# Leveraging Global Capabilities in Support of Joint Warfighters

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The events of the past few years have confirmed that threats to our nation's security and interests have become more diffuse, unpredictable, and challenging than ever before. The ongoing Global War on Terrorism (GWOT) and continued unrest and instability in multiple locations around the world illustrate the complexity of our times. The future is also uncertain. Due to the nature of the new strategic reality, our nation and Army will likely be involved in a protracted war, a point stressed frequently by General Peter J. Schoomaker, chief of staff, Army.[1]

While it is clear that uncertainty will remain for the near future, a number of implications for our Army have become apparent regarding the future operational environment.[2]

- Increased likelihood of operations in "complex" terrain
- Difficulty in identifying adversaries from combatants
- Blurring of conventional, unconventional, and terror operations
- Sophisticated asymmetric enemy capabilities
- Peer and near-peer threats in select niche areas
- Threats from weapons of mass destruction
- 360o threat across the depth of the battlespace
- Strategic effects of tactical operations

Because the Army will operate as part of the Joint Force, our forces must be prepared to provide support to joint warfighters in a similar environment since they too will be affected by these same implications. These challenges will also require additional technologies, new concepts of employment, and interdependent capabilities from each of the Services. As noted by Secretary of Defense Donald H. Rumsfeld, "We need to change not only the capabilities at our disposal, but also how we think about war. All the high-tech weapons in the world will not transform the U.S. armed forces unless we also transform the way we think, the way we train, the way we exercise, and the way we fight."[3]

The control of – and the fight for access to – information relevant to warfighters will be essential in future warfare. Gaining and maintaining information superiority will be an operational imperative. Battlefield information must be collected, processed into actionable information, and rapidly disseminated to commanders who can use it to shape and influence the battlespace. Domination of the information domain will require robust capabilities, seamless communications, and enhanced situational awareness for all members of the joint force, not just the Army's ground forces. Success will depend on the timely exploitation of this actionable information inside our adversary's decision cycle.

The evolving nature of the threat and advances in technology have made the use of Space essential to combat success for our joint forces. Space capabilities are recognized as a significant force multiplier when integrated into joint operations.[4] There is simply no land-based alternative to many Space-based products and services, particularly for communications and intelligence, surveillance, and reconnaissance (ISR) capabilities. In this regard, two capabilities stand out as vital to joint warfighters: Joint Blue Force Situational Awareness and Space Control.

## Situational Awareness: More Than a Map and Compass

Combat favors those who have more accurate and timely awareness of the battlespace, essentially being able to answer the timeless questions – "Where am I? Where's my buddy? Where's the enemy?" Timely and accurate answers to these questions provide enhanced situational awareness, the essence of information superiority. One key technology that has provided the friendly force component of information superiority in Afghanistan and Iraq is Blue Force Tracking (BFT). BFT, defined as "the employment of techniques to actively or passively identify and track US, allied, or coalition forces for the purpose of providing the combatant commander enhanced battlespace situational awareness and reducing fratricide," answers the "where" (friendly location) and "who" (friendly unit identification) of situational awareness.[5]

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During the initial phases of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF), BFT systems provided warfighters significant contributions to situational awareness for friendly forces. With BFT systems, commanders were able to make decisions and employ their forces unrestrained by the limits of line-of-sight communications. Soldiers also observed BFT systems were sometimes the only accurate means of determining position location and navigating, especially under extremely poor visibility conditions. With BFT systems, subordinate units that might otherwise have become lost or separated often were able to regain their bearings. An additional, and perhaps more significant, benefit of shared situational awareness was the contribution BFT made in preventing incidents of fratricide. Even today, thousands of hand-held and vehicle-mounted devices, facilitated by the 24/7 capabilities of the Global Positioning System (GPS), contribute to situational awareness for friendly forces.

