STATEMENT OF

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ON

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Introduction

Chairman Rogers, Ranking Member Cooper, and Members of the Subcommittee, I am pleased to be able to come before you again today to talk about the Department of Defense's national security space program and, in concert with Ms. Sapp, General Hyten, Mr. Cardillo, Mr. Weatherington, and Lt Gen Raymond, report to you on the shared progress we have all made to extend confidence in our space forces and respond to the growing threats in that domain. My testimony today is very much a continuation of the dialogue with this committee that began when I first testified here two years ago, and I am pleased to report that we have made substantial progress since then.

While much has changed in those two years, there have been two clear constants. First, space remains as vital today to our national security as ever. It continues to underpin DoD capabilities worldwide at every level of engagement, from humanitarian assistance to all levels of combat and, as Admiral Haney, Commander of the United States Strategic Command, testified before this committee last month, is a major cornerstone of our deterrent strategy. Second, threats to space systems continue to grow. These include both non-hostile threats such as the continued increase in space congestion, spectrum interference, and debris, but more concerning, the hostile threats posed by adversaries who would seek to eliminate the advantage space confers to our forces. Those threats continue to mature and as this committee knows, and as the Director of National Intelligence recently testified, our adversaries are not sitting still. As you will see over the course of this hearing, neither are we.

Let me also highlight that the threats we see IN space are not solely focused ON space. Just as there are those pursuing counterspace capabilities that they might use to take space away from us, we see many of those same actors improving their own capabilities to use space for their own purposes—to enable their operations, broaden their reach, support anti-access strategies, and engage U.S. forces. So, even as we seek to secure our own space capabilities, we must also be prepared to protect targeted U.S. interests.

Finally, I want to underscore that even as the United States clearly must focus on the national security dimension of space, we remain fully committed to assuring the peaceful uses of space for all nations. Space is a global good that has been a driver for economic growth, environmental monitoring, verification of treaties, and an enabler for the everyday lives of citizens at home and around the world. I will discuss today several initiatives we are working within the national security space arena that extend that commitment, seeking to drive down the threat to all space activities, deter conflict, and enhance the economic benefit we all derive.

Space and Deterrence

Earlier this year, Admiral Haney testified regarding deterrence calculus and the fundamental principles of costs and benefits. For decades we have understood how this calculus applies to nuclear deterrence and its tenets have served us well. Space was always and remains a part of that deterrence equation providing strategic intelligence, missile warning, nuclear command and control, and nuclear detonation detection.

Just as critical, although far more nuanced, is space's role in modern conventional deterrence. As the phrase implies, conventional deterrence is the ability of U.S. conventional strength to deter adversary conventional aggression. And here's where it gets complicated. While space's role in the nuclear environment is to enable nuclear deterrence, on the conventional side, space underwrites it. Our modern ability to project power rapidly and precisely—an ability made possible by the use of space—persuades our potential adversaries that the cost to them of conventional aggression the United States will outweigh any benefits. That is, of course, unless they can take space away from us; which is what the increasingly contested nature of space is all about. If an adversary can take space away, then the potency of U.S. power projection becomes uncertain, and the likelihood of aggression arising amidst that uncertainty increases.

This Administration intends to make sure that outcome does not happen. To that end, the President's budget includes substantial investment to make certain that U.S. space forces are as assured as the terrestrial forces they support. These investments, as well as non-material changes

that we are also undertaking, will make clear to all that attacks in space or against our space infrastructure would be both strategically ill-advised and militarily ineffective. The Department of Defense has labeled this a strategy of Assured Space Operations and the key concept that underpins its effectiveness is that of Space Mission Assurance.

