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SENATE ARMED SERVICES COMMITTEE
STRATEGIC FORCES SUBCOMMITTEE

STATEMENT OF

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Introduction

Mr. Chairman, distinguished members of the Subcommittee, we are honored to appear before you today to address the Navy's space activities. Navy's forward and geographically-dispersed operations underlines the importance of a healthy satellite constellation and assured access to those capabilities that support getting the necessary information to leadership in a timely manner to inform decisions at tactical, operational, and strategic levels. The space constellation brings synchronization of guidance and objectives between the shore-based headquarters and the forward-deployed Fleet, incorporates the tactical picture of each asset forward into a global common operational picture for increased awareness, and allows orchestration of operations amongst the detached units.

The Defense Strategic Guidance, released in January 2012, directs a rebalancing toward the vast Asia-Pacific region, due to the U.S.'s "inextricably linked" economic and security interests with countries in East and South Asia and the Western Pacific. The 30th Chief of Naval Operations, Admiral Jonathan Greenert, delivered his Sailing Directions in September 2011, directing the Navy to place warfighting principles and capabilities first, to operate forward, and to be ready to employ all Navy resources to accomplish assigned missions. The continued emphasis in forward operations combined with the re-emphasis on the global nature of U.S. security interests require Navy position itself to take full advantage of the critical benefits afforded from space. It also demands Navy continue to work with the other Services to develop and refine the necessary tactics, techniques, procedures, and capabilities to maximize the use of available constellations and maintain continual access in degraded or denied space environments. Navy

continues to recognize the need for space expertise as a guide in developing our space capabilities, and therefore is routinely examining its Space Cadre community management and optimizing its training and exercise regimen to strengthen Navy's ability to maximize the access to, and use of, these critical satellite constellations.

Information Dominance and synchronized, safe operations in the vast domains of the global commons require access to a combination of joint, interagency, commercial, and international space systems providing our Navy commanders with critical satellite communications (SATCOM) paths; positioning, navigation, and timing (PNT) signals; environmental monitoring (EM) data; missile warning (MW); and intelligence, surveillance, and reconnaissance (ISR) reporting necessary for the full range of operations from humanitarian missions to combat operations in one or more theaters. Access to, and mastery in, operations utilizing this combination of space capabilities enables decisiveness, sustainability, responsiveness, and agility – critical requirements for a globally engaged, superior naval force.

Mobile User Objective System (MUOS)

SATCOM access is the backbone of space-based capabilities supporting Navy's geographically-dispersed, forward operations. It is the pathway across which commanders can provide updates and receive guidance from higher headquarters "on the beach" and synchronize operations with land-based and other distant Fleet assets. It is also an important path to disseminate critical MW, ISR, and EM information to forward-deployed ships, providing threat warning, situational awareness, and a solid foundation with which the operational or tactical commander can make sound decisions. Navy

depends on others within the Department of Defense (DoD) to acquire sufficient wideband communications satellites to meet the variety of Navy missions requiring communications in these bands. As the Executive Agent for Narrowband Satellite Communications, Navy supplies the necessary narrowband capabilities to meet the total joint force requirements.

The increasing joint demand for narrowband SATCOM access at ever-higher data rates requires moving beyond antiquated legacy UHF satellite capabilities. The Mobile User Objective System, or MUOS, will use a wideband code division, multiple access (WCDMA) capability, similar to third generation (3G) cellular telephones, that will satisfy those demands by providing over ten times the capacity of the current UHF Follow-On (UFO) satellite constellation. With this capability and the increased capacity, MUOS will support Unified Commands and Joint Task Force Components, DoD and non-DoD agencies, and our coalition partners by providing worldwide tactical narrowband netted, point-to-point, and broadcast voice and data services in challenging environments, including double-canopy foliage, urban environments, high sea states, and all weather conditions.

Over the past year, the MUOS program made significant progress. The first MUOS satellite in the planned constellation of five satellites launched on February 24, 2012, and is scheduled for on-orbit capability in May 2012. Ground infrastructure improvements are completed for the initial MUOS capability, as is training of the operators at Naval Satellite Operations Center, who will be responsible for on-orbit maintenance and operation of the constellation. The second spacecraft is assembled and undergoing spacecraft level integrated testing. It is on track for a November 2012

delivery to the government and has a tentative launch date of July 2013, as assigned by the Air Force. Assembly and system level testing of the third spacecraft is nearly complete, and the program projects its on-time delivery for an anticipated FY 2014 launch.

With the launch of MUOS 1, the Department of Defense (DoD) begins its transition to a new UHF SATCOM capability based on 3G cellular telephone technology; however it will take time to launch the full constellation and shift the thousands of DoD UHF SATCOM users to this new technology. This transition will be made smooth through a number of proactive measures to extend access to the legacy UHF signals. First, each MUOS satellite has a legacy UHF payload that will be accessible by current UHF radios and will remain available throughout the satellite's lifetime. Navy also optimized the UHF SATCOM constellation to significantly increase the number of available channels and implemented the Integrated Waveform, a software upgrade to UHF SATCOM tactical terminals and control systems, to optimize the use of legacy UHF satellite channels. Navy continues to leverage commercial legacy UHF capabilities through leases directly with commercial companies and through a Memorandum of Understanding with the Australian Ministry of Defense for use of channels on an Australian hosted payload. Navy has explored additional options using commercially hosted payloads, but based on the improvements already employed, the recent successful launch of MUOS 1, planned future launches of the subsequent MUOS satellites, and the projected lifespan of the legacy UHF SATCOM constellation, Navy does not foresee a need for any additional legacy capacity now or through MUOS's projected lifecycle.

