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ON

NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2016

AND

OVERSIGHT OF PREVIOUSLY AUTHORIZED PROGRAMS

BEFORE THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON STRATEGIC FORCES HEARING

ON

FISCAL YEAR 2016 BUDGET REQUEST FOR NATIONAL SECURITY SPACE

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FISCAL YEAR 2016 BUDGET REQUEST FOR NATIONAL SECURITY SPACE

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON STRATEGIC FORCES,
Washington, DC, Wednesday, March 25, 2015.

The subcommittee met, pursuant to call, at 4:58 p.m., in room 2212, Rayburn House Office Building, Hon. Mike Rogers (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. MIKE ROGERS, A REPRESENTATIVE FROM ALABAMA, CHAIRMAN, SUBCOMMITTEE ON STRATEGIC FORCES

Mr. ROGERS. Good afternoon. I want to welcome everyone to the Strategic Forces Subcommittee's hearing on the fiscal year 2016 national security space activities of the Department of Defense.

We are honored to have a panel of expert witnesses who lead multiple areas of national security space enterprise. They are General John Hyten, Commander, Air Force Space Command; Mr. Douglas Loverro, Deputy Assistant Secretary of Defense for Space Policy; Mr. Dyke Weatherington, Acting Deputy Assistant Secretary of Defense for Space, Strategic, and Intelligence Systems; Lieutenant General John "Jay" Raymond, Commander, Joint Functional Component Command for Space; Mr. Robert Cardillo, Director of National Geospatial-Intelligence Agency [NGA]. And we are awaiting Ms. Betty Sapp, Director of the National Reconnaissance Office. She still hasn't been able to—we haven't been able to reach her since we moved the hearing back from 6 o'clock, but we have her opening statement.

This is a big panel. We will work to give every member a chance to ask questions in this open hearing, at which point, we will adjourn to a closed session to continue our oversight in an appropriately secure fashion.

I would like to take note that this is the first time we are having the Director of NGA testify at the Strategic Forces annual space posture hearing. This is important both literally and symbolically.

From a literal point of view, NGA has a critical role within the national security space community and, as a combat support agency, NGA provides tremendous support to our warfighters. From a symbolic point of view, the six of you on this panel, along with the other armed services and members of the space community, need to be working extremely closely together.

While each of you has your own missions with different roles and responsibilities, it is essential that national security space is integrated across the Department of Defense, both unclassified and

classified programs. In the end, all of your jobs are to support and defend our country.

Regarding the posture of national security space, we currently face many serious challenges. On January 28 of this fiscal year, the Armed Services Committee held a hearing with Mr. Frank Kendall, the Under Secretary of Defense for Acquisition, Technology, and Logistics, as a witness.

Chairman Mac Thornberry opened up the hearing with a question regarding the U.S. technological superiority and asked Mr. Kendall to provide his greatest concern. Mr. Kendall responded, "We are at risk, and this situation is getting worse."

He further went on to state, "The U.S. is being challenged at an unprecedented rate. It is not just missiles. It is other things, such as electronic warfare capabilities, anti-satellite capabilities, and a spectrum of things to defeat our space system. It is a number of things which I think are being developed very consciously to defeat the American way of projecting power, and we need to respond to that."

Mr. Kendall could not talk specifics in an open session. But when the most senior acquisition and technology leader of the Department of Defense [DOD] says we are at risk of losing our technological superiority, he must have our attention. We want to understand how you will be addressing that threat.

Aside from the growing foreign threat, we have also heard from our senior DOD and Air Force leaders about their concern about our assured access to space posture going forward. We held a hearing on this last week, and we will have a few more questions on that topic today.

Separately, we have heard risks of not maintaining the appropriate space-based weather-collection capabilities for top Department of Defense requirements. I am concerned we are not taking a strategic long-term view and are headed down a path with significant risk. We will not allow critical capabilities our warfighters rely on to be based out of Moscow or Beijing.

Additionally, we have systems on orbit that we have invested billions of taxpayer dollars in that we are still not fully using because of delays in ground systems and user terminals. We must do better for the taxpayer and the warfighters.

And, lastly, we are all aware of the current budget pressure. This means we need to do business smarter without sacrificing capability. As I have said multiple times in the past, I believe we can save money in wideband satellite communications, as one example. It will take strategic planning, better partnerships with commercial industry, and new contracting approaches.

Regarding the budget request, I support technology development and evolutionary acquisition, but remain concerned with efforts to create new programs, such as in missile warning and protected communications, and will conduct close oversight of such activities. I will need to be convinced that this is the right time to make billions of dollars in investments in new programs when our current programs are working better than expected.

I know the great men and women of the Department of Defense, including military, civilian, and industry partners, will not shy away from these challenges. It will take work, and I believe that

we need to strengthen national security space through capabilities development, organization, management, policy, and funding.

Thank you again for your leadership and for being with us today regarding these important topics. I look forward to your testimony.

[The prepared statement of Mr. Rogers can be found in the Appendix on page 29.]

Mr. ROGERS. I now recognize my friend and colleague from Tennessee, the ranking member, Mr. Cooper, for any opening statement.

Mr. COOPER. Thank you, Mr. Chairman. It is a pleasure to work with you.

And I, too, welcome the distinguished witnesses.

We have a crowd of witnesses to hear from today. So I will forego an opening statement and look forward to the testimony of the witnesses.

Mr. ROGERS. Now you know why I like him so much.

Roll Tide.

General Hyten, you are recognized for your opening statement.

STATEMENT OF GEN JOHN E. HYTEN, USAF, COMMANDER, AIR FORCE SPACE COMMAND

General HYTEN. Thank you, Congressman. And Roll Tide.

Chairman Rogers, Ranking Member Cooper, distinguished members of the subcommittee, it is a pleasure to be here today to represent the 38,000 men and women in the Air Force Space Command and tell our story. It is also a privilege to be here with my distinguished colleagues and friends to discuss some very important issues with you.

Everyone here has been fortunate enough to witness our Nation's evolution in space power. Our combatant and theater commanders have fully realized how fundamental space-based effects have become, but our potential adversaries have been watching and working to challenge these very capabilities.

So to prepare for tomorrow's fight, we have to be ready to respond to any threat. That response starts with command and control. And so we have to assure that our Space Operations Center is prepared to meet the challenges of daily operations and demands of war, and that starts with the Joint Space Operations Center [JSpOC] mission system [JMS] at Vandenberg Air Force Base. This is the key to everything.

Winning tomorrow's war also includes countering adversarial actions, and we are working to increase our overall resiliency by investigating desegregation, hosted payloads, onboard satellite protection, and defensive operations, as well as leveraging commercial capabilities. But we can build resilient architectures all day and, without assured access to space, it means nothing.

With today's national reliance on space capabilities, assured access has gone from important to imperative. It is our highest priority. So, in case you missed it just a couple hours ago, this afternoon we had another successful launch from Cape Canaveral. Delta IV with GPS [Global Positioning System] IIF–9 onboard was successfully launched, and that makes 82 successes in a row for the EELV [Evolved Expendable Launch Vehicle] program and ULA [United Launch Alliance].

But we also support competition in a healthy space launch industrial base and must move as fast as we can towards rocket engines that are built in the United States. So the Air Force and SpaceX are aggressively working together to close all the remaining criteria that we have to meet a June 2015 certification, and we are collaborating with private partners to invest in industry solutions for U.S.-made rocket propulsion systems.

Finally, returning to funding levels as directed by the Budget Control Act of 2011, the Air Force Space Command is going to have a difficult time meeting operational requirements. Compromises will be made. Risks would increase in any scenario. But we know that we have to continue to provide the Nation with necessary capabilities and not lose ground in the space arena.

So, Mr. Chairman, I thank you for your support, and I look forward to working with Congress to provide resilient, capable, and affordable space capabilities for the joint force and the Nation.

Thank you very much, sir.

[The prepared statement of General Hyten can be found in the Appendix on page 31.]

Mr. ROGERS. Thank you, General.

Mr. Loverro, you are recognized for 3 minutes.

STATEMENT OF DOUGLAS L. LOVERRO, DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR SPACE POLICY, DEPARTMENT OF DEFENSE

Mr. LOVERRO. Thank you, Mr. Chairman.

