SPACE POSTURE REVIEW

Interim Report

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(U) PREFACE

(U) Today, the United States obtains an asymmetric advantage from its use of the space domain. U.S. and allied space systems spur scientific discovery and technology development, contribute to the global economy and provide an information edge for national decision-makers and deployed forces.

(U) The space domain, however, is becoming increasingly congested and contested, and the international space industry is growing more competitive. These challenges have increased over the past decade.

(U) Growing international and commercial interest and expertise in space, however, also present the United States with many opportunities for leadership and cooperation. Leveraging these and other opportunities could enable changes to the U.S. national security space posture and support maintaining the advantages the United States gains from space.

(U) The 2009 Space Posture Review (SPR), conducted jointly by the Secretary of Defense and Director of National Intelligence, focuses on defense and intelligence space activities to evaluate the current national security space posture and identify potential opportunities for future activities.

(U) An interagency review of national space policy and strategy is also ongoing. To assure consistency in all aspects of space policy, the SPR defers discussions of national security space policy, strategy and investment until after the national review is complete. At that time, the Department of Defense (DoD) and Intelligence Community (IC) will conduct additional feasibility, risk, and cost analyses to determine how to update applicable national security space policy, strategy, and investment to reflect national direction. As future priorities evolve, the Secretary of Defense and Director of National Intelligence will provide updates to the Congress.

(U) This report represents deliberations to date and offers an interim review of U.S. national security space posture and opportunities for the future. This report describes the evolving strategic environment, growing challenges and emerging opportunities to shape the future national security space posture. To capture the spectrum of national security space missions and capabilities that will be affected by the evolving strategic environment, current and planned activities in nine national security space mission areas are also outlined in this report.

(U) The release of this report represents only an initial step in reviewing the many facets of U.S. national security space activities. Pending the completion of the interagency review of national space policy and strategy, in concert with the interagency process, the Department of Defense and Intelligence Community intend to help shape future United States' priorities and objectives by offering a new and comprehensive national security space strategy which capitalizes on this important foundational interim report.

(U) STRATEGIC CONTEXT

(U) For much of the past fifty years, the United States has been the leading nation in space. U.S. space capabilities benefit the U.S. economy, national security, international relationships, scientific discovery and quality of life. In recent years, the space strategic context has shifted. The desire to use space for economic and security benefit has increased, as has the proliferation of counterspace capabilities.

(U) U.S. BENEFITS FROM SPACE ACTIVITIES

(U) The United States relies on space for its economy, security and prosperity. U.S. economic strength and daily life is supported by space capabilities. U.S. citizens and businesses depend on satellite services to homes, schools, businesses and hospitals. Satellites enable global communications; television broadcasts; weather forecasting; land, sea and air navigation; and synchronization of computers, communications, financial markets and electric power grids. Space capabilities are also a key contributor to U.S. scientific and exploration pursuits.

(U) Satellites also enable global vigilance and connectivity. They collect information on the capabilities and intentions of potential adversaries; monitor compliance with treaties and agreements; and support military operations worldwide. The military, diplomatic and intelligence communities all rely on space capabilities. Space-based assets provide national leaders and military forces with asymmetric advantages, including strategic and tactical intelligence; control of unmanned aerial systems; missile attack warning; worldwide communications, including nuclear command and control; weather monitoring; navigation; and the ability to support operations in ways that minimize collateral damage and protect the lives of deployed forces.

(U) PROLIFERATION OF SPACE CAPABILITIES AND PARTNERSHIPS

(U) The United States, however, is no longer one of only a few nations with space capabilities. In recent years, space capabilities have become available to a wide range of actors – including states, private firms and other non-state actors – all seeking to attain benefits similar to those historically enjoyed by only a few.

(U) Proliferation of Capabilities

(U) Many nations have developed indigenous space system capabilities, including independent space access. Many more have purchased space systems and services from growing commercial markets or through international partnerships. Most of these systems are employed for civil and economic purposes, though there is also growth in foreign satellites for national security purposes in all

military and intelligence mission areas. The growth in foreign indigenous space capabilities and use of space for national security purposes is expected to increase over the next decade. Given the interchangeability of space launch vehicle (SLV) and ballistic missile technology, this highlights the national security concern with the proliferation of space access technology and some nations, under the guise of SLV programs, developing increasingly longer range missile systems inherently capable of delivering WMD.

