



Army Space Support as a Critical Enabler of Joint Operations

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

Space is inherently Joint and full operational integration of Space with Land, Air, Sea, and Information capabilities is necessary to achieve the Army's Transformation objectives, an integral part of Department of Defense (DoD) Transformation, and the Army Vision.

Army Space Policy, April 2003

The Joint Operational Framework

In sharp contrast to the sequential, deliberate campaigns of the 20th century, future joint operations will emphasize rapid strategic response by all joint arms, followed by the conduct of synchronized shaping and decisive operations, distributed throughout the entire joint operations area. The joint force commander must establish early control of all battlespace dimensions—air, land, sea, space and information—and focus power against the critical elements of the adversary's structure—key capabilities, decisive points and centers of gravity—moving thereby from the attrition-based campaigns of the past to more rapid decision via disintegration of the enemy's forces and will to fight.

Space and Joint Military Operations

As a space-empowered force, the joint force commander will routinely exploit the overhead constellation of military and civilian space platforms for intelligence, focused surveillance, area reconnaissance, long-haul communications, early warning, positioning, timing, navigation, missile defense, weather/terrain/environmental monitoring, and access to the global information grid. The layered redundancy and improved capabilities provided through space will sharply improve development of situational awareness at all levels, help resolve many current operational challenges (e.g., fleeting target engagement or limits on range and mobility of terrestrial communications), and strengthen the commander's confidence in the knowledge backbone that supports him. Development of capability to cross-cue intelligence and non-intelligence 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 may be insufficient (e.g., absence of fiber optic cable networks) or unreliable. Overall, space-based capabilities are critical enablers for implementation of the fundamental principles of the future force concepts, particularly with respect to achieving information superiority, creating

situational awareness, and operating within the high-tempo, noncontiguous, simultaneous framework of distributed operations.

Army Space Support to Operation Iraqi Freedom

Collectively, over a six-month period (December 2002–May 2003), Army Strategic Command (ARSTRAT) and the Space and Missile Defense Battle Lab (SMDBL) deployed the largest and most capable space force in our Army’s history. The deployment included six Army Space Support Teams (ARSSTs), personnel to support two Joint Space Support Teams (JSSTs), two Materiel Training and Fielding Teams, 12 rapidly-prototyped space equipment suites, Space Operations Resource Centers (SORCs)-Rear and -Forward, an element colocated with the U.S. Air Force’s Eagle Vision 1 ground station, the first ever tactically mobile ground-based laser weapon system (ZEUS) and one Joint Tactical Ground Station (JTAGS) Team. These forces supported combat locations in two theaters while supporting U.S. Special Operations Command Central, U.S. Central Command and two services (Army and Marines). They were committed to two major operations—Operation Iraqi Freedom and Operation Enduring Freedom—at four levels (Army, Joint, Combined, Coalition) and were integrated at four echelons (division, corps, joint task force and combined forces land component command).

In the continental United States, a combat-oriented Space and Missile Defense Command Operations Center (SMDCOC) conducted home-station operations center tasks supporting deployed forces. In addition to ARSTRAT and SMDBL organic elements, the Army’s space force deployment included Army Tactical Exploitation of National Capabilities (TENCAP) systems such as the Tactical Exploitation System (TES), organic to military intelligence battalions at division and corps to provide national imagery intelligence (IMINT) and signals intelligence (SIGINT) to the tactical commanders. Army TENCAP systems are managed and sustained by the Army Space Program Office (ASPO). There were a total of 12 TESs in theater from all services and an additional eight supporting through-reach capability. Each service had TES systems that provided the integration of intelligence, surveillance and reconnaissance (ISR), targeting and blue force tracking from “space to mud.” These operations collectively provided unprecedented space support to U.S. tactical forces engaged in the Global War on Terrorism.