Space Mission Assurance

In previous hearings there has been much discussion of such notions as resilience, disaggregation, reconstitution, and protection—all important concepts to be sure. But the more fundamental concept, the more foundational element of our strategy of Assured Space Operations is that of Space Mission Assurance. Space Mission Assurance is the means of securing space-based services so that our forces can count on those services being available to them whenever and wherever they are required. It is the notion that if we spend precious resources creating a space capability to serve national security goals, then we need to spend some of those resources to secure the capability and guarantee it during conflict. It is the notion that as conflict extends into space, we apply the same kind of strategies, tactics, and technologies we've applied in land, sea, and air to assure that space forces are as dependable as the forces which depend upon them. To be absolutely clear, this is not just a lofty goal; it is our unshakable intent; and it can be done.

The President's 2016 budget provides a major down-payment on that goal and, as we move forward, we will carefully gauge if more is needed to achieve it fully and to sustain mission assurance in space just as we do on land, at sea, and in the air. This does not mean we need to radically increase the amount we spend on space. But it does mean we need to reexamine how we spend the dollars we have; to understand where changes to our architectures are needed to make them more resilient; to assess where we'll need to provide new capabilities to defend space assets; to determine where we might need to plan for wartime reconstitution; and perhaps most importantly, to be resourceful enough to realize where critical new investments might be offset by taking advantage of robust capabilities provided by burgeoning commercial, entrepreneurial, and international space markets here at home and amongst our allies. In the end it all comes

down to the simple thought that to deter conflict, we must be prepared for it—and that preparedness must extend to our space systems as well.

Strategic Portfolio Review

These decisions regarding our space mission assurance and preparedness were not made in a vacuum. Recognizing that in today's world a terrestrial conflict could extend to space, the Administration initiated an interagency review of space security leading the Department to convene a Strategic Portfolio Review (SPR) of space to determine if our strategy for space was right and if our space forces and space investments reflected that strategy. In some cases, both were clearly on the mark. But where that was not the case, we made changes. The budget you have in front of you reflects those changes.

As we conducted the review, we came upon a new realization—one that required us to rethink how we approached the context of the missions we execute from space. The review highlighted that whereas previously DoD and the Intelligence Community have focused primarily on providing capability from space—a difficult task on its own—now we must focus on the equally demanding and more complex task of assuring and defending our space capabilities against aggressive and comprehensive counterspace programs of others. We built this year's budget with these needs in mind.

Now we know we cannot recast everything we do in space in one budget submission. But where changes were clearly warranted, and where solutions were determined to be ready, we began the long process to execute the change. On the DoD side, we either redirected or increased our planned budget on space security-related activities by about $5 billion over the next five fiscal years with changes spread throughout both our unclassified and classified budgets.

Importantly, these changes are not simply an increase in programmatic content. There is that to be sure. But just as important is the relationship amongst those programs, how they relate to our strategy, and how we believe they begin to address the specific findings of our portfolio review.

Today, I would like to draw a top-level picture of two of those findings and some of the specific investments we have made to address them.

Findings:

1) **Posturing for Defense**

First, the review revealed that today the U.S. is not adequately prepared for a conflict, which might extend to space. That is a statement of posture more than it is of capability. Throughout the history of National Security Space we focused on making sure that the space services we provide to U.S. and allied forces were the best they could be. In fact, we designed the systems and operated them with that primary goal in mind. But our review affirmed that in the case of a conflict that could threaten space assets that way of thinking must change. It is one thing to be prepared to deal with an on-orbit engineering issue or even a random outage caused by a piece of debris; it is quite another to have to respond to problems in space caused by a determined, thinking, and dynamically agile adversary.

We recognized that the most important near term action we could take to respond to that need was to invest in our people, our training, our modelling, our doctrine, and our tactics. To that end, we have proposed the standup of a new Joint Space Doctrine and Tactics Forum led by the Commander of the United States Strategic Command. The Forum's purpose is to help our forces understand and practice the strategy, doctrine, and tactics of a conflict that extends to space by investing in modeling and simulation, training, and operational exercises similar to what we do in other domains. In many ways, you can view the Joint Space Doctrine and Tactics Forum as the operational image of the Space Security and Defense Program (SSDP), which we established several years ago. Whereas SSDP focuses on the analytical and technical side of space security, the Doctrine and Tactics Forum will focus on developing and exercising the operational side of space security. This is a critically important step.