The final piece in realizing the full capability of MUOS is the fielding of MUOS-capable Joint Tactical Radio System (JTRS) terminals and by upgrading existing legacy UHF software programmable terminals to give access to the WCDMA waveform. Due to cost overruns and schedule delays, the MUOS compatible terminals of the JTRS program were reduced to the Handheld, Manpack, Small Form Fit (HMS) Manpack radio and the Airborne, Maritime, Fixed Station (AMF) Small Airborne radio versions. Recently, the Office of the Secretary of Defense made Navy responsible for systems engineering and integration of the end to end MUOS capability to include ensuring compatible user terminals are developed. Navy has appointed the MUOS Program Manager as the government development and integration lead and is implementing additional early end to end testing of the new MUOS capability in order to maximize the successful operational deployment of MUOS-capable JTRS terminals when fielded. With this new direction, Navy expects the JTRS HMS program to have the HMS Manpack certified and ready for testing in late FY13, in time to conduct the operational evaluation of the MUOS satellite system in FY14.

With five programmed satellites on orbit, MUOS will be the common denominator for future narrowband command and control, enhancing the capability to communicate from the tactical edge to theater headquarters. MUOS will allow more comprehensive and coordinated support to regional engagement efforts, providing the capability to synchronize actions with other Services and agencies.

TacSat-4

The level of importance that Navy places on SATCOM access directs the exploration of a variety of measures to counter anti-access and area denial efforts of potential adversaries. Navy is examining signal processing techniques that can be employed in the architectures of already on orbit satellites to maintain access to their signals in a degraded or denied space environment. Navy is also looking at technology that can be placed on satellites that are still under construction to give us an on-orbit capability.

On September 27th, 2011, Navy launched Tactical Satellite 4, or TacSat-4, to examine another tenant of space resiliency, that of operationally responsive space launches. TacSat-4 is a fourth-generation microsatellite funded by the Office of Naval Research and developed by the Naval Research Laboratory in response to a U.S. Marine Corps requirement for satellite communications "on the move" and Navy's requirement for rapid replenishment of SATCOM. Since launch, TacSat-4 has undergone, and continues to undergo, testing by the Navy, Marine Corps, Army, and Coast Guard, as well as the Canadian and British militaries, to better understand its true military utility in providing communications access to ground units in urban and mountainous terrain, ships and submarines on the high seas, and even units operating in the polar regions where traditional SATCOM satellites in geosynchronous orbits cannot reach. TacSat-4's inclined low-earth orbit, somewhat atypical for SATCOM satellites, is also being studied for its potential benefit for data exfiltration from ground and oceanographic sensors.

Positioning, Navigation, and Timing (PNT)

The Air Force's NAVSTAR Global Positioning System (GPS) continues to be Navy's space-based signal source for precise PNT data for platforms, munitions, combat systems and command, control, communications, computer, and intelligence (C4I) systems. Received and processed by Navy GPS receivers, it allows for precise navigation to ensure safe operations in, under, and above the seas. It provides accurate location data for guided munitions to ensure precise delivery to the target, minimizing inaccurate attacks that can often result in greater collateral damage. These, and many more benefits Navy enjoys from PNT data, underscore Navy's emphasis in maintaining user access to this capability, even in anti-access and area denial efforts of our adversaries.

Last summer, Navy awarded a multi-year contract to Raytheon Integrated Defense Systems for its follow on shipboard PNT system. The new system, GPS-based PNT Service (GPNTS), will replace legacy GPS user systems dating from the 1980s and 1990s. GPNTS will incorporate the latest GPS security architecture and feature redundant clocks and anti-jam antennas. Additionally, it will serve as a major stepping stone for Navy's transition to the new GPS M-code signal.

Navy is also undertaking an initiative to improve our critical shore-based timing services by implementing a common architecture that will improve assured time and frequency services. Additionally, Navy, as the DoD manager for Precise Time and Time Interval, is working closely with the Air Force to ensure the U.S. Naval Observatory's Master Clock is fully supportive of the new GPS III architecture.

Environmental Monitoring

Navy provides DoD with global atmospheric modeling and global and regional ocean modeling. We rely on partnerships with the Air Force, civil, and international agencies to meet our space-based environmental sensing requirements. Meeting these requirements is critical to the planning for and execution of safe, effective military operations. To this end, the Navy is engaged in defining the requirements for the follow-on to the Defense Meteorological Satellite Program (DMSP).