Chairman Rogers, Ranking Member Cooper, members of the subcommittee, I am pleased to appear before you today to discuss the DOD's national security space program and, in concert with my fellow panelists, report to you on the shared progress we have all made to respond to the growing threats in that domain. Those threats continue to mature, and our adversaries are not sitting still. Let me assure you, neither are we.

In order to address these threats, the Department has increased its budget for space security by $5 billion. This substantial increase is intended to make certain that U.S. space forces are as dependable as the terrestrial forces which depend upon them. These investments, as well as other nonmaterial changes, will make clear to all that attacks in space are not only strategically ill-advised, but militarily ineffective.

Notwithstanding our increased focus on the national security dimensions of space, we remain absolutely committed to assuring the peaceful use of space for all. Space is a global good and has been a driver for economic growth, environmental monitoring, verification of treaties, and an enabler for everyday citizens at home and abroad. Several of the initiatives I will discuss today are intended to extend that commitment, deter conflict in space, and enhance the economic benefit we all derive.

But let me be clear. We can no longer view space as a sanctuary. Potential adversaries 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, the civil side, and the national security side. We will not cede that leadership.

Together with allies and 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 would in any other domain.

My written remarks include additional detail. But in the interest of time, I would like to go ahead and thank you for the opportunity to discuss these policies and programs with you today. I look forward to working closely with Congress on these issues, and I stand ready to answer your questions.

Thank you.

[The prepared statement of Mr. Loverro can be found in the Appendix on page 52.]

Mr. ROGERS. Thank you, Mr. Loverro.

And now we will go to Mr. Weatherington for 3 minutes.

STATEMENT OF DYKE WEATHERINGTON, ACTING DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR SPACE, STRATEGIC, AND INTELLIGENCE SYSTEMS, DEPARTMENT OF DEFENSE

Mr. WEATHERINGTON. Thank you, Chairman Rogers, Ranking Member Cooper, and distinguished members of this subcommittee.

It is my pleasure to be part of this esteemed panel, which together represents the full spectrum of the United States national security space enterprise.

With your permission, I would like to submit my written statement for the record and just offer a very short oral statement so we can get to your questions more quickly and have a meaningful discussion.

Mr. ROGERS. Without objection, so ordered.

Mr. WEATHERINGTON. I am pleased to report to you that the Program Executive Officers for Space have been able to leverage that which has been provided by Better Buying Power initiatives undertaken by my boss, Under Secretary for Acquisition, Technology, and Logistics, to generate significantly improved prices and real savings as the government negotiates production contracts for several space systems. We look forward to seeing how these latest iterations of Better Buying Power 3.0 will continue this trend and save the taxpayers real dollars.

I am also happy to report—and this is in no small part due to the diligence of my distinguished colleagues, General Hyten and Ms. Sapp—that, with a few exceptions, our defense and intelligence satellite constellations are currently in a relatively stable, healthy, and well-populated situation to support both the Nation and our warfighters.

That said, we also need to recognize that many of these constellations will be entering a window of recapitalization in the coming years. How we approach these recaps will be a primary concern of the Department and will hinge on many ongoing analysis and study efforts, chief among those being the Secretary's strategic portfolio review and several key analysis of alternative studies. And, of course, those plans and programs will be drastically and harmfully impacted should the Department be hampered by another sequestration.

Moreover, I believe you will certainly take away a common theme from this panel today, a theme that no uncertain term portrays the rapidly emerging additional vulnerability. And, of course, I am speaking to the point that space is no longer a sanctuary. Would-be adversaries are developing formidable capabilities, capabilities designed to operate for the express intent of denying our intelligence professionals and uniformed warfighters the asymmetric advantages derived from our space capabilities.

You will hear from all my colleagues on this point, each from their own unique vantage point. From where I sit, it is my job to ensure the Department acquisitions for new capabilities stay abreast of this rapidly evolving challenge and that our warfighters have the capability they need, but not at the price that is untenable to Congress and the American people.

The President's fiscal year 2016 budget offers just these solutions, with a mix of sustainment of current capabilities, refreshing and upgrading other capabilities, and offering new starts for some very unique capabilities.

Let me wrap up, as I promised to be short. Thank you for working with us to provide space capabilities that address a warfighter's needs, prepares for future challenges, and looks at the broad range of our national security interests and protects the U.S. taxpayers.

I look forward to your questions, Chairman.

[The prepared statement of Mr. Weatherington can be found in the Appendix on page 68.]

Mr. ROGERS. Thank you, Mr. Weatherington.

Now General Raymond is recognized.

STATEMENT OF LT GEN JOHN W. "JAY" RAYMOND, USAF, COMMANDER, JOINT FUNCTIONAL COMPONENT COMMAND FOR SPACE

General RAYMOND. Chairman Rogers, Ranking Member Cooper, and members of the subcommittee, it is indeed an honor to appear before you again with my distinguished colleagues as the Commander of the United States Strategic Command's Joint Functional Component Command for Space [JFCC Space]. In doing so, I am representing the 3,200 soldiers, sailors, airmen, marines, civilians, and allied exchanges officers that make up the command.

Last year, I testified just shortly after my change of command that the space environment had changed. It was no longer the relative sanctuary it once was. Over this past year, the pace of change has accelerated and today the domain is even more congested, contested, and competitive than it was before with no signs of slowing down. We are quickly approaching the point where every satellite and every orbit can be threatened and the strategic, operational, and tactical advantages derived from space are no longer a given.

Now, more than ever, our responsive and flexible global space force is critical to our ability to continue to exploit the advantages of space. We are transforming our Joint Space Operations Center from an organization focused largely on cataloging objects in space to a command and control capability with the space domain awareness needed to meet those current and future challenges. With the help of the United States Strategic Command and the services, this

transformation is being fueled through innovation, experimentation, and partnerships.

As U.S. Strategic Command's Functional Component Commander responsible for conducting space operations in the domain, I am concerned that, if we do not receive relief from the Budget Control Act, our ability to provide our Nation assured access to these critical space capabilities will be at risk.

We are absolutely committed to assuring global access to space and peaceful operations in and through the space domain. 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.

Thank you.

[The prepared statement of General Raymond can be found in the Appendix on page 78.]

Mr. ROGERS. Thank you, General.

The Chair now recognizes Mr. Cardillo for 3 minutes.

STATEMENT OF ROBERT CARDILLO, DIRECTOR, NATIONAL GEOSPATIAL–INTELLIGENCE AGENCY

Mr. CARDILLO. Chairman Rogers, Ranking Member Cooper, and distinguished members of the committee, thank you very much for the invitation to join my colleagues here to testify before you today.

The National Geospatial-Intelligence Agency is the Nation's primary provider of geospatial intelligence [GEOINT] for both the Department of Defense and the Intelligence Community. Every local, regional, and global conflict has geolocation at its heart.

In a complex world of accelerating change, GEOINT delivers spatial awareness, temporal context, and insight that enables understanding and reveals unknown activities. NGA produces GEOINT with content from an array of platforms. As the GEOINT functional manager, I oversee current and future GEOINT requirements, evaluate sensor system performance to meet those needs, and we continue to require high-resolution imagery and have an increasing need to image targets frequently to maintain persistent awareness.

The sensors we use are not exclusively spaceborne. However, defense space programs are critical to accomplishing our diverse and worldwide mission. For spaceborne reconnaissance, NGA relies heavily upon platforms and services provided by the National Reconnaissance Office. NRO spaceborne assets continue to meet national security requirements that only its program could accomplish.

The fiscal year 2016 budget request also funds acquisition of commercial satellite imagery. This imagery enables NGA to provide GEOINT in current, high-interest and rarely imaged areas of the world. It also allows us to develop products that support air and sea navigation and humanitarian assistance missions.

The commercial satellite imagery market is expanding at an extraordinary rate, darkening the skies with small satellites that present a remarkable opportunity for NGA and our customers. If we can embrace the explosion in commercial sources and leverage the exquisite capabilities of our national technical space architec-

ture, we have the opportunity to realize the persistent GEOINT coverage that NGA and our customers have sought for so many years.

In closing, the President's budget for fiscal year 2016 supports NGA's requirements for space and space-based systems and services, provides us the resources and the capabilities we need to support our warning, targeting, mission planning, navigation, and flight safety missions.

So on behalf of the men and women of NGA, thank you for this opportunity to appear before the committee. I look forward to addressing your questions, and I look forward to earning a second invitation to testify before this committee.

[The prepared statement of Mr. Cardillo can be found in the Appendix on page 96.]

