HOUSE ARMED SERVICES SUBCOMMITTEE ON STRATEGIC FORCES

STATEMENT OF

LIEUTENANT GENERAL JOHN W. RAYMOND

COMMANDER

JOINT FUNCTIONAL COMPONENT COMMAND FOR SPACE

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FOR SPACE PROGRAMS

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INTRODUCTION

Chairman Rogers, Representative Cooper, and members of the Subcommittee, it is an honor to appear before you again as the Commander of United States Strategic Command's Joint Functional Component Command for Space (JFCC SPACE). 2014 was a very productive year for JFCC SPACE, due in no small part to the support received from this committee.

It is my highest honor to stand before you again, representing the 3,200 Soldiers, Sailors, Airmen, Marines and civilians that make up JFCC SPACE. These professionals, along with our exchange officers from Australia, Canada, and the United Kingdom, ensure our nation, our allies, and our joint warfighters have continued access to the space capabilities that enable the American way of life and provide a tremendous strategic advantage to our Nation.

Last year I testified that the space environment has changed; it is no longer the relative sanctuary it once was. Over the last year, a plethora of activity clearly demonstrated that space is even more congested, competitive and contested than ever before with no signs of slowing down. It is a challenging domain and will require a strong whole-of-government approach to assure access and promote a safe operating environment.

Subsequently, the operations tempo for JFCC SPACE is accelerating, and we are rapidly adjusting our mission focus to these challenges in the space domain. With the help of the Services, my team has started its transformation to the future through innovation, experimentation, technology insertion and partnering. We have made great strides, but have more work to do. We are absolutely committed to assuring global access to space and peaceful operations in and through space. Credible, reliable, and assured space capabilities are vital to our Nation's strategic deterrence. I look forward to continuing to work with you and your staffs as we advance and protect our Nation's space capabilities.

SPACE ENVIRONMENT

Space is now a contested warfighting domain and multiple players are increasingly challenging our ability to execute the strategic and operational Space capabilities required by our Nation, the Joint Force, and Allies and partners. The capabilities we launch, operate, command and control, track, support and defend are indispensable warfighting components to support the joint fight and our Nation's strategic deterrence. The Nation and Department of Defense (DoD) have never been more reliant on space capabilities as we face increasing threats to the peaceful use and freedom of action in the Space Joint Operating Area. The emerging space strategic environment demands we adopt new ways of thinking and continue to hone our skills across each mission area to protect and defend our national interests. We must prepare now and build our understanding of adversary tactics as we codify our options to decisively employ space power. We must develop solutions to counter emerging threats in our current fiscally-constrained environment. I am awed by the innovative spirit of our Airmen, Soldiers, Sailors, Marines and civilian workforce. The team members of JFCC SPACE are my number one asset, and through a culture of experimentation, they are developing improved tactics, techniques and procedures (TTPs) while pushing the envelope on superior technologies to provide unsurpassed space capabilities to the President of the United States.

JFCC SPACE, through its command and control center, the Joint Space Operations Center (JSpOC), continually tracks 23,000 known objects in orbit around the Earth, but the true amount of debris is certainly an order of magnitude higher. Although we may never be able to detect and track the smallest objects, every piece of debris on orbit poses a potential threat to all operational satellites. My team continues working to provide continuous awareness of the battle

space powered by the ability to task sensors and informed by threat assessments and automated warning. Confirming object location and cataloguing those objects is no longer good enough. We must actively search the space domain to derive location, identification and characterization of intent while providing actionable decision information for commanders to respond within tactical timelines.

Today there are eleven space-faring nations that have an indigenous space launch capability and at least 170 countries have access to space capabilities. As the barriers to access space are lowered, the number of actors is expected to increase, and our ability to carry out our missions will become more challenging.

With modern media the world has had a front row seat to our capabilities during multiple operations and they have observed how we integrate and leverage space capabilities to our advantage. In response, the capabilities being developed to deny the U.S. its advantage in space is constantly increasing. These capabilities range from low-end reversible actions to high-end kinetic anti-satellite weapons and everything in between. Examples of these capabilities are brute force jamming of Global Positioning System (GPS) and satellite communications (SATCOM) signals, highly sophisticated anti-satellite weapons intended to damage or destroy their targets, and lasing or blinding of imaging satellites.