To train properly, you need many things, one of which is space assets to exercise with. To provide those assets, we funded the continuation of older, already on orbit, legacy space vehicles.

In the past all our space systems were devoted 24 by 7 to actual operations and none could be freed for use in an exercise. By extending the life of older satellites, we begin to build a force structure that will truly allow us to exercise operations in space with actual working systems. And, as an added benefit, these assets help to proliferate our capabilities in case of attack, significantly increasing our overall resilience.

The change in posture also demanded a change in our command and control functions. As this committee knows, we have been hard at work for several years building our next generation Command and Control (C2) capability, the Joint Space Operations Center Mission System, sometimes referred to as the JSpOC Mission System or JMS. While the JSpOC Mission System is on track for its initial operational capability very soon that step only provides the most basic building block for a true warfighting C2 capability. Our budget submission accelerates the next JMS system increment which, together with the Doctrine and Tactics Forum and space situational awareness efforts discussed below, will allow us to better observe, assess, and react to future space threats.

2) Assuring Space Capabilities

Another major finding of the SPR was that we can clearly and credibly increase the assurance of space assets. For many years, people who follow the field of space security have urged this step, but many doubted if it was possible. The SPR concluded that it is possible and that the work needs to start now.

As discussed above, the extension of on-orbit legacy systems is one of the many ways the Department is investing in Space Mission Assurance. It costs us pennies on the dollar to extend the life of on-orbit systems. Such systems may lack the full capability they had when they were new, or be of lesser capability than a more modern system. However, in a world where satellites could become targets, that is cheap insurance which not only adds to the overall target set an adversary must face during conflict, but provides added capacity during peace, and affords the assets to support experience and innovation in training and exercise—a three-for-one deal. The

Department is applying that logic across a range of systems in this budget submission and then establishing criteria for how we make decisions asset-by-asset in the future.

The Department of Defense is also increasing, accelerating, and broadening our investment in anti-jam and anti-spoof technologies, especially for communications, navigation, and timing. Over the last several years the Air Force has been wisely using its space modernization investment funds to develop a new, more robust, protected waveform for wideband communications called the protected tactical waveform, or PTW. That work has exceeded expectations to the extent that we are now ready to implement it in fielded communication systems. The Navy has invested in including this new waveform in their next generation Satellite Communication (SatCom) modems, and along with earlier anti-jam investments we've made in the Wideband Global Satellite (WGS) Communications Systems, we are significantly enhancing our ability to protect what used to be unprotected SatCom. As an added benefit, this new waveform works over commercial satellites as well, so we can provide some level of enhanced protection to our forces regardless of whether they are using a government-owned WGS satellite, or a commercially owned and operated system. That flexibility and added protection will pay big dividends as we work to improve integration of commercial capabilities in our communications architecture. We're extending similar investments into the Navy's Mobile User Objective System (MUOS) for Ultra-High Frequency (UHF) communications.

On the Global Positioning System (GPS) front we significantly accelerated our development of advanced military code (M-code) user equipment, which provides both far greater jam resistance, and greater security against spoofing, which is a growing trend around the world. That acceleration means our forces will be able to integrate the best GPS user equipment years earlier than previously planned, and enjoy the benefits of enhanced on-orbit M-code power, advanced encryption, and better information assurance.

Understanding what's happening in space is fundamental to assuring it, and the DoD budget includes a substantially increased commitment to that critical area. Along with the Space Fence project, which entered into full scale development last year, we accelerated the replacement for our Space-Based Space Surveillance (SBSS) System follow-on, which will complement the

capabilities of our already in-orbit Geosynchronous Space Situational Awareness Program (GSSAP), as well as the cooperative U.S.-Australian program to operate the Defense Advanced Research Project Agency-developed Space Surveillance Telescope (SST) in Australia.