(U) Over sixty nations or consortia currently have assets in space. Many of these nations use space capabilities to support military, economic and national security requirements. Among them, Russia has maintained the largest architecture of space systems, relying on both modern and Soviet-era capabilities. Countries and consortia in Europe have emerged as global leaders in the development of space technologies and the application of space services for civil, commercial and military use. China in the past decade has developed a substantial architecture of space capabilities that supports civil and national security needs. In addition to making significant advances in its development and use of space systems, China also has made significant advances in the development and testing of anti-satellite (ASAT) weapons, most notably a direct-ascent ASAT successfully tested in January 2007. Countries such as India and Japan also are rapidly fielding indigenous space systems and are demonstrating their ability to integrate the benefits derived from space services into their government and society. In addition to having space-based assets, nine countries or consortia also have the ability to launch satellites into space. Iran became the newest member of this group in February 2009 by successfully launching a satellite. Countries such as North Korea, South Korea, and Brazil are on the verge of developing their own space launch capabilities, in addition to private firms now entering the space launch market.

(U) Commercial space activities are also increasing in both traditional commercial arenas and new markets. Space has been characterized as a $250 billion per year global business with a wide range of commercial services, from satellite launch and manufacturing to downstream services such as advanced geospatial and navigation products and satellite communications. In addition to these traditional commercial space sectors, new space markets, such as space tourism and private space launch, are emerging. These new space businesses are expected to grow and become established in niche markets over the next decade.

(U) Despite the recent global economic slow down, some space market forecasts are optimistic about the space sector. Although, the challenges for the commercial space industry will be in finding capital to fund costly and risky future space investments, and in having stability in government standards and regulations as a foundation for building commercial space markets.

(U) Nations that participate in the commercial aspects of space tend to reap the benefits of cost-sharing, innovation, technology development, and bartering space services for other resources. Through 2019, the trend of private industry uniting with governments in Public Private Partnerships

is expected to continue. Further, the number of dual-use systems (systems used for both commercial and military purposes) is expected to increase.

(U) Non-state actors can also harness space capabilities. The U.S. Global Positioning System (GPS), whose signal is available free-of-charge worldwide, provides inherent capabilities that may be harnessed by insurgents and terrorists. Commercial space products – such as satellite communications, ocean surveillance (e.g. radar, ship transponders, etc.), and Earth observation imagery – can be purchased globally. Much of that imagery can then be viewed free-of-charge via a variety of platforms.

(U) Growing Partnerships and Collaboration

(U) Over the past 20 years, globalization has connected the world via rapid informational and economic exchanges, creating an environment of interdependence and competition. Space has been a contributor to and a benefactor of globalization.

(U) Multiple nations currently have the ability to develop, manufacture and launch space capabilities, and many nations team for economic, political or technological gain. Most notably, the leading space-faring nations of Europe (France, Germany, Italy, Spain and United Kingdom) have become intertwined and they, along with smaller European space nations, often operate within the framework of the European Space Agency and increasingly, the European Union. In 2005, China and eight other pan-Asian countries signed an agreement to participate in an Asian Pacific Space Cooperation Organization to promote multilateral cooperation in space science and technology. Elsewhere, developing nations are teaming with foreign governments, commercial entities and universities to participate a wide range of space-based projects. Throughout the next decade, space will be defined by increasingly complex international alliances and partnerships that have overlapping security, economic, and/or scientific goals.

(U) CHALLENGES

(U) The proliferation of space capabilities presents a number of challenges to the United States and others with space capabilities. It also poses challenges to those nations with access to others' space products and services, and to those deciding whether to develop indigenous space capabilities. The space domain today is becoming increasingly congested and contested, while the international space industry is becoming more competitive.

(U) CONGESTED

(U//FOUO) Both the physical and electromagnetic environments of the space domain are becoming increasingly congested. There are approximately 1,100 active satellites in orbit, plus approximately 20,500 tracked pieces of debris, and additional man-made debris (estimated at tens of

thousands of pieces) which are too small to track with current sensors. All of these numbers are expected to grow. Many of these objects reside in those increasingly crowded orbital regimes where both government and private sector spacecraft operate. Congestion is also exacerbated because there is currently no agreed set of "best practices guidelines" for monitoring and warning of spacecraft close approaches. There are also gaps in space situational awareness, as evidenced by the unexpected February 2009 collision between a Russian Cosmos satellite and privately-owned Iridium satellite which created approximately 1,500 new pieces of space debris. To address these concerns, the United States has led efforts in the United Nations Committee on the Peaceful Use of Outer Space (UNCOPUOS) to develop international guidelines for debris mitigation and operational best practices for spaceflight safety.

(U) The radio frequency spectrum demand for worldwide satellite services is expected to grow as the number of users and satellite services and applications increases. As many as 9,000 satellite communications transponders are expected to be on-orbit by 2015. Current international spectrum management practices create uncertainty in access to the required spectrum, increase probability of interference and impose limitations on power and coverage. Consequently, this will create new challenges for international processes for the minimization of radio frequency interference.

(U) CONTESTED

(U) In addition to unintentional effects from the natural space environmental effects and the increasingly congested orbital environment, space systems face an increasing range of man-made threats that can deny, degrade, disrupt, or destroy these systems. The effects of counterspace capabilities range from reversible (temporary), such as from satellite communications/PNT jamming and cyber attacks, to non-reversible (permanent), such as from direct ascent anti-satellite weapons and high-energy lasers. As more nations rely on the effects derived from space, unconstrained testing of counterspace capabilities challenges the security and stability of the space environment.