China and Russia remain concerns for us as we assess threats in the space domain. Both countries have acknowledged they are developing – or have developed – counter-space capabilities. They have both demonstrated the ability to perform complex maneuvers in space and both have advanced "directed energy" capabilities that could be used to track or temporarily blind satellites.

Very visibly in 2007, and at least twice over the past 2 years, China demonstrated a ground-based direct ascent (DA) kinetic Anti-Satellite (ASAT) weapon. The latest tests did not destroy a satellite, but the 2007 DA ASAT added an estimated 3000 pieces of debris to the congested environment of space that still drives collision avoidance maneuvers for spacecraft. In fact, in 2014, 15 satellites maneuvered based on our recommendation to avoid colliding with debris from this one irresponsible act. China publicly stated that its goal for the next decade is to out-perform all other nations in space. China has invested large amounts of money into increasing the number of platforms in every orbital regime and increased their influence in space situational awareness.

Russia launched an object (Kosmos 2499) in May of 2014 in addition to three declared military communications satellites. Originally thought to be debris, we observed this object begin to maneuver. Because debris doesn't maneuver, we focused additional attention on this object and have determined that it is a microsatellite. Subsequently, Russia registered the object. We continue to monitor and assess this satellite, but this event highlights the need to know more than just the location of an object in space. Simply cataloging an object is not enough in a contested domain.

Other nations also recognize the strategic value of space assets. North Korea has been busy upgrading their launch facilities and Iran recently launched a satellite into orbit after a string of failures. Our Allies and Partners such as Australia, Canada, the United Kingdom, Japan, France, and Germany are also expanding and/or pursuing capabilities in space.

We are quickly approaching the point where every satellite in every orbit can be threatened. Now more than ever, a responsive and flexible global space force is critical to our

ability to continue to exploit the advantages of space to ensure effective and efficient military operations.

To meet the demands of the dynamic space environment, JFCC SPACE is focused on three operational objectives: (1) provide timely and accurate warning and assessment of threats, (2) support national users and Joint and Coalition forces, and (3) prepare to protect and defend our space capabilities and prepare for contingency operations. All of these objectives require increased space situational awareness and enhanced command and control (C2).

SPACE SITUATIONAL AWARENESS

Space Situational Awareness (SSA) provides timely and accurate warning to alert national and military leaders and our partners of impending threats and hostile actions. Fusion of sensor data coupled with enhanced command and control capabilities enables the rapid situational assessment, to include identifying potential threats, and providing indications and warning to decision makers.

Space debris continues to be a significant concern as even the smallest fragments pollute the space domain and can potentially disable, damage or destroy space capabilities. Fielding new sensors with greater sensitivity will allow us to track more and smaller objects, but we must do more than simply improve our vision. We must continue broader efforts to reduce the by-products of space launches, improve plans to dispose of defunct satellites, decrease the probability of accidental collisions between space objects, and thwart deliberate acts of destruction.

JFCC SPACE is responding to today's congested space environment by tracking and maintaining a catalogue of observable space objects, and by notifying more than 8,000 owners

and operators of close conjunctions to reduce the chance of collision. At the JSpOC's recommendation, satellite owner/operators conducted maneuvers to avoid a collision on orbit 121 times last year, including three involving the International Space Station. We continue to average 23 collision warning notifications per day.

Those figures are daunting enough without the fact that we believe there are another 500,000 objects in space that are too small for us to track. The challenge will only grow more difficult as space congestion increases. There were 229 new payloads launched last year. Of those, 158 were nano or microsats—defined as weighing between 1 and 100 kg. The latest space revolves around the most common of these small satellites—the CubeSat. A CubeSat is structured around a 10cm x 10cm x 10cm form factor, with deployed weights ranging from 1kg – 20 kg. CubeSat technology represents awesome potential, affordable access to space, coupled with significant safety of flight challenges. Unlike a normal space launch that is announced to the global space community so we can track them from the ground, CubeSats are typically deployed once they are already on orbit. In fact, 28 CubeSats were deployed from the U.S. ORS-3 mission in November 2013, and the International Space Station has deployed 48 CubeSats. In order for us to track these satellites in a timely manner, we need a substantial amount of coordination and cooperation with the owners and operators of those satellites. In addition to being small and hard to track, their numbers are on the rise, and once launched many of them will linger far beyond their useful lifetimes. There were 92 nano/microsats launched in 2013, 158 nano/microsats launched in 2014, and a predicted 2,000 – 2,750 nano/microsats launched within the next 5 years. In addition to their rapidly increasing numbers, many objects placed into orbit will linger there for many dozens of years--far beyond their useful lifetimes.