With Space Fence focused on improving our ability to accurately sense and characterize what is happening in low earth orbit, and SBSS, GSSAP, and SST focused on building the same picture for high altitude geosynchronous orbit, we have tremendously expanded the reach, responsiveness, and sensitivity of our entire space surveillance net. Married to JMS, these efforts will make it far easier for us to find things we couldn't previously see, characterize what we find, assess the threat those objects might pose, and react swiftly when we see things change. These systems provide the tools to move from a function focused on simply cataloging and tracking space objects to one focused on protecting our space systems from things that might do them harm.

Beyond Just Spending

Certainly the increased investments I've outlined in space security will make an impact on the ability of our space forces to accomplish their missions even in the face of adversary actions. Additionally, while the United States may be the world's preeminent space power, we are not in this alone—many of our allies and an ever expanding array of U.S. or allied commercial and entrepreneurial firms are in space with us. The SPR highlighted that the strategic pursuit of partnerships with allied nations and commercial partners, can simultaneously reduce the need for direct U.S. government investment, increase the complexity of the target set our adversaries must engage, and diversify the means for us to support space missions. It is one thing to have to deny the U.S. the use of a few government owned imagery systems. It is quite another to take on tens or even hundreds of allied and U.S. commercial remote sensing systems all at the same time.

The same goes for satellite communications, navigation and timing, satellite command and control, space situational awareness, and the hundreds of ground stations that serve them. Our intent is to leverage those capabilities to the maximum extent practical, using them to increase resilience, provide U.S. and allied forces access to ever more modern and ubiquitous space

services, create a political and industrial coalition that presents a shared focus on space security and sustainability, and help us further concentrate U.S government spending for those areas where there is no allied or commercial interest. The added benefit of this approach is that we not only increase capability and space mission assurance, but also the vitality of the U.S. space industrial base.

For example, we have had great success in collaborating with our allies around the world in both helping them understand the shared threats we face and in going about planning for how we deal with them. One of the premier areas of success has been with development of a memorandum of understanding (MOU) to create a Combined Space Operations (CSpO) initiative. In September 2014 DoD, along with our partners from Australia, Canada and the UK, signed that MOU creating a true coalition approach to space operations. Centered on the Joint Forces Combatant Commander (JFCC) for Space, the CSpO initiative represents the first step in what we plan to be a long journey toward truly combined space operations.

In today's world it is almost universally true that we don't go into crisis alone. We operate in the air, in the sea, and on land in coalition with our close and trusted allies. There is no reason why this should not be mirrored in space. CSpO helps us do that. It provides the venue to coordinate our space activities, share insights and knowledge of the space environment, and to plan and exercise our space forces together. Initial progress has centered on sharing operational experience and information in space situational awareness (SSA). Additionally, Australia, Canada, and the United Kingdom have each established a national space operations center, and through CSpO these centers and the JSpOC are routinely planning, coordinating, and exchanging space awareness information.

CSpO is an announcement to the world that if someone wants to try to deny the U.S. use of space services, they must take on more than just the U.S. And while today CSpO centers on just its initial four members, we know we must expand this initiative to include other like-minded allies with important space operations, capabilities, and interests.

The CSpO multilateral forum is backed by an extensive array of bilateral arrangements and initiatives. Last year I reported success in negotiating an agreement with Australia to host the SST. Over the past year the Air Force has integrated the Canadian Sapphire satellite, a close cousin to our own SBSS, into our shared SSA system. Also, DoD has now signed agreements with a total of 56 countries, multi-lateral organizations, consortia, and commercial partners to share more fully SSA information. Concurrently, we are working with other entrepreneurial elements of industry to support their push to determine if there's a business case to be made for a commercial SSA enterprise. If commercial firms can make the SSA business work, then DoD can benefit by being able to relieve our uniformed operators from focusing on routine peacetime SSA operations, such as tracking debris, and turning their gaze more squarely to the warfighting aspects of SSA. Plus, since the commercial world tends to be far more innovative than the Department of Defense, we can share in the improved processes and technologies that these companies will develop along the way. We are making sure that U.S policy helps to encourage these entrepreneurial activities, while remaining duly mindful of the national security concerns that could arise.

