self-development.

4-7. Facilities. Facility requirements will continue to be reexamined as space organizational requirements are determined, and the space professional military education requirements emerge.

Appendix A

References

FM 1
The Army

FM 3-0
Operations

FM 100-18
Space Support to Army Operations

JP 1-02
Department of Defense Dictionary of Military and Associated Terms

JP 3-0
Doctrine for Joint Operations

JP 3-13
Joint Doctrine for Information Operations

JP 3-14
Joint Doctrine for Space Operations

JP 3-31
Joint Land Operations

TRADOC Pam 71-9
Requirements Determination

Glossary

Section I Abbreviations

ASAT	antisatellite
BDA	battle damage assessment
BLOS	beyond line of sight
C2	command and control
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CBRNE	Chemical biological, radiological, nuclear and high-yield explosive
CONUS	continental United States
COP	common operating picture
CROP	Common relevant operational picture
CSS	combat service support
DOD	Department of Defense
DOTMLPF	doctrine, organizations, training, materiel, leadership and education, personnel, and facility
EMPRS	En Route Mission Planning and Rehearsal System
FA	functional area
FM	field manual
FOC	Force Operating Capabilities
GBS	global broadcast system
GIG	Global Information Grid
GPS	global positioning system
ID	identification
INFOSYS	information systems
IMD	integrated missile defense
IO	information operations

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IPB	intelligence preparation of the battlespace
IS	information dominance
ISR	intelligence, surveillance, and reconnaissance
ISR/TA	intelligence, surveillance, and reconnaissance/tactical
JFC	Joint Force Commander
JOA	joint operations area
JP	joint publication
MSS	maneuver sustainment support
NBC	nuclear, biological, chemical
NLOS	non-line of sight
PVNT	position, velocity, navigation, and timing
RSTA	reconnaissance, surveillance, and target acquisition
SA	situational awareness
SATCOM	satellite communications
SBIRS	space-based infrared system
SBR	space-based radar
SSE	Space Support Element
SU	situational understanding
TRADOC	U.S. Army Training and Doctrine Command
TT&C	telemetry, tracking, and commanding
UA	unit of action
UAV	unmanned aerial vehicle
UE	unit of employment
UGV	unmanned ground vehicle
WMD	weapons of mass destruction
WTEM	weather, terrain, and environmental monitoring

Section II

Terms

Army space operations

Army actions, activities, and operations contributing to space missions: space combat operations, space support operations, and combat support operations. Army space operations may be conducted from earth to space, space to space, from space to earth, or within or between terrestrial elements of a space system.

antisatellite (ASAT)

Any weapon designed to destroy or disable satellites; includes capabilities such as direct ascent terrestrial-based interceptors and co-orbital capabilities, which engage a satellite from orbits paralleling those of targeted satellites.

assured access

The ability of a force to prioritize and obtain support when it is needed, as opposed to when it is available, implies flexibility, affordability, timeliness, and availability on demand.

battle damage assessment (BDA)

The timely and accurate estimate of damage resulting from the application of military force, either lethal or nonlethal, against a predetermined objective. Battle damage assessment can be applied to the employment of all types of weapon systems (air, ground, naval, and special forces weapon systems) throughout the range of military operations. Battle damage assessment is primarily an intelligence responsibility, with required inputs and coordination from the operators. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment.

battlespace

The environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly; facilities; weather; terrain; the electromagnetic spectrum; and the information environment within the operational areas and areas of interest.

collection manager

An individual with responsibility for the timely and efficient tasking of organic collection resources, and the development of requirements for theater and national assets that could satisfy specific information needs in support of the mission.

combat service support

The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces, in theater, at all levels of war. Within the national and theater logistic systems, it includes, but is not limited to, that support rendered by service forces in ensuring that aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops, to permit those units to accomplish their missions in combat. Combat service support encompasses those activities, at all levels of war, that produce sustainment to all operating forces on the battlefield.

commercial space

A broad reference to capabilities, products, and services provided by companies operating space systems for profit.

consequence management

Services and activities essential to mitigating damage, loss, hardship, or suffering resulting from disasters or catastrophes, either man-made or natural; with respect to homeland defense, this is primarily a local and state responsibility.