(U) COMPETITIVE

(U//FOUO) Although the United States still maintains an overall competitive edge in space, the U.S. technological lead is beginning to erode in several areas due in part to increasing expertise among foreign competitors. Though today the United States develops leading technologies, it may lose some of that advantage in the future. U.S. suppliers, especially those in the second and third tiers, are at risk due to lack of consistent production rates, consolidation of suppliers under first tier prime contractors, and a more competitive foreign market. The United States no longer enjoys a paramount position in the international marketplace for space capabilities and services. Modifications to export restrictions have not kept pace with international advances in space technology, and U.S. firms are hindered from competing on the world market for those capabilities

that are now widely available internationally. The U.S. space industry also faces a growing challenge in recruiting, developing and retaining a technical workforce.

(U) OPPORTUNITIES

(U) Growing international and commercial interest and expertise in space presents opportunities for the United States for further collaboration and partnership in support of U.S. national security space activities, and the global community at large. The long history of cooperation in civilian space programs and U.S. government partnerships with commercial space service providers can serve as a foundation for collaborative global action to shape the future space environment.

(U) In cooperation with other U.S. Government departments and agencies, the DoD and IC have the opportunity to build on existing international and commercial relationships, as well as develop new partnerships, to enable changes to the space posture of the United States. Greater global investment in space can also help strengthen the U.S. space industrial base by providing more market opportunities to U.S. suppliers and service providers.

(U) Decisions to pursue these opportunities require additional feasibility, cost and risk analysis to determine the appropriate course of action for the United States. Leveraging partnership opportunities may lessen known risks; however, they could also create a new set of complexities that must be carefully managed. All opportunities for cooperation must be considered in the context of available resources and necessary security constraints.

(U) INTERNATIONAL

(U) Current international cooperation includes a variety of military-to-military and intelligence-to-intelligence agreements, as well as specific operational relationships. Bilateral space cooperation forums with key allies and partners can explore opportunities for mutually beneficial cooperative activities and facilitate the coordination and implementation of space policies, architectures, activities and programs. These forums can lead to specific bilateral agreements with other nations or international consortia for cooperative activities such as data exchange and system sharing. Additionally, the United States is working to expand upon its current data sharing and space situational awareness services with the broader international space-faring community to support spaceflight safety.

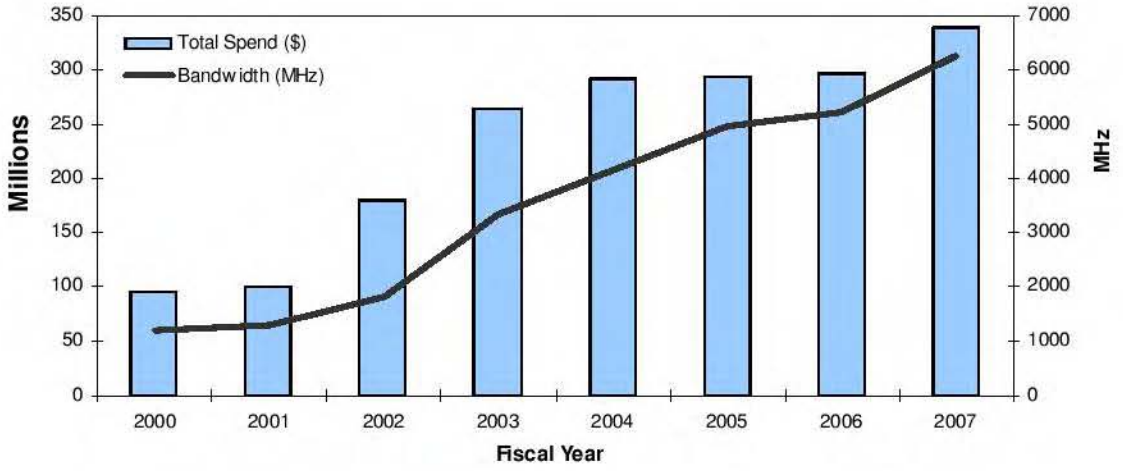
(U) The Department of Defense has a number of partnership agreements in place to conduct space operations. These agreements include shared operations and maintenance of surveillance sites and satellite operations. The department also conducts space operations in a variety of world-wide locations with the help of our allies and partners. The DoD also exchanges space operations personnel with a number of our allies and partners.

(U) The Intelligence Community has established longstanding classified sharing relationships with key allies and partners. Agreements include broad sharing agreements with allies as well as tailored agreements with other allies and coalition partners that span the broad spectrum of space-derived intelligence capabilities.