This is good for the growth of our domestic space enterprise, but causes concerns for future safety of flight. For example, Vanguard-1, first launched in 1958, is still on orbit 57 years later.

To mitigate these challenges, we are taking a multi-pronged approach to enhancing SSA. We are fielding new, more-capable SSA sensors, implementing a new SSA Sharing Strategy, and entering into two-way sharing partnerships.

New SSA capabilities provided by the Services such as, the Geosynchronous SSA Program, the Space Fence, and the Space Surveillance Telescope will fill critical shortfall in the SSA mission with increased tracking and characterization of objects in space. These successes represent initial steps toward the goal of leveraging existing and planned SSA capabilities of Allies and space partners.

A critical enabler is the standup of our Space Event Joint Fusion and Exploitation Cell (SE-JEFC) in 2014. The SE-JEFC combines Space operators and intelligence professionals from across the Intelligence Community (IC) into a single team with appropriate clearances and accesses to improve indications and warnings in the Space domain and help us answer the most challenging questions we face today. The SE-JEFC effectively links our operational challenges with the full capabilities of the IC, providing a deeper understanding of the Space domain and aiding in our ability to understand intent and operational capabilities of others.

Working closely with United States Strategic Command (USSTRATCOM), we are in the process of implementing a new tiered SSA Sharing Strategy. The tenets of this strategy are to share more information in a timelier manner with the broadest range of partners. We aim to promote an interactive, exchange-based relationship with satellite owners and operators where all parties gain. This open exchange of information also supports U.S. and allied efforts to detect,

identify, and attribute actions in space that are contrary to responsible use and the long-term sustainability of the space environment.

There are SSA sharing agreements with 46 commercial firms, eight nations and two inter-governmental organizations. Over the last year, USSTRATCOM, with interagency coordination, finalized five commercial and six international agreements. Five additional commercial/intergovernmental and five more national agreements are in work. The desired end state is the development of routine operational partnerships, creating a true data sharing environment that extends to the robust inclusion of international data. SSA Sharing Agreements are laying the foundation for increased international cooperation and are aided by efforts to integrate partner nation sensors into the Space Surveillance Network (SSN) such as the Canadian Sapphire satellite. Work is also being done to incorporate data from an Australian Electro Optic Systems (EOS) satellite laser ranging facility.

Combined space operations are USSTRATCOM's response to U.S. National Security Policy (NSP) and the National Security Space Strategy (NSSS) direction to establish an operational working relationship in the space domain with Allied and like-minded nations. This multinational military effort will strengthen deterrence, improve mission assurance, and enhance resilience. To best protect vital space-based capabilities, we need to operate in space as we do in other domains: with our closest partners and allies.

Because the commercial space industry has become so important to National Security Space missions, we are also working to better integrate commercial space into JSpOC operations to explore mission sharing, enhance commercial support to DoD flexibility and resiliency, and to better leverage commercial capabilities in our protect and defend mission. Through our routine Commercial Operators talks, we have initiated the initial steps of a 6 month pilot

program to implement a commercial presence in the JSpOC in 2015. I look forward to highlighting the results of this pilot to the Subcommittee in the future.

SUPPORT TO NATIONAL USERS AND JOINT AND COALITION OPERATIONS

With the knowledge provided by SSA, JFCC SPACE is able to provide necessary support to national users and joint and coalition forces. The space systems and capabilities provided by the Services are vital to USSTRATCOM's space operations mission.

Positioning, Navigation and Timing (PNT)

Positioning, Navigation and Timing provided by the Global Positioning System (GPS) is widely recognized by military, civil, and commercial users, and is highly integrated into the Joint Force. The dependence of joint warfighting on GPS services and the asymmetric advantage they provide to our way of warfare means that we must protect and defend this vital capability or face the reality of conducting our operations under very different circumstances.