The Mission and Tasks Supported

Of the four space mission areas (Space Force Enhancement, Space Control, Space Support and Space Force Application), the Space Support Element Toolset-Light (SSET-L) provided the ARSSTs and JSSTs capabilities primarily in support of Space Force Enhancement. To a lesser extent, these teams supported space control, information operations (IO) and Missile Defense/Missile Warning. This support included but was not limited to:

- Global Positioning System (GPS) Accuracy/Navigational Accuracy Products. This included analysis and implications of GPS jamming and analysis of GPS interference reports.
- Satellite Reconnaissance Advanced Notification Reporting. These reports provided information on Red, Gray and Blue overflights.
- Three-dimensional (3D) “fly-thrus,” for both air and ground route planning.
- Two-dimensional imagery and map products. These included large charts, rectified city images

and imagery. These products supported Long-Range Surveillance Detachments, Corps aviation assets and Office of Reconstruction and Humanitarian Assistance/Coalition Provisional Authority map requirements such as imagery maps showing lines of communications and war damage. The SSET-L provided the 1st Marine Expeditionary Force Topographic Team access to timely commercial imagery, which they could not otherwise acquire rapidly.

- 3D perspective views (still perspective views of a specific “look angle”).
- Development of space-related candidate targets (this analysis supported space control efforts).
- Support to Friendly Force Tracking (FFT). This included assessing technical tasks, architectures and requirements for managing and displaying the FFT picture, to include ensuring Grenadier Benchtop Reconfigurable Automatic Tester data was tracked and displayed in a timely manner.
- Analysis of Computer Network Operations from a space perspective. This analysis was integrated into various IO plans.
- Missile Analysis Support. This included briefings on Iraqi missile systems and included developing missile profiles for Air Defense elements.
- Missile Warning/Tactical Ballistic Missile (TBM) Warning. The SSET-L was used to receive and display real-world TBM warning using data feeds from Command and Control Personal Computer, Integrated Broadcast System-Simplex and IBS-Integrated. This task-integrated data feeds from Defense Satellite Program and from multiple sea-based and land-based radars. Also provided was analysis of missile coverage, and TBM Warning Plans and Concept of Operations for notification throughout the area of operations.
- Development of Annex N (Space) to various Operations Orders.
- Development of the Space Intelligence Estimate.
- Satellite communications (SATCOM) Planning and Assessments, including:
 - Sun-Conjunction Activity/Information Analysis/Reports/Charts, which provided outage times for communications systems;
 - UHF SATCOM troubleshooting to investigate incidents of interference;
 - Tracking of SATCOM Status and monitoring of SATCOM operational capabilities;
 - Ultra High Frequency Scintillation analysis and products;
 - High Frequency Illumination Charts.
- Support to daily targeting board meetings and working groups, Operational Planning Group meetings and Information Operations meetings.
- Download of “before and after” national imagery to support target development and Battle Damage Assessment in Deep Operations Coordination Centers and in some cases supporting Army Tactical Missile System strikes.

Critical to the deployed space forces’ ability to accomplish these missions and tasks was their capability to reach back, using organic secure high bandwidth communications, to multiple operations centers, data bases and organizations. Further developments of communications support to space forces are certain to retain organic and robust reach back capabilities.

Space and Missile Defense Command Operations Center

The Space and Missile Defense Command Operations Center also made substantial contributions to the success of joint operations in support of Operation Iraqi Freedom. SMDCOC served as a single point of contact supporting space-related and command and control efforts. The SMDCOC maintained an operational support database on the Secret Internet Protocol Router Network accessible to all Army Space operators. As a result, the SMDCOC served as a “one-stop shop” of sorts for the Army Space operations, allowing them to submit requests for information (RFIs), query previous RFIs, link to key Space sites and receive intelligence updates. During the operation, the SMDCOC received scores of RFIs that were routed to deployed units. RFI imagery requests made by Special Forces elements were also processed by the SMDCOC. The SMDCOC ensured that the unit received the information and was able to properly use it in accomplishing its mission.

Space-Based Blue Force Tracking and the Space-Based Blue Force Tracking Mission Management Center

The Global Positioning System once again proved its effectiveness in Operation Iraqi Freedom, contributing to all aspects of Perspective View Nascent Technologies and supporting all services. Perhaps one of the most significant and valuable uses of GPS was the Space-Based Blue Force Tracking System (SB-BFT), a system that can be credited for the campaign’s greatest success in avoiding incidents of fratricide.