Beyond SSA, a number of other collaborative initiatives are underway. The Congress is keenly aware that several U.S. allies have previously joined us in ownership or outright purchase of several SatCom systems, specifically, combined investment in our Advanced Extremely High Frequency (AEHF) system, and in WGS. In fact, two of the 10 planned WGS satellites are internationally owned. With the launch of MUOS, DoD and Navy leadership has been encouraging and responding to significant interest in international cooperation on that UHF system. As it was in WGS, providing access to MUOS technology for our friends and allies is good for our forces and good for American industry.

These examples reflect growing acceptance across the Department of Defense that we can simultaneously support our forces' needs and our industrial needs through robust partnerships with our allies. Our national security interests drive us toward collaborative space business in ways not previously seen or well understood. Whether it's collaboration on the next new SSA system, shared tasking and exploitation of imagery products, access to advanced U.S. military satellite communications systems, cooperative development of multi-global navigation space

system user equipment, industrial sales of state-of-the-art U.S. remote sensing technology, or creating the technologies and rule sets to allow U.S. forces the use of international navigation signals of the multiple allied analogs to GPS, DoD is changing its thinking and its approach.

Our approach recognizes that we are changing from a time when we planned to be the only one in the space fight, bringing the lion's share of space systems, to one where we share that burden with our allies and present a unified message to adversaries that if you want to take on the United States in space, you will have to take on our partners as well. These initiatives significantly strengthen combined space mission assurance and reinforce our strategy of conventional space deterrence. It's a new approach for those of us in space; but one that has served us well in every other domain of warfare on the earth below and we believe will do so equally well in the heavens above.

Space Security and Commercial Engagement

In addition to cooperation with allies, collaboration with commercial partners can similarly help safeguard the space security of U.S. space architectures and, by extension, improve U.S. national security. Partnering with the growing domestic commercial space industry also has the added benefit of strengthening the U.S. industrial base and minimizing costs for the Department. Commercial remote sensing and commercial SATCOM offer two prime examples.

Commercial remote sensing policy is particularly representative of the challenges we face in expanding commercial engagement. U.S. commercial remote sensing policy is a careful balancing act of three priorities: maximizing global leadership by the U.S. commercial sector; minimizing national security vulnerabilities; and maximizing national security benefits. Last year, the administration approved the sale of higher resolution commercial imagery. That decision, which had full DoD support, was a result of calculated analysis of both the commercial and national security implications of such a move. On February 21st of this year, we started to see the results of that decision. On that date, Digital Globe began commercial sale of 30 centimeter resolution imagery. Only time will tell if the business case for this higher resolution pays off. If it does, we'll see an expansion in this growing market, and U.S. firms will be well-

positioned to compete. That would mean greater business for U.S. companies and reduced costs for U.S. taxpayers on the imagery the government purchases.

Recognizing that the world is changing; that higher resolution is but one of a whole host of advanced remote sensing products that are rapidly expanding into real-time video, persistent access, multi-and hyper-spectral sensing, and all the other great innovations U.S. entrepreneurs are pursuing, the administration decided to pursue a different path than simple worldwide resolution restrictions. Specifically, we need to employ the means to protect national security information that Congress established under the Land Remote Sensing Act when the United States first entered the commercial imagery world several decades ago. It's the path we call modified operation or more euphemistically known as shutter control.