Mr. ROGERS. I thank you for that comment and for being here.

And I recognize myself now for the first set of questions.

General Hyten and Mr. Loverro and General Raymond, this will be targeted toward you.

The Department's requested a pretty significant increase in investment over the next several years for the protection and security of space systems.

Could you tell us about those investments and why you think they are important.

Let's start with you, General Hyten.

General HYTEN. So, yes, sir. As we look at the threat—and you have heard each of us in a different way talk about the threat being significant. And when we get into a closed hearing later, we will go into more detail about what that threat is.

But as you look at that, it is clear that the United States must increase our ability to respond to that threat. So in that increased investment that Mr. Loverro referred to, you will see increased efforts in space situational awareness as well as response options that will allow us to respond to threats that we see coming in the future.

And I think, as far as an open hearing, that is probably as far as I could go, but we can address that in more detail in the closed hearings.

Mr. ROGERS. Would you say the increased investments are proportionate to the need?

General HYTEN. I would say they are proportionate to need and they start us down a path. It would be nice to take more resources and begin. But, as you start programs, it is important to begin them in a prudent way so you understand what the initial investments are going to be and then grow from there. And that is what you will see in the fiscal year 2016 President's budget, sir.

Mr. ROGERS. Mr. Loverro.

Mr. LOVERRO. Yes, Mr. Chairman. First of all, I couldn't agree more with what General Hyten has already said. I think he is spot on.

Let me just add a couple of remarks. As I alluded to in my opening statement, we have to recognize that space is not a sanctuary. And several of us have said it up there. That means a lot. That is not the way we designed and operated systems for many years.

We designed and operated them as if it were. We did not lay out our space architectures. We did not build them with the notion in mind that they would be attacked by conventional means. That requires us to go ahead and make a change.

I am very pleased that we have aggressively pursued that change in the President's budget. I think that we made many, many good investments. As General Hyten said, we can't do everything at once. To do so would be foolhardy. We would probably fail.

But we have absolutely made a significant turn towards the space capability that we need to defend against adversaries, and we think that this will start us in the correct direction. There may be more in the future, but right now we think that we have got a very good balance within the fiscal year 2016 budget.

Mr. ROGERS. Okay.

General Raymond.

General RAYMOND. Thank you, Chairman.

I concur with what General Hyten and Mr. Loverro said. You know, for the last 20 years, we have worked hard to integrate space capabilities into the fight, and we have done so and it has fueled our way of war. We must protect those capabilities.

Our capabilities were really designed at a time when the domain was a sanctuary. Today, if you look at our space capabilities with the lens of the contested threat that we see emerging, then challenges materialize and we need this investment to keep pace with those challenges.

Thank you.

Mr. ROGERS. All right. Thank you.

General Hyten, in the launch hearing last week, we didn't get an opportunity to hear your perspective on the EELV launch capability [ELC] contract.

Can you provide your perspectives on the importance and how you can have fair competition with this contract in place.

General HYTEN. So, to be honest, Congressman, I don't think you can have fair competition with that contract in place. There will have to be a change. We are working with the acquisition community to figure out what that change is going to be. You may want to ask Mr. Weatherington about some of those issues.

But let me just give a little bit of history of why we have the EELV launch capabilities, the ELC contract in place. It was really put in place to preserve a very fragile industrial base because, in the mid part of the last decade, the mid-2000s, we were facing an era where the satellites we were building for the national security were not being delivered and the commercial marketplace that we thought was going to boom did not materialize either. And, therefore, the industry was in a very fragile perspective because there was not launches there available to support that industry.

So we created the ELC contract as a way to make sure that, even if we didn't launch—and there were years that we launched very small number of satellites—there would still be a healthy industrial base at the end of that period.

It was also put in place that, God forbid, we ever had a launch failure, that there would be a means to preserve that industry as we worked through the issue of that launch failure as well. So it is really an industrial-based concern.

As you build into a competitive environment, those reasons become much different. And so the competition and the existence of multiple capabilities really provide the resilience that you need to get through those kind of issues.

And we believe that the launch manifest will be increased. It will still be a significant challenge for our acquisition community to figure out how to transition from the current structure into the future, and they are working that issue now, sir.

Mr. ROGERS. Great.

Mr. Weatherington, the general wanted to put you on the spot. So I will do what the general ordered me to do.

Mr. WEATHERINGTON. Mr. Chairman, General Hyten is absolutely correct. There were and are very valid reasons for the ECL construct as it exists today.

But clearly there is an understanding that, with increased competition with the potential inclusion of new entrants into the launch capability family, that that capability, that function, has to be changed.

And so we are working very diligently with the Air Force to adjust, and we have that flexibility in Phase 1A, the competitive activity that is currently undergoing. Phase 2, fundamentally, that function will be likely wrapped into the rates that we pay on a per-launch basis.

And so the Department is committed to modifying and continuing to evolve its space launch capability to take advantage of the competitive launch environment that we see coming in the future.

Mr. ROGERS. Great. Thank you.

The Chair now recognizes the ranking member for any questions he may have.

Mr. COOPER. Thank you, Mr. Chairman.

General Hyten, I noticed in your testimony that you have made some organizational changes. In fact, you lead your testimony with it. And I am just curious.

By combining the A2, A3 and A6, is that something unique to your organization or is this something that is going to spread throughout the military?

General HYTEN. Right now it is unique to our organization, Congressman. But I think it is going to spread. And let me explain the fundamental reasons why.

If you look at the capabilities that we have integrated, the -2, the -3, the -6, which is intelligence, operations, and cyber, you put those three things together and you think about what we do as a command, those are three operational missions that we do.

If you go to an intelligence organization, whether it is the 18th Intelligence Squadron that is related to Space Command or another squadron in another command, and you look at the business that they do and you look at how we do space operations and then you go to San Antonio and you look at how we do cyber operations, it is very much the same.

So I believe that, in the future, the power of the military is the ability to integrate all information. And in our command, there is three elements of that: space, intel, and cyber. And so it is a logical step to take those three pieces and integrate them together because

the integration of information is going to be the power of military in the future.

Mr. COOPER. So is it too much to say that, by breaking down these silos, that you have created a new best practice in the military?

General HYTEN. We have not created a new best practice yet because we are still going through it. It is a significant challenge because it is a change of culture as well.

But our command is committed to changing that culture. We are committed to looking at each of those three areas as equal partners in the operations. And that is why we will have one flag officer on top of that pyramid that is responsible for integrating all those operations. We have had success so far, but we still have a long way to go.

Thank you for the question.

Mr. COOPER. Mr. Cardillo, in his testimony, makes the point very forcefully that one of his main problems is information overload, this vast array of data that comes in, how do you make sense of it.

And I hope that we have good answers to those questions because understanding an infinite number of visual images, which you say are increasing exponentially, that is a big problem to get your arms around.

How are we faring in that regard?

Mr. CARDILLO. Congressman, I couldn't agree with you more about the challenge. I have to tell you I am equally excited about the opportunity.

What I mean is that, if we are successful in managing the data in a way that we haven't before, I think it is going to elicit signatures, patterns, indicators we haven't seen before. But I won't argue with you that this challenge isn't large. And we are taking it head on.

Mr. COOPER. General Raymond's testimony was particularly interesting because I am not sure that the average constituent understands how crowded space is, with some 500,000 pieces of space junk up there. That is quite a lot to keep up with.

And I forget whether it was your testimony or another person who said, basically, we are going to have the first 24/7 traffic cop to warn people of collisions because there is some 23 announcements a day of potential collisions between, you know, satellites and space junk.

General RAYMOND. Yes, sir. The Joint Space Operations Center at Vandenberg actively tracks about 23,000 objects. Those are about 10 centimeters or greater. That is the size that we can track.

As you mentioned, 500,000 are below that level that we can't track. The JSpOC, by its nature, serves as that traffic cop. We provide space traffic control, if you will, for the world, providing warning of potential conjunction to keep the domain safe for all.

Last year, in 2014, alone, 121 times we recommended that a satellite move and it moved, including the International Space Station 3 times.

Mr. COOPER. It worried me a little bit that the number of warnings is increasing so much regarding possible missile launches from

the ground. You said there were 588 of those and some 9,648 infrared events. That is a lot to keep up with.

General RAYMOND. It is a lot to keep up with.

Mr. COOPER. How do we separate the wheat from the chaff here?