(U) These relationships present opportunities to deepen international relationships with existing space allies and broaden partnerships to the growing number of nations fielding, or seeking to field, indigenous space capabilities. As the number of nations with space capabilities increases, so too will the opportunities for increased sharing. For nations with existing capabilities, there exist opportunities for mutually beneficial partnerships to exchange current and planned data and capabilities. For nations without space capabilities there exist opportunities for the United States to assist those nations in developing capabilities that are compatible with U.S. capabilities to enable future cooperation. Greater international interest and expertise in space ultimately broadens and deepens the pool of potential partners and enables a more collaborative approach to future activities in space. Any cooperative agreement, however, should protect sensitive U.S. sources, methods, and technologies.

(U) COMMERCIAL

(U) Current national security use of commercial space services is focused in two areas – satellite communications and remote sensing. Forces deployed to theaters without reliable terrestrial communications infrastructure depend on satellites to meet much of their communications needs. Though there are government capabilities to support users, demand in some theaters far outstrips supply. Commercial wideband satellite communications services help meet that demand, in most theaters carrying far more communications than government systems. Remote sensing firms provide a complementary capability to national imagery systems. Though commercial systems do not provide the quality, volume, or timeliness of national systems, they can meet selective national security requirements.



(U) Figure 1. DoD Commercial SATCOM Bandwidth Utilization and Expenditures FY00 – FY07

(U) The United States has the opportunity to strengthen partnerships with existing commercial service providers and encourage the development of new commercial space capabilities. Because some existing commercial capabilities were initially procured to meet unanticipated needs, some commercial firms have not been approached strategically. For example, in some mission areas, the government has negotiated long-term rates for space services, but in others, services are purchased at market rates. Addressing the shortcomings of these relationships with commercial service providers can enhance U.S. capabilities, strengthen partnerships with private industry and stabilize cost profiles over the long term. Encouraging additional commercial endeavors in other mission areas could expand the range of available commercial capabilities available to the DoD, IC and other national space activities.

(U) SUMMARY

(U) The evolving strategic environment presents both challenges and opportunities to the national security space posture. An increasingly congested and contested environment threatens both U.S. systems and the ability of the global community to access and use space. Increasing competition in the global marketplace and increasing global expertise in fielding space capabilities also challenge the historical advantages of the United States space industrial base.

(U) Greater international and commercial interest and expertise in space, however, present opportunities as well as challenges. New opportunities for partnership and collaboration with both international and commercial space actors have the potential to support future national security space activities and enhance U.S. leadership.

(U) The next section presents current and planned national security space missions and capabilities that operate within the evolving space context described previously. The ongoing interagency

review of national space policy and strategy is assessing the degree to which these capabilities address the policy, requirements, and objectives of the United States.

(U) NATIONAL SECURITY SPACE MISSIONS AND CAPABILITIES

(U) Leveraging opportunities for partnership and collaboration has the potential to impact not only U.S. policy and strategy, but missions and capabilities as well. To provide an overview of those national security space missions and capabilities, the following sections describe the space capabilities utilized by the Department of Defense (DoD) and Intelligence Community (IC). These capabilities are organized here into nine mission areas: Intelligence, Surveillance and Reconnaissance; Integrated Tactical Warning and Attack Assessment; Environmental Monitoring; Satellite Communications; Positioning, Navigation and Timing; Spacelift Operations; Satellite Operations; Space Situational Awareness; and Space Command and Control. Following is a description of each mission and a general description of current and planned military and intelligence capabilities.

(U) INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR)

(U) Mission Description

(U) Space-based Intelligence Surveillance and Reconnaissance (ISR) is an integration of space-based systems, capabilities and synchronized planning and operations that support national security decision-making. Space-based ISR provides unfettered access to denied areas and creates a decision advantage by enabling a rapid and tailored response to emerging needs on a global scale, and are vital to the nation's overall intelligence collection posture, global security interests such as counterterrorism and counterproliferation, peacetime policy support and strategic intelligence.

(U) Current and Planned Capabilities

(U) ISR capabilities provide asymmetric advantages in space. In the future, the ISR architecture will continue to be capable of collecting on and responding to current requirements. The IC has continued to design and use sophisticated interconnected and interrelated systems and capabilities to address threats and support national security. Ongoing efforts are underway to transform the ISR architecture from a system designed to collect on and respond to specific requirements to a balanced mix of collection systems and sensors that deliver data into an integrated and collaborative architecture specifically designed to enhance support to mission partners and users.

(U) INTEGRATED TACTICAL WARNING & ATTACK ASSESSMENT (ITW/AA)

(U) Mission Description

(U) The primary mission of the ITW/AA system is to provide unambiguous, timely, accurate and continuous strategic missile warning and attack assessment information to the national leadership, designated combatant commanders and other users for assessment of attack through all levels of conflict. ITW/AA information sources may also provide data for use by operational forces. ITW/AA data is used as an input to the international Shared Early Warning System (SEWS).