A variety of military and commercial BFT systems, using national, line-of-sight networks, or commercial satellite communications (SATCOM) architectures, have supported joint warfighters during OEF and OIF. By one count, more than 60 different BFT systems were employed during the initial combat phase in OIF.[6] Unfortunately, each of these systems has different protocols and policies. Several lessons have resulted from the use of BFT devices, including the necessity to:

- Display all BFT data in an accurate common operational picture (COP)
- Select and display BFT data relevant to units' specific missions/ operations
- Send tailored, relevant Blue Force data to other users
- Expand and improve capabilities by increasing interoperability and mitigating line-of-sight, bandwidth, and track distribution limitations
- Establish common system standards and protocols

Significant steps have been taken to integrate the disparate BFT systems. In May 2003, the Joint Requirements Oversight Council approved a proposal to establish an Army-led integrated product team to report to the U.S. Joint Forces Command (USJFCOM). The team, comprising Service, combatant command, and special forces representatives, was assigned the mission to review every BFT system already fielded, find capability gaps, and assess new technologies. USJFCOM is responsible for developing a BFT family of systems, an effort termed as Joint Blue Force Situational Awareness (JBFSA).

JBFSA is defined as "the collection and integration of capabilities provided by systems or tracking devices and transmission media employed to obtain, report, and share Blue Force identification, location, status, and intent information.[7] JBFSA includes both one-way and two-way active reporting capabilities, addresses all capabilities of BFT as well as "why" (friendly intent) and "what" (friendly status). JBFSA, vice BFT, describes the capability SMDC/ARSTRAT provides in support of joint warfighters with enhancements provided to the Joint Mission Management Center (Joint MMC) in Colorado Springs, Colorado.

In an effort to address the operational necessity to display all JBFSA data in an accurate COP, the Space and Missile Defense Future Warfare Center undertook an Advanced Concept Technology Demonstration (ACTD) in fiscal year 2003 to improve the capabilities to select, receive, and display current JBFSA data. The JBFSA ACTD is focused on providing an integrated architecture to address the current disparate BFT systems, an interim concept of operations, and integration standards for future JBFSA capabilities and systems. The goal of the ACTD is to forge the resulting interoperability information into an accurate COP and provide a relevant level of situational awareness for joint warfighters.

During the combined field training exercises for U.S. and Republic of Korea forces, Foal Eagle 04, conducted in March 2004, the ACTD successfully demonstrated the ability to integrate eight BFT devices (national, commercial, and line-of-sight systems); Force XXI Battle Command Battalion/Brigade and Below (FBCB2), Movement Tracking System (MTS), Grenadier BRAT (Cobra), Mini transmitter (MTX, Cobra), OmniTRACS/DTRACS(Defense Transportation Recording And Control System), Marine Data Automated Communications Terminal (MDACT), Orbcomm (commercial logistics tracking, and Talon Reach (Air Force prototype BFT device using Iridium) into the JBFSA ACTD architecture. Additionally, the ACTD disseminated and displayed from the Joint MMC into the Pacific Command theater a consistent blue force picture within the Global Command and Control family of systems.

As a result of the proven success of the ACTD, a system developed under the JBFSA ACTD is being installed in the SMDC/ ARSTRAT Joint MMC. The ACTD's integration function is being incorporated into the Joint MMC and will be available for the Geographic Combatant Commands and their components later this fiscal year. As additional line-of-sight receivers or other sources of BFT data are employed (aircraft, UAVs, aerostats) the Joint MMC testbed will integrate this BFT data into the architecture.

## Space Control: Protecting Our Space-Based Capabilities

By one estimate, more than 3,000 operational payloads are in orbit, nearly 1,000 of which belong to the U.S.[8] As such, protecting our ability to leverage the products and services provided by Space-based assets, and denying an adversary the same could be pivotal to the success of future U.S. military operations. Assured access is also vital to our nation's economic and social well-being. Today, Space-based capabilities are essential to virtually all aspects of our society, ranging from communications to financial transactions.