General RAYMOND. It is a lot to keep up with. We have the world's greatest capabilities with SBIRS [Space-Based Infrared System] and DSP [Defense Support Program]. We have got the world's best airmen that are operating that. And one of the keys is that, when you are dealing with warning of potential missile attack to theater or potential attack on the homeland, you take that very, very seriously and put a lot of emphasis on it to make sure we do it perfectly.

Mr. COOPER. Mr. Loverro, I would be interested—you made a pretty forceful statement about domain and protecting our domain.

I would be curious, in the rhetoric of this and other administrations, is yours the most forceful statement or are you mirroring other rhetoric?

Mr. LOVERRO. Yes, sir. I don't know if I want to call mine the most forceful, but it is certainly what I believe strongly. And I don't necessarily want to call it just pure rhetoric either. It is absolutely our intent.

You know, it probably has been an evolving state of affairs because the threat has evolved. Quite frankly, it is one thing to anticipate an imaginary threat. It is another thing to see that threat develop, watch it be exercised, as we have on the Chinese on several occasions, recognize what it can do to our capability, and react to that.

And that is what we are doing right now, is reacting to it and making it very clear. We have no desire to have a conflict extend to space. That is not in our interest. We don't believe it is in the interest of anybody on the face of the planet.

We want our potential adversaries to understand that, if it does, the U.S. will be prepared to defend our space assets. Attacking our space assets is not a way to get the United States to back off of a fight.

We are going to make sure that space assets are there to support the men and women that General Hyten and General Raymond have talked about so we can do the job that you have asked us to do.

Mr. COOPER. Finally, Mr. Weatherington, you mentioned the terrific recapitalization problem that we are about to face. A generation or two earlier we had huge nuclear investments that we are struggling to be able to recapitalize right now.

And it would be great to have some sort of early warning system for how many years we need to be planning recap for our space assets. So I hope you can help us with that.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank the gentleman.

And I want to recognize Ms. Sapp, who has made it. I want to apologize to her for the moving target of start time, but we are at the mercy of the leadership and when they call votes. But I do appreciate you being here. We did accept your opening statement for the record already.

[The opening and prepared statements of Ms. Sapp can be found in the Appendix beginning on page 103.]

Mr. ROGERS. Now I will recognize the gentleman from Colorado, Mr. Lamborn, for 5 minutes.

Mr. LAMBORN. Thank you, Mr. Chairman.

And thank you all for being here and for your service to our country in various ways.

General Hyten, we talked earlier today about an issue I would like to ask you a little bit more about, the Air Force space-based weather collection program. And I am concerned about the future planning.

In October 2014, in response to a congressional-directed report, there was a briefing by the Air Force that stated, "DOD does not currently rely on nonallied international sources for environmental data, but may be required to do so as early as 2017 due to EUMETSAT's recent decision not to replace Meteosat-7."

I have another memo on this topic that was written just last month by the Air Force. It states, "New information has come to light that demonstrates an unacceptably high risk for relying on civil and international sources."

And the memo further states, "While China and Russia have mature technical systems, recent events indicate they present unacceptable security and operational risk. This dependency, particularly over the USCENTCOM [U.S. Central Command] area of responsibility, provides an unnecessary risk to U.S. operations and American lives."

So, actually, my first question will be to Mr. Loverro. But thank you for the discussion that we had earlier, General Hyten.

Mr. Loverro, should we be creating new reliances on China and Russia for weather data for our warfighters?

Mr. LOVERRO. Mr. Congressman, I like the fact that you started off with General Hyten first, so——

No. This is a very complex issue. But let me make one thing very clear before I answer in detail. The DOD has no intent, no plans, and has no current reliance on Chinese or Russian weather satellites. We do not have it today. We will not have it in the future. That is not where we are heading.

We had a conversation with this committee 2 years ago on a problem with satellite communications in that regard. We fixed that. And thank you very much for helping us do that. We are not going to go ahead and repeat that error with the weather satellites.

Now, we do have an issue. What we are talking about is geosynchronous weather prediction and monitoring. That is not primarily a DOD mission. That is a NOAA [National Oceanic and Atmospheric Administration] mission for which the DOD uses their capabilities.

And NOAA makes arrangements with other international capabilities around the world. The one you mentioned, EUMETSAT, has been our partner in the Indian Ocean for many years.

Because of the kind of budget problems the Europeans have been having, they are having a hard time trying to fill that gap. And they in the World Meteorological Organization have decided that, for civilian purposes, that organization would like to use indige-

nous capabilities, which includes Chinese and Russian and Indian satellites.

We right now do not—I cannot tell you today how we will go ahead and address this gap. We are working with NOAA. I met with them just last week along with the folks from Air Force A3, who wrote the letter that you quoted from, to figure out how we can move forward.

NOAA has several alternative plans that they are examining. Some of them are to move another European satellite, EUMETSAT–8, over to the region. There are other capabilities that we might look at. And I also visited India 2 weeks ago to start the conversation with them about Indian satellites.

So there are several alternatives that we are looking at. I cannot tell you what the answer is today. But let me make it clear, once again, we do not intend to, we have no plans to, we will not rely on Chinese and Russian satellites.

Mr. LAMBORN. Well, that is a concern. Also, cost is a concern. With constrained budgets, we have to make every dollar count. I understand that. But getting the maximum capability out of our existing constellation is also a concern.

Mr. LOVERRO. Yes, sir. Yes, sir. No. Absolutely. And, you know, today that is not a mission that the DOD flies. So as we look at that gap and we examine how we need to fill that, we will have to assess whether or not there is something the DOD needs to invest in or simply get NOAA to invest in. It is one of those issues that is developing as we speak. I wish I had an answer for you today. We know it is an issue.

Mr. LAMBORN. Okay.

Mr. LOVERRO. We are following it.

Mr. LAMBORN. All right. Thank you.

And let me—General Hyten, let me try to work in one—well, I am going to have to wait for a second round, I am afraid.

I yield back.

Mr. ROGERS. I thank the gentleman.

The Chair now goes to Mr. Garamendi from California for 5 minutes.

Mr. GARAMENDI. I thank you, Mr. Chairman.

And, gentlemen and ma'am, thank you very much for being here.

I guess this goes to Mr. Loverro and probably Mr. Weatherington and Mr. Cardillo.

What are the opportunities to leverage the growing commercial capabilities, services, for example, Skybox and Planet Labs? And how long will it take for the U.S. Government to replicate those assets or to use them?

So start at the right or the left. Let's start over here.

Mr. LOVERRO. Why don't I deal with the general, and then I think Mr. Cardillo is better suited to answer the specific questions.

So, sir, you are absolutely right. We have a great opportunity here. As the DOD budget shrinks and as we focus more on the security of space, we need to figure out how to do things smarter. One of the smarter things we can do is to leverage the commercial field far better.

There are certainly two areas where the commercial field is burgeoning, mostly the U.S. commercial field, which is great for us and

our Nation's industry. You mentioned one of them, commercial imagery, Skybox, Planet Labs. There are about 20 names out there, all of which will try their hand at trying to figure out how to revolutionize this field, as well as our tried and true providers, like Digital Globe.

The commercial SATCOM [satellite communications] world is just as exciting. While we still have the legacy of 40 or 50 years of commercial SATCOM, we have a whole bunch of new entrants, from the likes of Elon Musk to many others. We are looking at new constellations and new configurations. All of these can provide capability. We need to figure out how to leverage them better.

Let me turn over the specifics, maybe, to Mr. Weatherington or Mr. Cardillo.

Mr. CARDILLO. First, I couldn't agree more with the opportunity that is before us. I can't answer your specific question about exactly when. I can just tell you we are fully engaging with each.

And I should also say, too, I am a huge commercial imagery consumer today. I just use it for what we call our foundation mission. This is mapping, charting, geodesy, so the baseline products upon which we then apply NRO's capabilities to provide that exquisite level of intelligence and information. And I can give you more examples about that in closed.

But we are fully engaged with the companies that you just mentioned to explore. We are looking to do pilots and test beds to be able to answer your question, and we will keep you fully informed.

Mr. GARAMENDI. Good. I am going to go to another series of questions. I know my colleague to my right here has this issue, and he will pick it up, I am sure, in just a moment.

I want to go to the vulnerability of the GPS system and should we have a backup system available to us, specifically the eLoran program. And it is maybe $50 million to put it in place, another $10 million a year to keep it going.