The Army SB-BFT Mission Management Center (SB-BFT MMC) worked closely with elements of the special operations forces (SOF) by monitoring aircraft and ground forces faced with emergency or in extreme situations and alerting SOF command and control nodes of the situation. The SB-BFT MMC also worked closely with the Coalition Forces Land Component Commander by providing Near Real Time Blue Force Tracking data to the V Corps commander in support of his operations.

Spectral Operations Resource Center

The SMDC Spectral Operations Resource Center Forward provided imagery support to Operation Iraqi Freedom, including the preparation of high-resolution images to coalition forces that permitted a better understanding of the terrain in specific areas of operation. Of particular importance, it produced imagery-based spectral products for air-drop planning. These included two- and three-dimensional perspectives of terrain and vegetation used to identify and eliminate sites that were unsuitable for airborne assault operations. Standard maps were also created to support ordinary mission planning. The standard image maps were derived from high and medium resolution commercial imagery.

Intelligence, Surveillance and Reconnaissance

One of the most important warfighting advantages provided by Space-based assets is in the ISR realm. Space-based ISR capabilities often provide the first “eyes on target” in support of terrestrial military operations. In Operation Iraqi Freedom, SMDC personnel and organizations, particularly the ARSSTs and Army TENCAP Programs such as TES, made significant contributions to joint operations with ISR. The ARSST was able to provide the ground commander with information on potential enemy positions. Archived satellite imagery was merged with more recent spectral imagery to identify changes in the spectral reflectance of the Earth’s surface in a particular geographical location. These changes were then typed by spectral signatures and analyzed to provide change detection

information, e.g., a change over time from one image to another. This influenced the targeting process and enabled ground force commanders to identify areas of change and to concentrate their forces on potential enemy hiding places. Using French SPOT (Satellite Pour l'Observation de la Terre) satellite overflights and Satellites Advance Notice Charts, the ARSSTs were able to provide satellite overflight times and potential friendly-force vulnerability windows to its supported units.

One of the major ISR success stories as highlighted in the initial lessons from Operation Iraqi Freedom combat operations was Army TENCAP, specifically the TES as part of an integrated "space to mud" ISR architecture. TES Forward and Main systems were especially significant in focusing corps IMINT support for targeting and greatly enhanced U.S. Air Force close air support and air interdiction for forward maneuver forces. The TES system, managed and sustained by the Army Space Program Office (ASPO) reduced theater and national imagery by as much as six to ten hours and national and theater SIGINT support for targeting operations by as much as 30 minutes to two hours, enhancing the tactical commander's ability to gain situation awareness across vast distances and shape the deep battlefield for successful maneuver of advancing U.S. forces. TENCAP additionally was part of an integrated missile warning architecture, as it received unit level missile warning data from JTAGS.

Conclusion

The success of joint operations depends heavily on improved support and force enhancement capabilities provided by space-based assets. Operation Iraqi Freedom was truly a space-enabled operation. Secure space-based communications made long-distance, real-time cooperation and conferencing possible and gave tactical commanders an increased degree of command and control over their units.

Space capabilities have been integrated into joint operations at all levels and now represent an indispensable component of the warfighting package. As ever-smaller forces are given ever-greater responsibilities, it is likely that there will be an increasing demand for, and reliance upon, Space-based force enhancement capabilities. With that in mind, future joint operations will also focus on denying this same capability to threat forces to ensure that the joint force commander enjoys information superiority on the battlefield.

The U.S. Army Space and Missile Defense Command deployed all its assets and capabilities in support of Operation Iraqi Freedom, with most soldiers and equipment deploying from the 1st Space Brigade and its subordinate battalions as members of Army Space Support Teams. ASPO produced, fielded and trained and sustained Space support elements that were organic to the maneuver units. This will be an enduring capability that SMDC will provide to all future joint operations to improve the warfighting capability of the joint and coalition forces.