Modified operations refers to the regulatory ability of the Secretary of Commerce to require commercial imagery licensees to take necessary steps to not take or not release imagery that the Secretary of Defense or Secretary of State determines would be harmful to U.S. national security or foreign policy interests. It provides the ability to focus a limitation on the particular times and locations of concern, rather than to apply limitations in a blanket fashion. The requirement for modified operations decisions to require cabinet-level approval also ensures that the tool is not used lightly and that it does not become a burden on U.S. industry. At the same time, unlike resolution restrictions, modified operations offers an important tool for mitigating the impacts of new remote sensing capabilities like real-time video or persistent imaging, as well as capabilities that have not yet emerged. The Administration exercised this system last year, and we plan to do so regularly.

Commercial SatCom is a second important commercial growth area. As this committee is aware, commercial SatCom has been a backbone of U.S. national security operations for decades, with an unprecedented growth in that regard over the last 15 years. But our means to access this robust market have not evolved as quickly as the technology and markets themselves. Congress has told DoD to change that; we want to change that; and we're taking steps to do so.

As a result of the study that the office of the DoD Chief Information Officer and the office of the Under Secretary for Acquisition, Technology and Logistics [OUSD (AT&L)] completed in spring 2014, the Secretary of Defense directed both the Defense Information Systems Agency (DISA) and the Air Force to assess a series of pathfinders to determine better ways to access this growing and vibrantly evolving market. Both agencies did that and have laid out a disciplined approach to walking towards that goal. The Air Force awarded its first pathfinder activity last year, purchasing an on-orbit transponder for U.S. Africa Command at substantial savings over the normal lease costs. The DoD owns that transponder for the next five years, even while it's being operated for us by the commercial entity that first launched it. It's an exciting development and only the first small step down this road. DISA is preparing its first pathfinder this year.

Through a series of five such activities each, we hope to better understand all the variety of ways that the DoD can best leverage this incredible resource, driving down the cost of access, increasing the agility and flexibility of the service, providing tighter operational integration between commercial and military SatCom, and in the end, eliminating the distinction for our forces of how their needs are being met. At the same time, we will increase the assuredness that those needs will be met, whether in peace or in war. Again, this is all part of the same mission assurance theme at the heart if our strategy: strengthening resilience, increasing deterrence, creating warfighting capacity, and reducing cost. By wisely exploiting the commercial market, by marrying routine DoD needs with commercially available products, and by implementing new strategies, business models and operational approaches, we can bring down our cost while enhancing our space mission assurance.

Conclusion

In sum, U.S. national security is inextricably linked to our space-based systems and services. That is a statement of not just our defense posture but our economic posture as well. It is a posture that bears substantial benefit and savings for DoD both in terms of dollars and, more importantly, in the safety and effectiveness of our land, sea and air forces. It is a benefit we refuse to surrender.

Our approach for deterrence—and if deterrence fails to guarantee we can meet our national security objectives—is to assure space services are available to our forces in peace as well as in combat. Assured Space Operations is our strategic approach and the Department's Space Strategic Portfolio Review examined that strategy and concluded it was credible and necessary. The President's budget begins the process of programming the resources required to begin its execution.

The results of those investments will take time, well beyond the timeframe of one budget submission. Just like security in the land, sea, and air domains, ensuring security in the space domain will be an enduring requirement, not a one-time fix. We're doing this not just through investment, but by changing our policies for how we access space both through our alliances and through our commercial sector. It's new; it's different; and it will take us time to get it right. But in the end, we will.

While it may have been true sometime in the past that space was viewed as a sanctuary, that is no longer the case. We have potential adversaries who understand our reliance on space and want to take it away from us—we won't let them. The U.S. leads the world in space on the commercial side, on the civil side, and on the national security side. We will not cede that leadership. Together with our allies and our commercial partners, we will continue to defend the right of all nations to access space for peaceful purposes. But where that access is threatened; where others would seek to remove the national security or economic benefits we derive from that access, we will defend our use just as we have in every other domain.

Closing

Thank you for the opportunity to provide these updates on the Department's space policies and programs. My colleagues and I look forward to working closely with Congress on implementing this new approach to space and I stand ready to answer your questions.