Should we move forward with such a backup system?

I will start—you are nodding your head, Mr. Loverro.

Mr. LOVERRO. Yes, sir. So we have had a lot of discussion of this within the DOD. Our fiscal year 2016 budget includes an initial investment into eLoran, as you are aware. We do believe that is a good idea.

However, it is not a panacea. It is great for backing up the use within the continental United States. For civilian use, however, eLoran, as currently configured, is not nonspoofable. It doesn't extend around the world. It doesn't meet the needs of our warfighters. So, absolutely, for civil concerns, it is a good solution.

But from DOD concerns, we need to do more. We are doing more. We are investing significantly in anti-jam capabilities both on the satellites, in our user equipment. We, in fact, accelerated—part of that $5 billion investment that I talked about was a large acceleration of nonspoofable, nonjammable user equipment that the Air Force will be building for the new GPS signals.

We are also in talks with our allies. Galileo, Japan and their Quasi-Zenith satellite systems, these are other systems that perform the same functions, are separate from GPS, yet perform a capability. We are looking very strongly at how do we leverage those as a backup as well.

Because for military use, we do need that worldwide or at least regional overhead system that we can't get from the eLoran system which basically provides two-dimensional timing and navigation, but doesn't really help us in the three-dimensional overseas world that we fight in.

Mr. GARAMENDI. Thank you. I appreciate all of that.

Also, the Coast Guard is interested because it does go about 1,000 miles off the coast. And so it is useful in many different ways.

Mr. LOVERRO. Absolutely agree.

Mr. GARAMENDI. Thank you.

I yield back my remaining time.

Mr. ROGERS. Thank the gentleman.

The Chair now recognizes the gentleman from Oklahoma, Mr. Bridenstine, for 5 minutes.

Mr. BRIDENSTINE. Thank you, Mr. Chairman.

And thank you to our distinguished panel for being here.

General Hyten, I have heard you comment in the past that we need to get past the days when we think about military satellite communications and commercial satellite communications. Just start talking SATCOM.

One of the parts of the last NDAA [National Defense Authorization Act] that we did, we had section 1603, and it specifically asked the Department to look at the idea of having SMC [Space and Missile Systems Center] as the single acquisition agent for space.

My question for you is: In your best professional military judgment, is having a single acquisition agent for space necessary to get the architecture to include both mil [military] and commercial satellite communications capabilities?

General HYTEN. Well, thanks very much for the question, Congressman.

So, in my judgment, it is essential that there is a single point in the Department of Defense, a single agency in the Department of Defense, that is responsible for integrating how we provide SATCOM. If we have multiple agencies that are looking at buying and leasing capabilities, we will never have a fully integrated, most cost-effective, most military-useful capability to do that.

And so you asked me about SMC. I think the Department is in agreement that we need to have a single place that does that. From my judgment, the best place to do that is in Los Angeles at SMC because that is where the bulk of military satellite communications is procured. So if you have the bulk of a single procurement agency in one place, it makes sense to look at how you integrate those.

Now, the Department as a whole is still looking at that. We owe you an answer to that 1603 language. We will work that. But you asked my opinion, and I am glad to give it. Thank you.

Mr. BRIDENSTINE. Thank you, General.

Mr. Loverro, section 1603 of the fiscal year 2015 NDAA also requires the DOD to revise the Executive Agent for Space's directives and guidance with respect to SATCOM strategies, architectures, and programs and, also, a report on reforming the SATCOM organizational structure.

Can you briefly describe where you are in that process and when we might be able to see that report.

Mr. LOVERRO. Yes, sir. I would be glad to.

So both the CIO's office, our chief intelligence officer's office, and our acquisition, technology, logistics office—excuse me—chief information—thank you—and our acquisition, technology, and logistics organization—not Mr. Weatherington's office, but another sector of that—have been given the lead to answer that question.

They have been convening a series of working groups in order to go ahead and look at it. I believe they have scheduled an interim brief to this committee on the 19th of April. I cannot tell you what the results are yet. I have not been personally part of that. But they are working on that.

It comes at an opportune time. We are rewriting right now our DOD instruction on SATCOM management. In fact, I have a copy of it in front of me here as the draft. And so we will integrate that into the rewrite of this instruction as well as what Congress has directed us to do, which is to look at how we rewrite the EA [Executive Agent] for Space charter.

Mr. BRIDENSTINE. General Hyten, have you been part of those discussions or the planning process?

General HYTEN. We have not been part of those planning processes yet. Congressman, I fully expect to——

Mr. BRIDENSTINE. Okay.

General HYTEN. As you have said earlier, I have some strong opinions on that. I think the Department knows what those opinions are. Certainly Mr. Loverro does.

Mr. BRIDENSTINE. Okay.

General HYTEN. And so I fully expect to be brought in, as does the Executive Agent for Space, who happens to be the Secretary of the Air Force.

Mr. BRIDENSTINE. Okay. Mr. Loverro, I have got a minute and 23 seconds left.

Section 1605 of the fiscal year 2015 NDAA authorized a SATCOM pilot program using working capital funds.

Can you share with us the status of that program, if there is anything we can do here on this committee to help assist with that.

Mr. LOVERRO. Yes, sir. So we very much appreciate the help Congress gave us in authorizing those funds.

Unfortunately, because of the way the pilots are constructed and the way working capital funds work, the match isn't 100 percent perfect. We are trying to work through it. But as I have shared with you previously, that is a very difficult match to make.

I am not the financial wizard within the Department to be able to tell you how to modify that today. I am happy to go ahead and take that for the record and come back on a better way to do that.

But we absolutely want to move forward on the Pathfinders that that was intended to fund. Those Pathfinders have been laid out. I think we are anxious to get started.

Mr. BRIDENSTINE. Thank you for that. I have 33 seconds remaining.

General Hyten, speaking of the Pathfinders, if you could, for this committee—I think it is critically important that we get those Pathfinders funded. It doesn't appear that the President's budget request funded Pathfinder 2 or any of the other Pathfinders.

Can you share with this committee with why the Pathfinders are so important.

General HYTEN. The Pathfinders are important for a number of reasons. The quick answer is that, if we are going to walk down the path where we leverage the commercial sector in the right way, we need to figure out the business models to do that. The Pathfinders are structured in order to do that.

The Pathfinders also have the opportunity for us to test different capabilities. It is possible that we can work the protected tactical waveform inside a Pathfinder program and explore the operational utility of that before we actually have to make an operational decision.

Those are the fundamental issues that make the Pathfinder so important.

Mr. BRIDENSTINE. Roger that.

I yield back.

Mr. ROGERS. I thank the gentleman.

The Chair now recognizes the gentleman from Arizona, Mr. Franks, for 5 minutes.

Mr. FRANKS. Well, thank you, Mr. Chairman.

And thank all of you for being here, for your commitment to freedom.

Lieutenant General Raymond, let me, if I could, direct a question to you, sir.

As you may be aware, the Director of the Defense Intelligence Agency, Lieutenant General Stewart, at a House Armed Services Committee hearing on worldwide threats earlier this year said that "China and Russia are developing capabilities to deny the U.S. use of space in the event of a conflict." And that is a quote.

I mean, I find that pretty sobering and having implications of a pretty profound nature. And it seems to me the United States is facing the most challenging environment we have ever seen in space.

And I would like to ask you directly: Would you agree that this is the most challenging space environment we have seen?

General RAYMOND. Yes, I would. I would agree. I think the threats are real. I think they are technologically advanced and they are concerning.

Mr. FRANKS. All right. Well, if I could, then, turn to Mr. Loverro and Mr. Weatherington.

As you also very likely know, previous congressionally mandated commissions have reported on the value of setting up a major force program [MFP] in the budget structure itself for space. And I am aware that a virtual MFP was set up, but I am not sure that it truly provides the benefits the commissions were originally seeking.

What is your position on the benefits and challenges of establishing a true MFP with centralized authority for space? And, beyond an MFP, do you think that it is important that we evaluate all aspects of the national security space, not just the capabilities and development, but, also, organization, management, policy, doctrine, training, to strengthen national security space within the Department of Defense? And, if so, what are we doing about that?

Mr. LOVERRO. Yes, sir. As Secretary Carter testified during his confirmation hearing, we do intend to go ahead and look at the organization of space within the DOD.