data

Representation of facts, concepts, or instructions, in a formalized manner, suitable for communication, interpretation, or processing by humans, or by automatic means. Any representations, such as characters or analog quantities, to which meaning is, or might be, assigned.

distributed operations

Activities and functions executed simultaneously throughout the depth, width, and height of the area of operations. They are targeted against multiple decisive points simultaneously, rather than concentrated against one decisive point, or a series of decisive points in sequence.

downlink

A communications channel from a satellite to an earth station.

fires

The effects of lethal or nonlethal weapons.

fire support

Fires that directly support land, maritime, amphibious, and special operations forces to engage enemy forces, combat formations, and facilities in pursuit of tactical and operational objectives.

geospatial information and services

The concept for collection, information extraction, storage, dissemination, and exploitation of geodetic, geomagnetic, imagery (both commercial and national source), gravimetric, aeronautical, topographic, hydrographic, littoral, cultural, and toponymic data accurately referenced to a precise location on the earth's surface. These data are used for military planning, training, and operations, including navigation, mission planning, mission rehearsal, modeling, simulation, and precise targeting. Geospatial information provides the basic framework for battlespace visualization. It is information produced by multiple sources to common interoperable data standards. It may be presented in the form of printed maps, charts, and publications; in digital simulation and modeling databases; in photographic form; or in the form of digitized maps and charts or attributed centerline data. Geospatial services include tools that enable users to access and manipulate data, and also include instruction, training, laboratory support, and guidance for the use of geospatial data.

homeland security

Protecting U.S. territory, population, and critical infrastructure at home, by deterring and defending against foreign and domestic threats, supporting civil authorities for crisis and consequence management, and helping to ensure the availability, integrity, survivability, and adequacy of critical national assets. The military is primarily in a support role, with the exception of national missile defense, air defense, and internal DOD activities for force protection, antiterrorism, and critical asset assurance.

humanitarian assistance

Programs conducted to relieve or reduce the results of natural or manmade disasters, or other endemic conditions, such as human pain, disease, hunger, or privation that might present a serious threat to life, or that can result in great damage to or loss of property. Humanitarian assistance provided by U.S. forces is limited in scope and duration. The assistance provided is designed to supplement or complement the efforts of the host-nation civil authorities or agencies that may have the primary responsibility for providing humanitarian assistance.

imagery

Collectively, the representations of objects reproduced electronically or by optical means or film, electronic display devices, or other media.

information

1. Facts, data, or instructions in any medium or form.
2. The meaning that a human assigns to data by means of the known conventions used in their representation.

information operations (IO)

Actions taken to affect adversary information and information systems while defending one's own information and information systems.

intelligence

1. The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas.
2. Information and knowledge about an adversary obtained through observation, investigation, analysis, or understanding.

joint theater missile defense

The integration of joint force capabilities to destroy enemy theater missiles in flight, or prior to launch, or to otherwise disrupt the enemy's theater missile operations through an appropriate mix of mutually supportive passive missile defense; active missile defense; attack operations; and supporting command, control, communications, computers, and intelligence measures. Enemy theater missiles are those that are aimed at targets outside the continental United States.

maneuver

1. A movement to place ships or aircraft in a position of advantage over the enemy.
2. A tactical exercise carried out at sea, in the air, on the ground, or on a map in imitation of war.
3. The operation of a ship, aircraft, or vehicle to cause it to perform desired movements.
4. Employment of forces on the battlefield through movement in combination with fire, or fire potential, to achieve a position of advantage in respect to the enemy in order to accomplish the mission.

military satellite communications

The satellite communication resources that are owned and operated by DOD, primarily in the government frequency bands.

multispectral imagery

The image of an object obtained simultaneously in a number of discrete spectral bands.

national missile defense

Broadly, the defense of the 50 states against ballistic or cruise missile attack; programmatically, refers to the joint program to defend against limited intercontinental ballistic missile attacks.

national systems

A term used generically to refer to any asset used by the collective organizations of the United States, especially space-based systems.

negation

Measures to deceive, disrupt, deny, degrade, or destroy an adversary's space systems and services.

satellite

An object that revolves around a cosmic body, such as a spacecraft orbiting about the earth.

satellite communications (SATCOM)

SATCOM includes military satellite communications and DOD use of commercial, allied, and civil satellite communications.