(U) Current and Planned Capabilities

(U) ITW/AA capabilities include both space and ground assets. This posture review includes details of only space assets. The Defense Support Program (DSP) is a legacy system that provides near-real time strategic and theater warning and limited assessment of ballistic missile attack against the United States, its deployed forces and allies. Because it detects boosting launch vehicles, DSP also is critical to space situational awareness by providing detection and reporting on space vehicle launches.

(U) The Space-Based Infrared System (SBIRS) is the follow-on acquisition program to DSP. It is designed to maintain, extend and improve the global ITW/AA capability currently provided by DSP, as well as provide new capability for missile warning, missile defense, battlespace awareness and technical intelligence. To date, two SBIRS Highly Elliptical Orbit (HEO) payloads have been launched and certified for missile warning operations.

(U) ENVIRONMENTAL MONITORING

(U) Mission Description

(U) Space systems provide data on meteorological, oceanographic and space environmental conditions. While most of these systems support civil needs, military and intelligence operations also depend on environmental monitoring capabilities. Space capabilities provide data that forms the basis for forecasts, alerts and warnings for space environmental conditions that may negatively impact space assets, space operations and terrestrial operations. Geospatial capabilities also provide joint force planners with current information on terrestrial and atmospheric conditions. This knowledge allows operational forces to avoid adverse environmental conditions while taking advantage of other conditions to enhance operations. Such monitoring also supports joint intelligence preparation of the operational environment.

(U) Current and Planned Capabilities

(U) The Defense Meteorological Satellite Program (DMSP) provides environmental monitoring capability. DMSP collects global visible and infrared cloud imagery and other critical air, land, sea and space data. It supports DoD forces and the IC and passes data directly to land and shipborne terminals. The Department of Defense also leverages the civil Polar Operational Environmental Satellites (POES), Geostationary-orbiting Operational Environmental Satellites (GOES), and the European MetOp satellites for additional meteorological information. DMSP, POES and GOES are operated by the National Oceanic and Atmospheric Administration (NOAA), with back-up capability provided by the Air Force. DMSP, POES, and GOES data are shared among DoD, civil and international partners.

(U) The National Polar-orbiting Operational Environmental Satellite System (NPOESS), a joint DoD and Department of Commerce (DoC) program, is intended to improve the environmental monitoring capability currently provided by the DMSP and POES systems. Independent reports and an administration task force have concluded that the current program cannot be successfully executed with the current management structure, and with the current budget structure. On February 1, the White House announced that NOAA and the Air Force will no longer continue to jointly procure NPOESS. NOAA and NASA will take primary responsibility for the afternoon orbit, and DoD will take primary responsibility for the morning orbit. DoD is continuing to develop its plan for the way ahead.

(U) Space weather monitoring is currently provided by the Communication/Navigation Outage Forecasting System (C/NOFS) and sensors on DMSP, POES and GOES. Additionally, space weather data from various civil and scientific research spacecraft are exploited by Air Force and NOAA space weather operators. These systems include the Solar and Hemispheric Observatory (SOHO), Advanced Composition Explorer (ASC), Solar TErrestrial RElations Observatory (STEREO), and ground-based radio and optical observatories.

(U) SATELLITE COMMUNICATIONS (SATCOM)

(U) Mission Overview

Satellite communications (SATCOM) provide a broad range of capabilities, including global reach-back to information networks, transmission of critical intelligence, the ability to tie sensors to shooters, survivable strategic communications and beyond-line-of-sight communications for disadvantaged users in areas with limited or no infrastructure. Satellite communications capabilities are grouped here into the wideband, protected and narrowband systems, each with supporting terminal programs. Commercial systems provide a substantial part of the U.S. capability with wideband and narrowband capabilities supporting ongoing operations and deployed forces.

(U) Wideband Communications

(U) Mission Description

(U) Wideband satellite communications systems provide high data rates to meet the capacity demands of a variety of users. Wideband terminals often reduce the need for multiple ground-based communications systems and extend a broad range of services to mobile forces.

(U) Current and Planned Capabilities

(U) Legacy wideband military satellite communications (MILSATCOM) capabilities are provided by the Defense Satellite Communications System (DSCS) and Global Broadcast Service (GBS). DSCS satellites provide tactical, infrastructure and special operations communications capabilities to national leadership and joint warfighters. GBS broadcasts information to dispersed users equipped with small receiver terminals. The system is used to broadcast data, imagery and video (such as unmanned aerial vehicle feeds, maps, logistics data, weather forecast, operational orders and television broadcasts).

