



## SPACE SUPPORT TO OPERATIONS

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The space support to operations function provides capabilities to aid, protect, enhance and complement the activities of other military forces, as well as intelligence, civil, and commercial users. These capabilities improve the integration and availability of space capabilities to increase the effectiveness of military operations and achieve national and homeland security objectives.\* Space support to operations capabilities contribute to counterspace operations, incorporate both active and passive measures for self-protection, and benefit from defensive counterspace (DCS) actions to suppress attacks, as required, in all domains.

Space support to operations capabilities include: [intelligence, surveillance and reconnaissance](#) (ISR); launch detection; missile tracking; [environmental monitoring](#); [satellite communications](#); and [positioning, navigation, and timing](#). Due to the significant impact on global military operations, space support to operations capabilities require robust, multi-layered DCS operations to protect them from attack, interference, and unintentional hazards, in order to preserve the US and friendly ability to exploit space for military advantage.

### Intelligence, Surveillance and Reconnaissance

ISR is conducted in, from, and through all domains, across the range of military operations and in all phases of operations. Space-based sensors perform ISR that contribute to battlespace awareness in all domains. Detailed ISR contributes to support of all space operations. This is especially true for counterspace operations. ISR conducted from space also supports military operations in other domains.

ISR information can be collected, processed, exploited, analyzed, produced, and disseminated to provide indications and warnings of adversary offensive counterspace operations, counterspace targeting analysis, adversary course of action development, adversary capability assessment, battle damage assessment, and battlespace characterization.

### Launch Detection

Launch detection is accomplished by space-based and ground-based sensors to provide real-time intelligence and post-launch analysis to determine orbital characteristics and potential conjunctions with other objects in space. Detection of space launches is accomplished for both domestic and foreign launches. Launch detection data is used to evaluate events that could

\* Per Change 1 to Department of Defense Directive 3100.10, Space Policy, dated 4 Nov 16.

directly or indirectly threaten US or allied space assets. Similar to [missile warning](#), this information is analyzed to determine potential impacts on assets so that timely warnings and recommendations for suitable countermeasures can be made.

## **Missile Tracking**

Missile tracking supports missile warning and missile defense functions using a combination of space-based and ground-based sensors. These systems provide tactical warning and attack assessment information to operational command centers regarding nuclear detonations or adversary use of ballistic missiles. These systems may contribute to [space situational awareness](#) (SSA) and provide warning of attack against ground and space-based space systems.

## **Environmental Monitoring**

Environmental monitoring is conducted both for space and from space. Environmental monitoring provides data on meteorological, oceanographic, and space environmental factors that may affect military operations. Monitoring the space domain provides data that forms the basis for forecasts, alerts, and warnings on space environmental factors that may negatively affect space assets and space operations. The contribution of environmental monitoring data to SSA helps to determine if potential disruptions to space services may have been caused by environmental factors, system malfunctions, or adversary actions.

## **Satellite Communications**

Satellite communication (SATCOM), whether it is military, commercial, foreign, or civil, provides global coverage, which affords the US and allied national and military leaders with a means to maintain strategic situational awareness and a means to convey their intent to the operational commander responsible for conducting joint operations in a specific area. SATCOM capability is a critical component of providing command and control to counterspace forces.

SATCOM, in a contested environment, benefits from a number of passive defense measures to provide uninterrupted service. Protected SATCOM negates or mitigates the purposeful disruption, denial, unauthorized access, or exploitation attempts of communication services by adversaries.

Commercial SATCOM services may be used to augment military capability, but there are additional planning considerations. Communications may not be protected to military standards; telemetry, tracking, and commanding links may be unencrypted; and vendors may lack the ability to identify, geolocate, and support the Department of Defense response to jamming or interference.

## **Positioning, Navigation, and Timing**

Space-based positioning, navigation, and timing (PNT) is a global utility whose multi-use services are integral to US national security, economic growth, transportation safety, and homeland security and are an essential element of the worldwide economic infrastructure. When conducting joint military operations, it is essential that PNT services be available with the highest possible confidence.

Space-based PNT systems, in combination with user equipment, provide the joint force with precise three-dimensional positioning capability, navigation options, and a highly accurate time reference. Precision timing provides the joint force the capability to synchronize operations and enables communications capabilities such as frequency hopping and cryptologic synchronization to improve communications security and effectiveness.

PNT also provides exact positioning to other satellites to enable their “position autonomy.” PNT enables orbital rendezvous between space systems (e.g., space docking for the International Space Station) and precise timing to communications satellites and to systems in geosynchronous orbits.

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