Space Control capabilities are quickly becoming critical to our assured access to Space. In testimony to Congress, the Honorable Peter J. Teets, former Undersecretary of the Air Force, noted, "Because we rely so heavily on Space capabilities, we must be prepared, when directed, to confront our adversaries on the 'high ground' of Space. Our intent is to use diplomatic or other non-lethal means to preclude hostile use of Space. If these measures fail, we reserve the right under international law to take defensive action against an adversary's Space capability."[9] Secretary of Defense Rumsfeld also

*(See Leveraging Capabilities, page 50)*

## Leveraging Capabilities ... from page 5

noted this importance with the observation, "Our dependence on operations in Space makes us somewhat vulnerable to new challenges. It's only logical to conclude that we must be attentive to these vulnerabilities and pay careful attention to protecting and promoting our interest in Space."[10] The recent steps taken by the Department of Defense (DoD) to request Presidential approval for revision of the National Space Policy, last updated in September 1996, is a clear recognition of the importance of assured access to Space to our national security.

Although the U.S. currently possesses overwhelming Space capabilities, our dominance in Space is not guaranteed. Adversaries are quickly developing adaptive strategies, tactics, and capabilities to exploit our perceived vulnerabilities and to counter or mitigate our strengths. The rapid growth in global Space capabilities increases potential adversaries' ability to monitor our forces and potentially negate our advantages in Space. Threats may arise from many sources, including: cyber attacks, terrorist strikes, and jamming against ground segments or stations; radio frequency jamming that interferes with Space system links; and lasers that temporarily degrade or destroy satellite subsystems.[11]

A recent U.S. Air Force assessment noted, "Adversaries can conduct attacks against our Space capabilities using various methods both symmetric and asymmetric. Adversaries may have the capacity to develop counter-Space capabilities but, in many cases, may simply acquire them from a third party."[12] Adversaries can purchase Space products and services, such as imagery and communications, which often rival those available to our own military forces. As an example, satellite imagery of 1-meter resolution is currently available for purchase from commercial sources. Our ability to purchase all the shutter time for high quality commercial imagery satellites may be limited in the future, as contrasted to the early combat phases of OEF when the National Imagery Mapping Agency (later renamed to the National Geospatial-Intelligence Agency) bought up all the shutter time for the Ikonos satellite.[13]

Space Control ensures the use of Space while denying it to our adversaries, if required, and includes: surveillance of Space; protection of U.S. and friendly Space systems from hostile threats and environmental hazards; prevention of an adversary from exploiting U.S. or Allies' Space services; and negation of Space systems and services used for purposes hostile to U.S. national security interests.[14] Space Control systems both protect the force from enemy Space ISR and deny the enemy the use of Space capabilities. This capability mitigates risk while providing multiple benefits to combatant commanders, including:

- Protecting against adversary Space-based ISR during staging of forces, embarkation, and debarkation
- Denying adversaries the capability to observe our actions
- Reducing adversaries' lethality, thus reducing casualties and loss of equipment
- Maintaining the element of surprise through superior assured access to ISR and communications
- Denying adversaries the capability to command and control, reducing his responsiveness
- Maintaining friendly situational awareness advantage
- Allowing freedom of maneuver and footprint reduction
- Providing situational awareness of adversary as well as commercial satellites (location, activity, surveillance)

Space Control is a joint mission, and the U.S. Air Force is the lead Service for this area. The U.S. Air Force recently published in Air Force Doctrine Document 2-2.1 policy and guidance concerning counterspace operations.[15] I encourage you to review this publication both for its thoughtful treatment of this issue as well as the use of terminology and evolving concepts. AFDD 2-2.1 identifies the Space Control mission areas as "Situational awareness, the 'fundamental underpinning' of Space operations; defensive counterspace, or protecting US assets; and offensive counterspace, used to maintain our ability to operate in the medium of Space."[16]