(U) Demand for high-data rate communications services has grown in recent years. The Wideband Global SATCOM (WGS) system is replacing DSCS with satellites each capable of providing ten times the capacity of one DSCS satellite. WGS user equipment, however, does not support anti-jam/protected communications capabilities of DSCS. In addition to X-band service, the WGS payloads provide a new two-way Ka-band service to support "on the move" forces, manned and unmanned aircraft, inter-theater communications, reachback communications to the continental United States and intelligence collection and dissemination of resulting exploited products. Australia has partnered with the United States by funding an additional WGS satellite in exchange for a percentage of the overall WGS constellation capacity. This enables global wideband communications interoperability between U.S. and Australian forces.

(U) The DoD also leverages commercial wideband unprotected satellite services, both mobile and fixed, to augment or replace specific military SATCOM wideband communications. Commercial wideband services are predominantly used in similar ways as military wideband SATCOM systems and have been employed effectively as an integral complement to military wideband systems since the 1980s. Both are used to extend the military information networks to deployed warfighters.

(U) Protected Communications

(U) Mission Description

(U) Protected communications capabilities provide worldwide, secure, anti-jam anti-scintillation communication capabilities to strategic and tactical users.

(U) Current and Planned Capabilities

(U) Legacy protected systems include the MILSTAR constellation and the Interim Polar System (IPS). These systems will be replaced by the Advanced Extremely High Frequency (AEHF) and Enhanced Polar System (EPS). AEHF will extend and increase tenfold the capacity of protected communications capability, as compared to that currently provided by the MILSTAR system. The United States has AEHF international cooperative agreements with Canada, the United Kingdom and the Netherlands to share system capacity in exchange for funding contributions. EPS will replace IPS by providing persistent north polar coverage.

(U) Narrowband Communications

(U) Mission Description

(U) Narrowband communications systems provide low data rates in the ultrahigh frequency (UHF) radio band to support mobile users. Narrowband communications are more vulnerable to jamming, however, they have advantages such as mobility, ability to operate through foliage and weather and ease of use for daily operations.

(U) Current and Planned Capabilities

(U) The current narrowband communications system is the Ultra High Frequency Follow-on (UFO). The UFO system will be replaced by the Mobile User Objective System (MUOS). MUOS will be a limited protection narrowband system that will support a worldwide population of mobile and fixed-site terminal users, providing increased communications capabilities to small terminals, while still supporting interoperability to currently existing terminals. When fielded, MUOS will aid DoD transformation by providing a significant increase in channel capacity, availability and quality of service for narrowband MILSATCOM users, as well as providing access to military information networks.

(U) The DoD also leverages commercial Mobile Satellite Service (MSS) for its narrowband needs. MSS provides satellite communication services for small mobile terminals, whether land, airborne or maritime, for the provision of voice and data services.

(U) Terminals

(U) A variety of military SATCOM terminals provide connectivity for strategic forces and tactical communications for a variety of missions. Planned capabilities include increased multi-band operations, interoperable communications, modularity and improved capacity.

(U) POSITIONING, NAVIGATION AND TIMING (PNT)

(U) Mission Description

(U) Space-based Positioning, Navigation and Timing (PNT) assets provide essential, precise and reliable information that underpins nearly every military system and operation, and increasingly, civil, commercial, and critical infrastructure applications. PNT permits joint forces to more effectively plan, train, coordinate and execute operations. Precision timing provides the joint force with the capability to synchronize operations and enables communications capabilities such as frequency hopping and cryptological synchronization to improve communications security and effectiveness. PNT also enables precision attack from stand-off distances, thereby reducing collateral damage and allowing friendly forces to avoid threat areas.

(U) Current and Planned Capabilities

(U) The cornerstone of U.S. military PNT is the Global Positioning System (GPS). Positioning and timing are provided from a constellation of GPS satellites, controlled by the GPS ground control system and accessed via military user equipment. GPS offers persistent, highly accurate time and 3-dimensional position and velocity information to military, intelligence, civil, commercial and foreign users worldwide. GPS PNT services work on or above the Earth's surface, in all weather and with unlimited users.

(U) The current GPS constellation provides civil positioning service broadcast on one frequency to commercial users and an encrypted positioning service broadcast on two frequencies to authorized military users. The next block of GPS satellites will provide a second (and eventually third) civil signal, an Earth coverage military signal and flexible power signal for military anti-jam capability. The GPS Block III, currently in acquisition, will add a new civil signal that is compatible with the future European PNT system, Galileo (scheduled for initial operational capability no earlier than 2016). The next generation GPS control segment will support legacy and future capabilities.

(U) SPACELIFT OPERATIONS

(U) Mission Description

(U) Spacelift operations provide the ability to deliver satellites, payloads and material into space and into the correct orbital location. Spacelift operations are conducted to deploy, sustain, augment or reconstitute operational satellite constellations supporting U.S. military operations and national security objectives, as well as launch science and technology payloads to demonstrate advanced capabilities. The requirements for spacelift capability are determined by the architectures of the other mission areas.