The reliability of our GPS constellation continues to improve as the Air Force systematically replaces aging satellites with more capable satellites and upgrades their supporting architecture. These improvements will reduce the vulnerability of the PNT mission by making the GPS signal more robust/resilient, boosting the power and reliability to users, and providing near real-time command and control to enable space operators to take quick action in the face of growing threats. We routinely provided enhanced GPS support to combat forces this past year and advanced warfighting TTPs for Geographic Combatant Commanders.

Missile Warning

JFCC SPACE is responsible for providing robust, reliable, global missile warning for the U.S. and our allies. While spaced-based missile launch detection is a key element of the mission, ground-based radars are the mainstay of our homeland protection capability. Most of these systems have been operating 24 hours a day, 365 days a year since the early days of the Cold War. I'm proud to say that 50% of our strategically-placed phased array radars have been upgraded to provide improved detection capabilities and enable autonomous missile defense.

In addition to maintaining ground based warning, the men and women of JFCC SPACE continue to maximize the use of our national Overhead Persistent Infrared (OPIR) missile warning capability, the space-based element of our missile warning architecture. In 2014 alone, 9,648 infrared events and 588 missile warning reports were generated and distributed to national leaders and the combatant commands. In addition to protecting the homeland, our OPIR assets provide near-real time support to joint forces in Iraq, Afghanistan, and more recently, Syria. We have only begun to fully understand and exploit the ground-breaking capabilities provided by these new systems and must continue explore innovative ways to use them.

Military Satellite Communications

JFCC SPACE continues to provide the Joint Force with protected, wideband, and narrowband satellite communications. Information technologies have revolutionized our capability to operate globally. Terrestrial wired, wireless, and cellular networks are connecting the world, but they do not meet the need for a flexible, responsive network to communicate globally, securely, and reliably in all locations and under all conditions. From combat operations

to humanitarian assistance, we use military satellite communications every day when no other form of communications is capable or available.

Our protected communication capability is the reliable, survivable command and control mechanism for decision makers regardless of the circumstance, even in a contested and potentially nuclear environment. Emerging mission sets and advanced technologies have additional communications requirements that present unique challenges, requiring high bandwidth and theater-centric communications capabilities. Highly mobile satellite communications capability provides ground, sea, air, and Special Operations Forces additional flexibility in a dynamic operational environment. We operate a complementary suite of satellite communications capabilities with the enhanced capabilities of Advanced Extremely High Frequency (AEHF), Wideband Global SATCOM (WGS), and the Mobile User Objective System (MUOS) narrowband satellites, along with commercial satellite communications to provide the Joint Force vital command and control not only for wartime operations, but peacetime missions as well.

PROTECT AND DEFEND AND PREPARE FOR CONTINGENCY OPERATIONS

The importance of JFCC SPACE-provided capabilities highlights our need to protect and defend the Space domain. Space Control requires knowledge derived from SSA to warn and assess threats that pose a risk to US and coalition space operations. Space Control may also include threat avoidance, safeguarding of our on-orbit assets, and the ability to mitigate electromagnetic interference. We must also impact our adversary's perception and subsequent decision calculation to influence behaviors. To effectively deter others from threatening our space capabilities, we must understand their capabilities and their intent and make it clear that no

adversary will gain the advantage they seek by attacking our space assets. We must apply all instruments of power and elements of deterrence. The more like-minded nations can partner and collaborate in space, the more bad actors will be discouraged. It is in the collective best interest for all space-faring nations to encourage the peaceful and responsible use of space. No Nation should desire to extend a war into the space domain. Any conflict in space would be impossible to limit to just the participants. Not only would it exacerbate the debris problem, it would be detrimental for mankind. All space faring nations would be affected, and the implications would go far beyond the assets in space—they would impact the global economy.