sensor

Equipment that detects and may indicate and/or record objects and activities, by means of energy or particles emitted, reflected, or modified by objects. Active sensors send out electronic signals to detect radar, sonar, etc. Passive sensors do not send out signals (microphones, heat-detection devices, NBC detectors).

small-scale contingency operations

Small-scale contingencies encompass the full range of military operations, beyond peacetime engagement, but short of major theater warfare; may include show of force operations, reinforcing allies, limited strikes, interventions, and sanctions enforcement. Small-scale contingencies often serve as the transition point between shaping the international environment and responding to crises, and are facilitated by the maintenance of forward-deployed forces.

space

The part of the universe that extends from the upper limits of the earth's atmosphere outward. While a precise limit cannot be ascertained, in general it begins at about the altitude above the earth that corresponds to the lowest stable satellite orbits and above which aerodynamic forces can no longer support the control of conventional aircraft. This is usually an altitude in excess of 100 kilometers.

space control

Combat and combat support operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space. The space control mission area includes surveillance of space, protection of U.S. and friendly space systems, prevention of an adversary's ability to use space systems and services for purposes hostile to U.S. national security interests, negation of space systems and services used for purposes hostile to U.S. national security interests, and directly supporting battle management, command, control, communications, and intelligence.

space forces

The space and terrestrial systems, equipment, facilities, organizations, and personnel necessary to access, use, and, if directed, control space for national security.

space force application

Combat operations in, through, and from space to influence the course and outcome of conflict. The force application mission includes ballistic missile defense and force projection.

space force enhancement

Combat support operations, to improve the effectiveness of military forces, as well as support other intelligence, civil, and commercial users. The space force enhancement mission area includes ISR; tactical warning and attack assessment, command, control, and communications; position, velocity, time, and navigation; and environmental monitoring.

space superiority

The degree of dominance in space of one force over another that permits the conduct of operations by the former and its related land, sea, air, and space forces, at a given time and place, without prohibitive interference by the opposing force.

space support

Combat service support operations to deploy and sustain military and intelligence systems in space. The space support mission area includes launching and deploying space vehicles, maintaining and sustaining spacecraft in orbit, and deorbiting and recovering space vehicles, if required.

space surveillance

The observation of space and of the activities occurring in the space region. This mission is normally accomplished with the aid of ground-based radar and electro-optical sensors. This term is separate and distinct from the surveillance mission area of space force enhancement in which space assets conduct surveillance of terrestrial activity.

space systems

All of the devices and organizations forming the space network. These consist of: spacecraft; mission package(s); ground stations; data links among spacecraft, mission, or user terminals, which may include initial reception, processing, and exploitation; launch systems; and directly related supporting infrastructure, including space surveillance and battle management, and/or command, control, communications, and computers.

space weather

The conditions and phenomena in space, and specifically in the near-earth environment, that may affect space assets or space operations. Space weather may impact spacecraft and ground-based and satellite communications, navigation, radar, weather, imaging, and surveillance systems. Space weather is influenced by phenomena such as solar flare activity, ionospheric variability, energetic particle events, and geophysical events.

split based

The ability to conduct operations (such as logistics and intelligence management functions) so that only those functions absolutely necessary are deployed, allowing some management functions to be accomplished in near real time, through connectivity between CONUS and a forward-deployed unit, or between one theater and a forward-deployed unit in another theater. Can also be used to describe the same relationship within a theater.

strategic responsiveness

The Army's long-term transformation objective; the ability to rapidly project the right mix of mission-tailored, combat-ready land forces and capabilities, including support and sustainment, from CONUS or forward-deployed areas, to any point on the globe, to achieve decisive results as part of joint or multinational operations.

theater missile defense

The integration of joint force capabilities to destroy enemy theater missile in flight, or prior to launch, or to otherwise disrupt the enemy's theater missile operations through an appropriate mix of mutually supportive passive missile defense, active missile defense, attack operations, and supporting command, control, communications, computers, and intelligence measures. Theater missiles are those that are aimed at targets outside CONUS (ballistic, cruise, or an air-to-surface missiles, not including short-range, nonnuclear, direct fire missiles, bombs, or rockets).

uplink

The earth-to-space telecommunications pathway.

FOR THE COMMANDER:

OFFICIAL:

LARRY R. JORDAN
Lieutenant General, U.S. Army
Deputy Commanding General/
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//signed//
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