(U) Current and Planned Capabilities

(U) Medium and Heavy Lift

(U) Spacelift for medium and heavy payloads is currently provided by the Evolved Expendable Launch Vehicle (EELV) Program's Delta IV and Atlas V launch vehicles. The National Space Transportation Policy directs the Secretary of Defense to fund the annual fixed cost for both EELV families. Contracts are currently in place for a combination of infrastructure (cost plus contracts) and launch services (fixed price contracts for the marginal cost of each launch). This approach provides for assured access to space and supports mission assurance.

(U) Small Lift

(U) Space access for small payloads is currently provided by the use of refurbished excess missiles (Minotaur I and IV) and commercial vehicles, including the Pegasus and Falcon I. The United States currently has a limited ability to respond to unanticipated needs for space capability within a militarily useful timeframe. Operationally responsive capabilities are being developed by the DoD Operationally Responsive Space (ORS) Office to demonstrate an initial capability for operationally responsive access to and use of space to support DoD requirements. Though only currently in the architecting and demonstration phase, a fielded ORS capability could complement existing space capabilities by providing the capacity to respond to unexpected loss or degradation of selected capabilities and providing the timely availability of tailored or new capabilities. Responsive payloads are currently baselined for launch on Minotaur I and IV vehicles.

(U) Spacelift Range

(U) The Spacelift Range System (SLRS) consists of the Eastern Range at Patrick Air Force Base (AFB)/Cape Canaveral Air Force Station (AFS), FL, and the Western Range at Vandenberg AFB, CA. The SLRS provides tracking, telemetry, flight safety, communications and other capabilities to conduct national security, civil and commercial spacelift operations and support DoD ballistic and Missile Defense Agency missile defense tests. The SLRS modernization effort and complementary product improvement projects could strengthen range responsiveness, enhance range safety, standardize logistics support and reduce operations and maintenance costs. Growing obsolescence, however, continues to make range sustainability challenging and expensive. To address these concerns, plans are being prepared to divest redundant assets and recapitalize the remaining assets to improve reliability and increase availability.

(U) SATELLITE OPERATIONS (SATOPS)

(U) Mission Description

(U) The United States conducts satellite operations (SATOPS) to maneuver, configure, operate and sustain on-orbit assets. Satellite operations are characterized as spacecraft and payload operations, including telemetry, tracking and commanding (TT&C); maneuvering; monitoring state-of-health; maintenance sub-functions; and support for emergency recovery and end-of-life payload disposal. The requirements for SATOPS capability are determined by the architectures of the other mission areas.

(U) Current and Planned Capabilities

(U) National security SATOPS are conducted on both shared and dedicated satellite control networks. The Air Force Satellite Control Network (AFSCN) is the backbone of the shared satellite control networks, providing common-user access, while the Navy Satellite Control Network, National Reconnaissance Office mission ground stations, military satellite communications mission ground stations, environmental monitoring mission ground stations, GPS mission ground stations, and SBIRS mission ground stations conduct operations through dedicated networks. Common user networks are optimized for assured access commanding (uplink operations), while dedicated user networks are optimized for satellite mission data collection and relay to Earth (downlink operations).

(U) The common-user AFSCN is a ground-based, global system of interconnected control centers, remote tracking stations and communications links that provide telemetry, TT&C support for launch and early-orbit operations of satellites. The AFSCN provides initial deployment and checkout of satellites; assured command, control and communications (C3) connectivity between ground SATOPS centers and operating satellites; emergency recovery of malfunctioning satellites; mission and spacecraft data reception and relay; satellite position determination; and satellite disposal operations.

(U) The AFSCN modernization effort is an acquisition program to replace aging and increasingly unsustainable equipment, improve interoperability and increase data capabilities. Modernization of worldwide Remote Tracking Stations (RTS) is underway, replacing core electronics and antennas that are well beyond their design lives.

(U) SPACE SITUATIONAL AWARENESS (SSA)

(U) Mission Overview

(U) Space Situational Awareness (SSA) is the requisite foundational, current and predictive knowledge and characterization of space objects and the operational environment upon which space operations depend – including physical, virtual, information and human domains – as well as all factors, activities and events of all entities conducting, or preparing to conduct, space operations. SSA, at a minimum, requires continual awareness of orbiting objects; real-time search and high-fidelity information; threat detection, identification and location; predictive intelligence collection and analysis of foreign space capability and intent in a geopolitical context; and a global reporting capability for friendly space systems. SSA can be divided into four major functional capabilities: detect, track and identify; threat warning and assessment; intelligence characterization; and data fusion and integration (which will be discussed as part of Space Command and Control).