An MFP, a major force program, may or may not be an important step, but I think that is putting the cart before the horse, quite frankly.

I think we need to figure out what, if any, organizational changes do we need to make and then find out if an MFP is necessary to have that organization function in much the same way we stood up SOCOM [Special Operations Command] and then decided we need an MFP–11, not vice versa.

So I would say we need to do our study first. Secretary Carter has committed to doing that. We intend to do that. And then we can come back to you and tell you whether an MFP is necessary in order to go ahead and enhance the capability of that structure.

Mr. FRANKS. Mr. Weatherington, could I ask you to address the same question.

Mr. WEATHERINGTON. Congressman, I really can't add anything more than Mr. Loverro just commented on. I mean, it is really—you know, the acquisition organization supports the warfighter, and we align with the policy decisions.

So once we have made this decision on the organizational structure, then we can align the resources to whatever that organizational structure is, assuming there are any changes.

Mr. FRANKS. And so, therefore, it is your perspective and testimony that the original congressionally mandated commissions—do you think that the MFP that was set up on sort of a—do you think that that is actually what they were looking for? I mean, in other words, just a virtual MFP, is that what they were looking for?

Mr. WEATHERINGTON. Sir, you are asking me to interpret the intent. I can tell you from the Department's perspective that we can provide the oversight responsibilities of your committee with where every dollar in the space enterprise is going.

Now, whether that was the original intent, I mean, that—as Mr. Loverro said, Secretary Carter took this on. We are working this very hard, and we will have a response back this summer.

Mr. FRANKS. All right. And, Mr. Loverro, not to belabor the subject, but you think that this—you know, again, congressionally mandated commission, do you think that you have satisfied that requirement?

Mr. LOVERRO. Sir, I think both the Rumsfeld Commission and the Allard Commission, as we call them, both had many recommendations about how to go ahead and improve space organization management.

Many of those recommendations were implemented. MFP–12 that they recommended was part of some of those recommendations. We certainly did not execute all of the recommendations for those commissions, and a lot has changed since then.

While I think those were both valuable studies, I really do think in today's world, where we see a different threat than was present in 2000 or 2006, we really need to look at the question again.

Mr. FRANKS. All right. Well, thank you.

Quickly, Ms. Sapp and Mr. Cardillo, as you know, previously the director of the NRO was also the Under Secretary of the Air Force, and those days are gone.

But do you believe it is important to have appropriate integration in this warfighting domain between this so-called white and black space or unclassified and classified space committees? And what is being done to strengthen this integration? And are there opportunities for improvement?

Ms. SAPP. I think we have a great relationship. As you said, we think the threats in space are very real, and that is across white and black space. We have a great relationship with General Raymond and General Hyten. We do joint exercises, joint games. We have linked our op [operations] centers. So there is a very, very close relationship there.

Mr. FRANKS. All right. And, Mr. Cardillo, would you like to take a shot at it?

Mr. CARDILLO. No. I am a customer of that relationship. So I am good.

Mr. FRANKS. All right. All right. Thank you all very much.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you.

The Chair now recognizes the gentlemen from Colorado, Mr. Coffman, for 5 minutes.

Mr. COFFMAN. Thank you, Mr. Chairman.

Well, first of all, I think the GPS system is incredible. As somebody who served on the ground when it was first introduced at least to us on the conventional level during the first gulf war, it was an extraordinary asset.

What are the challenges right now? I know synchronization is one of them with other systems. But what are some of the challenges we have in terms of upgrading and updating the GPS system?

General HYTEN. So, Congressman, I will go ahead and answer first, and then we will open it up across the board.

But I think there is two big challenges we really face now with GPS—actually, three. One is the satellite piece of it. The other is the ground command and control piece. And the final one is the user equipment piece. Those three elements have to be synchronized.

We are actually very close to having those in line right now. But on the ground segment, we have a program called OCX, the new operational control segment for GPS, that we are moving into the future with. The challenge there is that that capability is required to provide us the information assurance capabilities that we need to defend our system against the cyber threat.

The GPS system today has external interfaces into 35 different organizations in the world. Each of those interfaces go out into the world. We have to tighten those down and protect them. That is one of the biggest concerns I have with GPS, in general.

And then, as we go forward in the user equipment, we need to figure out how to take advantage of the anti-jam capabilities, the various capabilities that Mr. Loverro talked about earlier, and the new satellite systems have to be able to provide the signal structure that will allow that.

So if you put those three things together, it is a complicated problem, but one that we are making good progress on.

Mr. COFFMAN. Thank you. Anything else?

Thank you, Mr. Chairman—oh. Sorry. Go ahead. Yeah.

Mr. WEATHERINGTON. Congressman, the only thing I would add to General Hyten's remarks are last month Mr. Kendall personally led a deep dive on the OCX activities, that it has got significant attention at both the Air Force and the AT&L [Acquisition, Technology, and Logistics] level. We are tracking that progress very, very closely because OCX is really critical to the next capability set that GPS is going to provide. And, for now, we believe we have a plan to execute that program and deliver that capability.

Mr. COFFMAN. Okay. Mr. Chairman, I yield back. Thank you.

General RAYMOND. Could I jump in and say one thing?

Mr. COFFMAN. Please.

General RAYMOND. I just wanted to say thanks for that question. The GPS constellation is a national treasure. General Hyten talked about the launch occurring.

I will tell you that on that we have made first contact with the satellite that was launched today. That will continue to provide 24/7 navigation with the other satellites that are up there. And we are completely integrated with those forces in theater to make sure that they have the precision navigation timing that they need.

Thank you.

Mr. COFFMAN. Well, thank you.

I was just a simple infantry guy for the Marine Corps. But, you know, to go from having a map and trying to figure out where you are in order to call in air support or artillery with, you know, sand dunes that are shifting, roads that don't exist, and all of a sudden, you know, to be able to, you know, get a grid coordinate, you know, within, at that time, probably 100 meters was extraordinary.

Thank you very much. I yield back.

Mr. ROGERS. Thank the gentlemen.

We have been called for votes. But before we head out, Mr. Lamborn had something else he wanted to revisit. So he is recognized.

Mr. LAMBORN. Yeah. Thank you. And I will try to make this quick for everyone, although some, I am sure, will have to leave in a minute to vote before I finish, perhaps.

General Hyten, last year we were briefed that the JMS program would be integrating and delivering advanced SSA [Space Situational Awareness] commercial capabilities in Increment 2 of the program by the end of the calendar year 2016 to help detect and track these threats.

Is the Air Force's JMS program still on track with this Increment 2 delivery schedule?

General HYTEN. So the JMS program is making good progress. If you go to Vandenberg today—and General Raymond sees it every day, at least every day he is at Vandenberg. He sees the capabilities coming in.

And the commercial elements of that are a very important element. In fact, the commercial element really is the visual display capability and the user interface into that system.

And so we have taken tremendous advantage of commercial capabilities in Increment 2. We plan to take even further advantage of those capabilities in Increment 3. But we are making great progress with the Joint Space Operation Center's mission system.

Mr. LAMBORN. Do you believe it is on schedule?

General HYTEN. Right now those capabilities are on schedule. Right now we are getting ready to deliver—Service Pack 9 is the element that is being delivered.

And the reason that is an important element is because that is the delivery that will eliminate—or develop the new catalog that eliminates the reliance on the old SPADOC [Space Defense Operations Center] system that was built in the mid-1990s, and we need that to move forward in the future.

General RAYMOND. Sir, I would just add I agree. It is on the operations floor today in increments. It is delivering real-time capability today that is very useful.

And like any other commander in any other domain, if you are going to conduct operations, you have to have the ability to command and control, and this is the key to that for me.

Mr. LAMBORN. Okay. Thank you very much.

And, lastly, Mr. Loverro, I wrote section 913 of the fiscal year 2013 NDAA.

And on the European code of conduct, will the Department of Defense issue any manner of guidance or instruction to the military, to our military, if the President were to sign this or a similar code of conduct?

Mr. LOVERRO. Yes, sir. Thank you for the question.

So we have been—my office is the lead for the Department of Defense on the code of conduct, working very closely with the Joint Staff, and we have worked very closely with the Department of State as well.

We would indeed issue implementing guidance if we decide to go ahead and subscribe to the code of conduct. We are working very vigorously to make sure that what gets signed is something that we absolutely can live with.