Significant efforts are ongoing across the DoD to enhance our Space Control capabilities, including hardening of assets and research into the feasibility of direct attack of enemy capabilities by kinetic or directed energy weapons, electronic disruption, or denial of use of Space systems. The U.S. Air Force is also taking steps to achieve Space situation awareness by modernizing Space surveillance infrastructure, developing a single integrated Space picture, and protecting navigation and timing capabilities by improving GPS with increased power, anti-jam, and spoofing capabilities.[17]

SMDC/ARSTRAT, responsible for providing Space Control operations and Space support to the joint force and Army component, also develops technologies to protect our Space systems (on-orbit elements, ground stations and communications link segments) from electronic warfare and potential denial, disruption, or destruction. The U.S. Army Kwajalein Atoll facility provides unique Space surveillance capabilities. Ground-based Space surveillance systems assist the commander, USSTRATCOM, in identifying and characterizing potential adversary Space capabilities.

The High Energy Laser Systems Test Facility at White Sands Missile Range, N.M., helps determine the vulnerability of satellites to laser weapons. The Space and Missile Defense Technical Center in Huntsville, Ala., is conducting research on hardening and electromagnetic pulse that will enhance the survivability of our Space systems.[18] The 1st Space Battalion's 3rd Space Company provides an operational capability in support of our joint warfighters.

## Our Legacy to the Future

All military operations today are affected by Space-based communications, imagery, positioning and location support, missile warning, and related capabilities. As the Army transforms itself for the future, Space will be essential for achieving dominance necessary for the conduct of full-spectrum joint operations. Future Joint Warfighters will expect Space support on demand. The capabilities currently available, although vital to support of our joint warfighters in the GWOT, must evolve to support the operational requirements of the future. Today's Space professionals are vital to that process. Secure the High Ground!

Notes

1. General Peter J. Schoomaker, published in the foreword of Serving a Nation at War: A Campaign Quality Army with Joint and Expeditionary Capabilities, on-line at <http://www.army.mil/jec/>
2. General Kevin Byrnes PowerPoint briefing, "The Future Operational Environment: "Implications for Ground Forces," on-line at <http://www.dtic.mil/ndia/2004precision_winter_roundtable/byrnes.pdf>
3. Secretary of Defense Donald Rumsfeld, remarks at the National Defense University, 31 January 2002, on-line at <http://www.defenselink.mil/speeches/2002/s20020131-secdef.html>
4. Joint Publication 3-14, Joint Doctrine for Space Operations, 9 August 2002, pg vii, on-line at <http://www.dtic.mil/doctrine/jel/new_pubs/jp3_14.pdf>
5. Chairman of the Joint Chiefs of Staff Instruction 8910.01A, Joint Blue Force Situational Awareness Operations Guidance, 30 April 2004, on-line at <https://ca.dtic.mil/cjcs_directives/cdata/limited/8910_01.pdf>
6. Daniel Gouré, "Standardize Blue-Force Tracking," 8 November 2004, on-line at <http://www.defensenews.com/story.php?F=494578&C=>
7. JBFSA Operations Concept, 20 May 2004
8. Center for Space Standards and Innovation, 16 May 2005, on-line at <http://celestrak.com/satcat/boxscore.asp>
9. The Honorable Donald H. Rumsfeld, 8 May 2001, on-line at <http://www.defense.gov/news/May2001/n05102001_200105104.html>
10. Honorable Peter J. Teets, House Armed Services Subcommittee on Strategic Forces, 9 March 2005, on-line at <http://www.house.gov/hasc/testimony/109thcongress/Strategic%20Forces/3-9-05Teets.pdf>
11. CRS Report for Congress; Military Role in Space Control: A Primer, 23 September 2004, on-line at <http://www.fas.org/man/crs/RL32602.pdf>
12. Air Force Doctrine Document 2-2.1, Counterspace Operations, 2 August 2004, on-line at <www.dtic.mil/doctrine/jel/service_pubs/afdd2_2_1.pdf>
13. Interview with Lieutenant General Joseph M. Cosumano Jr.; Military Aerospace Technology Online Archives, originally published on 1 August 2002 in volume 1, issue 4, on-line at <http://www.military-aerospace-technology.com/article.cfm?DocID=299>
14. Joint Publication 3-14, Joint Doctrine for Space Operations, 9 August 2002, on-line at <http://www.dtic.mil/doctrine/jel/new_pubs/jp3_14.pdf>
15. AFDD 2-2.1 IBID
16. General Lance W. Lord, Commander, U.S. Air Force Space Command, remarks at Ramstein Air Force Base, Germany, 16 April 2005, on-line at <http://www.usafe.af.mil/news/news05/uns05114.htm>
17. Lord, Military Aerospace Technology Online Archives, volume 2, issue 1; published on 2 February 2003, on-line at <http://www.military-aerospace-technology.com/article.cfm?DocID=89>
18. AUSA Background Brief 85, The Army's Interest in Space Control, December 1999, on-line at <http://www.ausa.org/ilw>