(U) Detect, Track and Identify

(U) Mission Description

(U) Detect, track and identify capabilities provide the ability to discover, track and differentiate among space objects. The primary focus of existing Space Surveillance Network (SSN) systems has been to provide detect, track and identify capability for near Earth and deep space. DoD has increased funding requests over the last two years to establish the necessary capabilities to improve space flight safety over the next decade as many new nations begin their exploration of space and current space-faring nations expand their space capabilities.

(U) Current and Planned Capabilities

(U) The current dedicated Space Surveillance Network includes Ground Based Electro-Optical Deep Space Surveillance, Eglin Radar System, Globus II Radar, Moron Optical Space Surveillance (MOSS) System and the Air Force Space Surveillance System. The processing and analysis of data from the network of space track systems and their command and control elements detects, identifies, characterizes and monitors man-made objects in Earth orbit. The Space-Based Space Surveillance (SBSS) program adds to these capabilities and will improve timely detection of man-made objects in geosynchronous orbit. The Space Surveillance Telescope (SST) and S-band Fence programs also enhance U.S. space situational awareness by providing rapid, un-cued search, detection and tracking of deep-space and near-Earth objects, respectively. Other sensors, with primary missions other than SSA, may contribute to the overall SSA picture.

(U) Threat Warning and Assessment

(U) Mission Description

(U) Threat warning and assessment is the ability to predict and differentiate among potential or actual attacks, space weather environment effects and space system anomalies.

(U) Current and Planned Capabilities

(U) The primary fielded and planned capabilities to conduct threat warning and assessment are Eagle Sentry, Silent Sentry, Joint Space Operations Center (JSpOC) Mission System (JMS) (discussed under Space Command and Control) and the Rapid Attack Identification Detection and Reporting System (RAIDRS) Block 10 and the Self-Aware Space Situational Awareness (SASSA) program. RAIDRS Block 10 will consist of ground-based systems with the capability to detect and geolocate satellite communications interference. Following operational development and deployment, SASSA's on-board threat detection sensors will be used to identify and characterize attacks on U.S. and allied on-orbit assets while relaying mission data to the ground in support of global SSA. Additionally, current and planned nuclear detection, missile defense and missile warning systems contribute to threat warning and assessment through detection of nuclear and launch events. Warning and assessment of environmental threats are provided by the space environmental monitoring capabilities described in the Environmental Monitoring mission area.

(U) Intelligence Characterization

(U) The Intelligence Community provides intelligence characterization to provide performance and characteristics of current and future foreign space and counterspace system capabilities, as well as foreign adversary intentions to operational, force modernization and policy making consumers. A combination of single source and all-source intelligence enables characterization of foreign space and counterspace capabilities and assists in attributing space events as well as predictive awareness of events.

(U) SPACE COMMAND AND CONTROL (SPACE C2)

(U) Mission Description

(U) Space Command and Control (Space C2) is the ability to exercise authority over assigned and attached space forces and resources to monitor, assess, plan and execute space operations at all echelons of command. The integration and fusion of information improves protection and defense of critical space assets and response to new and emerging threats. C2 functions are performed through an arrangement of personnel, equipment, communications, facilities and procedures employed by a commander in planning, directing, coordinating and controlling forces and operations to accomplish the mission. Data fusion and integration is the ability to correlate and integrate multi-source data into a single common operational picture and enable dynamic decision-making for the entire set of space missions.

(U) Current and Planned Capabilities

(U) The Joint Space Operation Center (JSpOC) allows the Commander, United States Strategic Command (USSTRATCOM), to conduct space integrated command, control, communications, processing, analysis, dissemination and archiving activities. The JSpOC Mission System (JMS) is a new program, that when executed, will be responsible for space situational awareness and command and control for space forces. The JMS program is a consolidation of the Integrated Space Situational Awareness, Rapid Attack Identification Detection and Reporting System (RAIDRS) Block 20 and Space C2 programs.

(U) The future JMS will provide integrated space knowledge and information for the Commander, USSTRATCOM, and will fuse information from the multiple sources that combine to provide SSA. JMS will provide and support the ability to monitor the environment, including all space objects that are observable, terrestrial events that may influence space operations and assigned and attached space force status and activities. It also will enable information sharing between the DoD and IC, as well as with those commercial and foreign entities that have signed agreements with United States Strategic Command. It will enable the Commander, USSTRATCOM, to assess how rapidly changing events on Earth and in space will impact U.S. and allied interests and operations.

(U) CONCLUSION

(U) The 2009 Space Posture Review represents an initial look at the evolving strategic context and those challenges and opportunities it presents to the national security space posture. The space environment is becoming increasingly congested and contested, and international and commercial competition in fielding space capabilities is growing. These challenges span activities across the many national security space mission areas.

(U) The ongoing review of national space policy and strategy is an important precursor to any changes to national security space policy, strategy and investment. Department and Agency policy, strategy, plans and programs will evolve with national vision, direction and coordination. As the review of national space policy and strategy progresses, the DoD and IC will remain engaged as key stakeholders in this process.