We will not sign a code we cannot live with, and we will issue implementing guidance so it is very clear what the responsibilities of the United States DOD is with regard to that agreement.

Mr. LAMBORN. Well, I am really concerned because, on the surface, a code of conduct would be nonbinding. Isn't that correct?

Mr. LOVERRO. It is absolutely correct. Not legally binding. We have many such agreements between nations.

What the code of conduct does is it sets out rules of behavior that good citizens in the domain follow. It really helps us to distinguish who are good citizens and who are not.

Mr. LAMBORN. Yeah.

Mr. LOVERRO. You know, sometimes it seems like that doesn't mean much. But I can tell you, for example, as you are well aware, in 2007, the Chinese, of course, demonstrated their ASAT [anti-satellite weapon] capability and blew apart a satellite, which now——

Mr. LAMBORN. Oh.

Mr. LOVERRO [continuing]. General Raymond used to do.

But in the latest one they didn't mostly because of the condemnation of the world, not because there was anything that prevented them from doing it legally.

Mr. LAMBORN. Well, my concern is something on the surface would be nonbinding, but through you issuing a guidance for the employment of force instruction, a GEF instruction, it becomes binding upon the military.

And so, as a Congressman, I am concerned about the interaction between the executive branch and Congress, and this is something that would not be submitted to the Senate for treaty ratification and could be viewed as kind of an end run around Congress.

Mr. LOVERRO. Mr. Congressman, if I could take that for a closed session, I can, I think, provide you a more nuanced answer on how this will work.

Mr. LAMBORN. Okay. Thank you very much.

Mr. Chairman, thank you so much.

Mr. ROGERS. I thank the gentleman.

We have been called for votes. And we are going to recess until approximately 6:50, when we will reconvene in the closed session next door in 2216.

[Whereupon, at 5:58 p.m., the subcommittee proceeded in closed session.]

A P P E N D I X

March 25, 2015

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 25, 2015

Opening Statement of Hon. Mike Rogers
Chairman, Subcommittee on Strategic Forces

HEARING ON

Fiscal Year 2016 Budget Request for National Security Space

March 25, 2015

Good afternoon. I want to welcome everyone to the Strategic Forces Subcommittee's hearing on the Fiscal Year 2016 National Security Space activities of the Department of Defense.

We are honored to have of panel of expert witnesses, who lead multiple areas of our national security space enterprise. They are:

General John Hyten
Commander, Air Force Space Command

Mr. Douglas Loverro
Deputy Assistant Secretary of Defense for Space Policy

Mr. Dyke Weatherington
Acting Deputy Assistant Secretary of Defense, Space, Strategic and Intelligence Systems

Lieutenant General John "Jay" Raymond
Commander, Joint Functional Component Command for Space

Mr. Robert Cardillo
Director, National Geospatial-Intelligence Agency

And,

Ms. Betty Sapp
Director, National Reconnaissance Office

This is a big panel. We will work to give every member a chance to ask questions in this open hearing, at which point we will adjourn to a closed session to continue our oversight in an appropriately secure fashion.

I'd also like to note that this is the first time we are having the Director of NGA testify at the Strategic Forces annual space posture hearing. This is important both literally and symbolically.

From a literal point of view, NGA has critical role within the national security space community, and as a combat support agency, NGA provides tremendous support to our warfighters.

From a symbolic point of view, the six of you on this panel, along with the other armed services and members of the space community, need to be working extremely closely together. While each of you has your own missions with different roles and responsibilities, it's essential that national security space is integrated across the Department of Defense, both unclassified and classified programs. In the end, all of your jobs are to support and defend our country.

Regarding the posture of national security space, we currently face many serious challenges. On January 28th of this year, the Armed Services Committee held a hearing with Mr. Frank Kendall, the Undersecretary of Defense for Acquisition, Technology, and Logistics, as a witness. Chairman Mac Thornberry opened up the hearing with a question regarding U.S. technological superiority, and asked Mr. Kendall to provide his greatest concern.

Mr. Kendall responded that, 'We are at risk, and the situation is getting worse.' He further went on to state that, 'the U.S. [is] being challenged at an unprecedented rate. It's not just missiles, it's other things, such as electronic warfare capabilities, it's anti-satellite capabilities and a spectrum of things to defeat our space systems. It's a number of things, which I think are being developed very consciously to defeat the American way of projecting power and we need to respond to that.'

Mr. Kendall could not talk specifics in an open session, but when the most senior acquisition and technology leader of the Department of Defense says we are at risk of losing our technological superiority, he must have our attention. We want to understand how you will be addressing this threat.

Aside from the growing foreign threat, we've also heard from senior DoD and Air Force leaders about their concern about our assured access to space posture going forward. We held a hearing on this last week, and will have a few more questions on that topic today.

Separately, we've heard of risks of not maintaining the appropriate space-based weather collection capabilities for top Department of Defense requirements. I'm concerned we are not taking a strategic long-term view and are headed down a path with significant risk. We will not allow critical capabilities our warfighters rely on to be based out of Moscow or Beijing.

Additionally, we have systems on orbit that we've invested billions of taxpayer dollars in, that we are still not fully using because of delays in ground systems and user terminals. We must do better for the taxpayers and the warfighters.

And lastly, we are all aware of the current budget pressure. This means we need to do business smarter, without sacrificing capability. As I have said multiple times in the past, I believe we can save money in wideband satellite communications, as one example. It will take strategic planning, better partnerships with commercial industry, and new contracting approaches.

Regarding the budget request, I support technology development and evolutionary acquisition, but remained concerned with efforts to create new programs, such as in missile warning and protected communications, and will conduct close oversight of such activities. I will need to be convinced that this is the right time to make billions of dollars in investments in new programs, when our current programs are working better than expected.

I know the great men and women of the Department of Defense, including military, civilian, and industry partners will not shy away from these challenges. It will take work, and I believe that we need to strengthen national security space though capabilities development, organization, management, policy, and funding.

Thank you again for your leadership and for being with us today regarding this important topic, and I look forward to your testimony.

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SUBCOMMITTEE ON STRATEGIC FORCES
HOUSE ARMED SERVICES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE
SUBCOMMITTEE ON STRATEGIC FORCES
HOUSE ARMED SERVICES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: Fiscal Year 2016 National Defense Authorization Budget Request for National Security Space Activities

STATEMENT OF: General John E. Hyten
Commander, Air Force Space Command

March 25, 2015

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SUBCOMMITTEE ON STRATEGIC FORCES
HOUSE ARMED SERVICES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

Introduction

Chairman Rogers, Ranking Member Cooper and distinguished Members of the Subcommittee, it is an honor to appear before you for the first time as the 15th Commander of Air Force Space Command (AFSPC). It is my privilege to represent the 38,000 outstanding men and women of AFSPC currently stationed at 134 locations worldwide to include the over 1800 Airmen and civilians forward deployed in the past year. These dedicated Airmen provide space and cyberspace capabilities to our great Nation 24 hours a day, 7 days a week, and work through challenging operational scenarios and tight budget constraints to ensure capability is delivered to the warfighter when and where it's needed.

As a new commander, I want to ensure our priorities align with our ever important mission and vision, which remain unchanged.

Win Today's Fight

It is a simple message, but one of utmost importance. The Nation depends on this command to deliver game-changing effects in both the space and cyberspace domains, and we must continue providing that as quickly, as effectively and as efficiently as possible. As we develop systems and personnel for space and cyberspace operations, our efforts will be focused to ensure the domains are manageable, securable and defensible within the United States Air Force (USAF) Total Obligation Authorities.

Prepare for Tomorrow's Fight

If war extends to space, as it has extended to every other domain on this planet, we have to be ready to fight and win in that domain. That means re-examining our development and acquisition process to deliver capabilities more quickly and efficiently while fully meeting our Nation's warfighting requirements. We will transition from a command focused on global space

operations and persistent network operations, to a more proactive, and if challenged, defensive space and cyberspace command.

Taking Care of Our Airmen and Our Families

For the past 20 years, this country has been in a perpetual state of conflict. The constant deployments, stressful operations tempo and uncertain fiscal environment have understandably taken a toll on not only our Airmen, but also on their families. To ensure resilience in the midst of these factors we must proactively implement the "Four Pillars" of the Comprehensive Fitness Program: physical, emotional, social and spiritual. We will continue a culture of respect and actively care for each one of our valued members and their families.