## Technology Initiatives ... from page 7

tively difficult to endanger personnel and property through an errant missile.

The upper level winds on Kwajalein are, based on the data of the Range Reference Atmosphere, lower than other CONUS-based Space ports. At 14 km altitude (typically the worst case wind), the 3-sigma value for Kwajalein is ~35 m/sec, while the Cape has 90 m/sec and VAFB ~75 m/sec (winds in E-W direction for the worst case month)

A closely related advantage, again a result of the RMI consisting primarily of deep ocean area, is the relative ease of addressing environmental and historical concerns. While environmental and historical concerns must still be addressed at Kwajalein, there is relatively little land area to be considered in terms of missile debris. Most launch vehicle contractors have encountered the stringent regulations associated with CONUS operation and would realize significant operational savings at Kwajalein.

Another factor, undoubtedly little understood by potential customers, is the advantage of collocating a Space launch facility at the range. Operations at Kwajalein enjoy the advantages of minimal safety, security and environmental constraints with high levels of radio frequency isolation. The suite of instrumentation available at Kwajalein is unparalleled in the world with significant wideband connectivity to CONUS locations via DS3 and fiber. This offers the potential to provide a level of "diagnostic" information unavailable at any other launch facility in the world. This can be particularly important for relatively immature launch vehicles that are likely to experience flight anomalies.

An additional factor related to collocation with the range is the nature of the community at Kwajalein. The entire Kwajalein community is focused on missile test and associated support. The level of experience and expertise is the highest in the world and provides a tremendous pool of talent to assist the launch vehicle and payload personnel in addressing any issues associated with their operations.

The Kwajalein community is also very comfortable with a wide variety of missile flight test operations and thus there is little likelihood of community resistance to introduction of a new launch vehicle, as one would expect to encounter at some other launch sites. Typical expenses associated with community outreach, town hall meetings, local permitting, etc., would largely be eliminated at Kwajalein.

The USAKA/RTS equatorial location, unparalleled instrumentation and extensive logistical infrastructure offer a major advantage for a Space launch complex and support to DoD's Operational Responsive Launch on Demand.

## Near Space Missions and Platforms

The Army Future Force will rely heavily on the technological advances needed for understanding and managing the battlespace environment. The platforms operating in the Near Space Region can support the warfighter in achieving the tenets of Army operations – initiative, agility, depth, synchronization and versatility.

Near Space is classified as the atmospheric region between 20 km. (12.4 miles) and 100 km. (62 miles). In the past three years, the Near Space Region has been gaining interest by DoD and the National Aeronautics and Space Administration (NASA).

For platforms positioned at an altitude of 60,000 feet, the line of sight (LOS) to the horizon is 300 miles and at 100,000 feet, the LOS to the horizon is 389 miles providing the battlefield commander with an extended view of the battlefield. Capable of deploying with various payload configurations, a wide range of mission areas could be supported to include intelligence, Wide Area Surveil-