As stated in last year's testimony, Navy deferred procurement of an altimeter satellite, GEOSAT Follow-On 2 (GFO-2), until FY16, assuming risk in antisubmarine warfare and mine warfare areas in exchange for increased emphasis in areas deemed of greater importance to DoD. However, with the 2012 emphasis on forward operations in the Pacific and Indian Oceans, Navy has altered its planning assumptions and must reduce risk in antisubmarine warfare and mine warfare through an assured source of space-based altimetry data, critical data for battlespace awareness and planning undersea warfare operations. Navy is considering all options to meet this altimetry requirement, from GFO-2 to civil or international partnerships consistent with Presidential Policy Directive 4.

Missile Warning and Intelligence, Surveillance, and Reconnaissance

Space-based assets can provide unique access to information critical to decision making throughout the range of military operations, whether it is insight into potentially hazardous areas resulting from natural disasters or the preparatory activities of an emerging threat to U.S. and our partners' interests. The global maritime picture built by quilting together a variety of assets, including those that allow mapping ice boundaries in

the polar regions and the EM assets that support other oceanographic studies, can result in greater maritime domain awareness and lead to more efficient defenses from seaborne threats to safety and commerce, as well as safer navigation for the world's merchant fleets.

Navy continues to engage the Intelligence Community as they explore future acquisitions and consider the capabilities of commercial vendors to meet the ISR needs of the U.S. Government. Navy's relationship building fosters better understanding throughout the Intelligence Community of the unique ISR requirements in the maritime domain, improving the accuracy of factoring Navy requirements into acquisition decisions and the probability of them "making the cut." These requirements can vary significantly from the traditional ISR collections of terrestrial targets to which we have become accustomed and, thus, require extra emphasis and explanation. For example, terrain such as mountains and river crossings can help focus collections on mobile, land-based elements, but maritime vessels of interests have greater freedom of movement and, therefore, require a much broader area surveillance method and more frequent revisits to maintain a credible and reliable track. In support of this, Navy, under Presidential Policy Directive-4 (PPD-4), the National Space Policy, is working with partners to foster international collaboration using civil and commercial space systems to enhance global maritime domain awareness. The recommended program has three major facets: Harmonization, Operational Cooperation and Experimentation, and Influencing Technology Development, through which it will achieve the advantages of increased persistence, increased coverage, and reduced cost.

To complement the efforts to build requirements into future systems, Navy continues to leverage its Tactical Exploitation of National Capabilities, or TENCAP, Branch and various research labs to explore new methods in which we can use the current, traditional data collection systems in often non-traditional manners or in an atypical combination of sources to meet these unique requirements. These efforts are paying dividends, but more work and investment in the research and development of such techniques is necessary. As budgets continue to decline, it will be these efforts in non-traditional processing and exploitation, combined with ensuring future architectures take into account the unique maritime ISR requirements, that will give Navy the necessary, timely intelligence to make the right decision within realistic time constraints.

Navy Space Cadre

Key to Navy's development and full exploitation of space-based capabilities is our Space Cadre. As Navy continues to operationalize space amongst the Fleets and develop its capabilities to maintain access to the critical functions our nation's space constellations provide, Navy will rely on its Space Cadre to lead the development of tactics, techniques, and procedures (TTPs) unique to the maritime domain. Deployed forces need these TTPs to take full advantage of the benefits space provides and maintain critical warfighting functions despite the anti-access and area denial efforts of future adversaries. Development of this expertise requires formal education, intense training, and challenging exercises. Navy continues to integrate space awareness training into core training opportunities throughout the Information Dominance Corps and in pre-deployment training for Strike Group staffs. This broad training raises general awareness

throughout the Navy of available capabilities and how to take full advantage of all DOD space assets.

From this baseline, Navy grows an experienced group of people identified as Space Cadre who receive advanced education in space operations, technology, and engineering and are placed in specific space-related jobs to assist in translating Navy requirements to the joint force. The unique needs of maritime domain operations are often not intuitively obvious to those more experienced in land-based operations, so placement of these "translators" at key acquisition and space operations billets ensures appropriate advocacy for the unique requirements for space-based capabilities to support maritime operations.

Finally, Navy is incorporating more demanding scenarios in Strike Group and other pre-deployment exercises to increase the Fleet experiences in operating in degraded or denied space environments. These exercises give the Fleet a chance to test TTPs and transform them from something read in a publication to a second-nature reaction to maintain access to those key space capabilities the Navy needs to execute our assigned missions.

Conclusion

The Navy is heavily reliant upon space for mission enhancement from SATCOM, PNT, MW, EM, and ISR assets to communicate with, and provide valuable information to, our commanders and leadership at sea and ashore to inform their decisions and guide maritime operations. This requires balancing investments in new acquisitions, additional training in the use of already available assets, and continued development of a Space

Cadre core that can examine alternatives and provide sound operations and acquisition recommendations to leadership, especially within the bounds of today's fiscal realities. Navy will continue to consider the threat posed to these critical resources by those developing cutting-edge space denial technologies and the probability of their use against the U.S. as we examine the balance between the cost, benefit, and investment timing into necessary capabilities to protect our access to space constellations and ensure our forward-deployed commanders have the tools necessary to maintain information dominance and decision superiority.

Mr. Chairman - thank you for the opportunity to share our efforts with you today. We look forward to answering any questions you and the Subcommittee may have.