Our current space systems and set of TTPs were not developed to operate in today's contested and congested environment. Nonetheless, these systems will be operating for years to come under just such constraints. In order to effectively operate using the current capabilities, JFCC SPACE is leading the effort in the development of options and TTPs through experimentation and exercises that provide the highest possible level of protection against evolving threats. Further, we are developing or modifying existing practices that accept and normalize the reality of contested operations and address risks to space assets by accepting risk of action at appropriate levels and in a practical time-frame to counter threats, ensure mission success, and meet national security requirements.

In 2014, we implemented two key new concepts in the JSpOC. First, we established the first ever 24/7 crew position dedicated to identifying and responding to potential threats in Space. Prior to the establishment of this position, our primary focus was simply on cataloging space objects and providing warnings about close approaches between objects in space (termed conjunctions) for flight safety or reentries of objects into the Earth's atmosphere. This new position is evolving our mission focus towards search, identification of intent, and

implementation of response options to mitigate threat. It is proving to be a real game changer for us, and while we are in our infancy with respect to the full potential of this capability, we are learning rapidly through a culture of experimentation.

Second, we recently introduced a Battle Management Concept that enables us to harness the collective expertise of our nation in order to help us respond to the tough challenges in today's space domain. These space experts reside in DoD, IC, academia, laboratories, and industry. They are my "on-call" tactics team. We pull this team together to quickly triage challenges in the domain, fully develop domain awareness, assess potential courses of action, and guide recommendations to mitigate or defeat threats. Support for this concept has been exceptional across the broader Space enterprise, and we are routinely exercising the capability better protect and defend the Space domain.

There is no silver bullet to address the space protection challenges. Better intelligence, improved C2 systems, increased capacity, balanced policies, robust coalition sharing agreements, and improved SSA sensors are critical needs that will allow the U.S. to face challenges of space threats. All of these areas need to be addressed to ensure responsible use of space and our national security. JFCC SPACE, with USSTRATCOM and other Combatant Commands, Allies, and partners will plan and prepare for contingencies that allow the U.S. to maintain the strategic advantage.

It is also worthy to note that an attack in space does not necessarily require that we must respond in space. Any response in self-defense to such an attack may involve actions across multi-domains including air, sea, land or cyberspace or the other elements of national power.

ENHANCE OUR ABILITY TO COMMAND AND CONTROL

Like all commanders responsible for operations in a domain, I must have the ability to command and control my forces. I don't have what I need today, but it is coming in the JSpOC Mission System (JMS). As I mentioned in my statement last year, JMS is currently in the process of replacing our legacy command and control system called Space Defense Operations Center (SPADOC), which was designed in the 1980s and fielded in the 1990s. JMS is designed as a decision aid supporting the full range of JFCC SPACE operations. Increment 1 of JMS is on the JSpOC operations floor providing us great utility today. This year we operationally accepted the first deliverable of Increment 2. Once Increment 2 is fully delivered and operationally accepted, we will transition from SPADOC to the high speed computing capability provided by JMS. I expect this to occur in calendar year 2017. JMS will provide an architecture that aggregates and rapidly processes data into actionable information for our operators and planners, giving them the understanding and ability to develop courses of action (COAs) and provide support to senior leader decision-makers.

JSpOC TRANSFORMATION

The dynamic change in the Space domain requires an evolutionary change in our operations within my primary C2 node, the JSpOC. With the strong support of USSTRATCOM and the Services, we've recently developed and have begun executing a JSpOC Transformation Plan to better position the JSpOC to meet the growing demands facing us today and in the future. A living plan, it outlines a series of tasks across the doctrine, organization, training, materiel, leadership and education, personnel, facilities and policy areas necessary to meet the vision of a JSpOC that enjoys superior domain awareness, full battle management command and control capabilities, and fully leverages the Nation's talent across the Space enterprise. I look forward to providing the Subcommittee an update to our progress in the future.

CONCLUSION

Space professionals of all types—military, commercial, academic, and foreign—share the view that the space environment has changed. We are living that change day-to-day at JFCC SPACE. The domain is clearly more contested, more congested and more competitive, and the change is accelerating. However, with the hard working, smart, innovative professionals like the Soldiers, Sailors, Airmen, Marines and civilians assigned to JFCC SPACE, I believe our national security is in great hands. Thank you for the opportunity to address this Subcommittee, and thank you in advance for the support you continue to provide to the JFCC SPACE team.