AFSPC Re-organization

In-line with re-examination of current procedures to better serve our Nation, AFSPC has implemented a new organizational structure within its Headquarters. One of the most significant changes is the merger of the A2 (Intelligence), A3 (Operations) and A6 (Communications) into a single Directorate. For this major command (MAJCOM) to execute its operational responsibilities, our intelligence, surveillance, and reconnaissance (ISR), space and cyber experts must work together seamlessly to build integrated operational solutions to meet warfighter needs. There are also other areas where it makes good sense to align with the organizational structure of our parent Air Force Headquarters (HQ). We have shifted the majority of our mid and long-term planning functions to the A5 and created an A5/8 (Strategic Plans and Requirements) to mirror the HQ Air Force A5/8 structure. Likewise, we have merged our programming and financial management functions into a single Directorate, the HQ AFSPC/FM (Financial Management), to mirror the SAF/FM organization which is now responsible for both programming and financial management at the Pentagon. Finally, one of the more demanding transitions is the

reorganization activities that are influenced by the standup of the new Air Force Installation and Mission Support Center (AFIMSC). The mission support functions that reside at the MAJCOM-level are being consolidated at the new AFIMSC. Amidst all the changes, I am confident the resultant HQ capabilities will dramatically enhance our contribution to national security objectives and the success of our warfighters.

Space and Cyberspace Integration

In previous eras, the largest army, navy, or air force was normally the victor; however, that traditional military equation no longer holds true. Today, it is about integration, synergy and leveraging the capabilities of multiple domains to create decisive battlefield effects to achieve victory. We have not lost sight of the fact that our space systems are intimately integrated into the cyber mission area. All command and control of space-based systems, and delivery of space-based products, are dependent on operations in cyberspace. Space capabilities, such as position, navigation and timing and weather are essential to kinetic operations and are delivered through cyberspace.

In the United Sates Air Force, our mission is to fly, fight, and win in air, space and cyberspace. At AFSPC, we are responsible for two of the three domains – space and cyberspace. In space, we provide pathways for information or control the information traveling through those pathways. It is in this respect the cyber mission is fundamentally the same as space and the reason it falls within our purview. Furthermore, when AFSPC's space and cyberspace missions integrate, it represents a force multiplier for all mission capabilities to the joint warfighter. AFSPC is not only providing multi-domain deterrence capabilities, but formidable integrated combat capabilities across the entire range of military operations. To that end, both the *National Military Strategy* and *DoD Strategy for Operating in Cyberspace* recognize cyberspace is no

longer a mere information conduit, but a domain. Like air and space, it is a domain in which we operate to provide effects to achieve our missions. The future of the United States Air Force is in leveraging Airmen's innovation across air, space and cyberspace to deliver integrated effects in support of Joint and Air Component Commanders.

The command must be prepared to face the increasingly complex and sophisticated threats in cyberspace. As the pace of technological and geopolitical change quickens, the ability of Joint Force Commanders to defend our Nation's interests will increasingly rely on the access, persistence and awareness provided by cyberspace systems and capabilities. Determinedly, Twenty-fourth Air Force, located at Joint Base San Antonio-Lackland, Texas, continues to take an operational approach to cyberspace to significantly increase our security posture, defend freedom of action and leverage our effectiveness across Joint and coalition operations.

Assured Access to Space

As we prepare to face the current and future challenges in cyber, AFSPC's oldest domain has its own obstacles. Since the Sputnik launch in 1957 getting to space has been important. However, with the nation's reliance on space capabilities, assured access to space has become one of AFSPC's highest priorities. It is essential we sustain a reliable capability to deliver national security satellites to space. The Evolved Expendable Launch Vehicle (EELV) team continues an unprecedented string of successful national security space (NSS) launches. In 2014, the Atlas V and Delta IV launch vehicles executed 13 launches, nine of which supported NSS missions, extending the record of EELV total launch successes to 78 as of March 2015. These launch vehicles carry some of our most precious spacecraft into orbit including global navigation and timing, missile warning, communications, weather and intelligence spacecraft.

In addition to building on the unprecedented string of launches, the launch enterprise team executed two launches in a span of only four days on the same coast, a remarkable achievement from a dedicated crew. Furthermore, the team also executed two launches in seven days, but from different coasts. The launch enterprise and EELV team remain focused on ensuring 100 percent mission success, one launch at a time.

Within the context of assured access to space, the Command's launch priorities are to reintroduce competition into the EELV program using the mission assurance processes that have made the EELV program successful while eliminating the use of the Russian RD-180 rocket engine. This commitment is exemplified by the dedicated professionals at the AFSPC Space and Missile Systems Center (SMC), under the command of Lieutenant General Sam Greaves, who have worked tirelessly to develop a plan to transition off the RD-180 without sacrificing assured access to space and mission assurance and to certify new entrants into the space launch enterprise.

Collaborating in Mission Assurance

On February 11, 2015, a SpaceX Falcon 9 lifted off from Launch Complex 40 at Cape Canaveral Air Force Station, Florida carrying the Deep Space Climate Observatory (DSCOVR) satellite. DSCOVR is the result of a partnership between the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA) and the Air Force, but more importantly is a prime example of where the Air Force, acting in its capacity as the mission's launch services provider, worked closely with SpaceX in the name of mission assurance. The Air Force and SpaceX teams put in significant effort together over the last two years in preparation for the DSCOVR/Falcon 9 mission. The transparency and collaboration developed over that period of time enabled the combined teams to cooperate in overcoming both

technical challenges and weather issues during the final days of the launch campaign. Ultimately, DSCOVR will be positioned 1.5 million kilometers from Earth to monitor and provide advanced warning of extreme emissions from the sun that could affect power grids and satellite operations. The combined team's focus on mission assurance culminated in a very successful launch and orbital insertion of the DSCOVR satellite, and bodes well for a future Air Force - SpaceX partnership.

Launch Competition

Since 2006, to safely launch our capabilities we have relied on a single industrial partner whose mission success is superior. This was necessary when there was a critical need for robust launch vehicle performance and limited business opportunities; however, the market is now expanding. U.S commercial companies want to invest in, and compete for, government contracts. The U.S. Government now has an opportunity to leverage the growing commercial launch market in order to drive price points on the NSS launch solution that would be more competitive for commercial launch. We are absolutely committed to support competition and a healthy space industrial base. In order to sustain an affordable assured access to space, we must have a healthy industrial base. There are good reasons for exacting standards and rigorous certification; however, we must continue to welcome new partners into this arena. The Air Force is committed to getting new entrants certified as quickly as possible.

Finally, it is important to note that the Secretary of the Air Force has directed a review of our new entrant certification process by an independent team to examine our processes, procedures and personnel resources dedicated to the certification effort as well as capture lessons learned so we can enhance competition for launch services. I strongly support the Secretary's

initiative to review the certification process for potential efficiencies, while protecting mission assurance.

New Engine Development

Russian aggression in Ukraine is a cause for great international concern and created uncertainty with the Russian made RD-180 rocket engine that powers United Launch Alliance's Atlas V launch vehicle. While the RD-180 is a fine engine, uncertainty regarding its future availability highlighted the need to consider other options for assured access to space. The United States should not be reliant on another nation, particularly Russia, to assure our access to space. Upon the completion of an RD-180 Risk Mitigation Study directed by the Secretary of Defense, it became clear that a prolonged interruption would result in increased risk for our national security space posture due to unavoidable delays. We are collaborating with private partners to invest in industry solutions for U.S.-made rocket propulsion systems. We have developed a strategy to eliminate the use of the RD-180 and reintroduce competition for NSS launch. The strategy starts with investment in U.S. based rocket engine technology.

In December 2014, the FY15 National Defense Authorization Act approved $220 million for a new rocket propulsion system to help transition from the Russian RD-180. AFSPC fully supports domestic launch capabilities. However, we must maintain mission success and assured access to space for our NSS assets by ensuring this effort results in a launch system. With the FY15 congressional add, we plan to invest in the first two steps of a four step process to attain domestic, commercially viable launch system providers. The initial investment of roughly $60 million will go towards improving U.S. hydrocarbon boost capability with NASA, national labs, universities and industry. The remaining FY15 funds will be used to start the investment in the development of rocket propulsion systems. Starting with the funds in the FY16 budget, we

intend to expand the investment into the corresponding launch systems, leveraging investments in Rocket Propulsion Systems started with the FY15 funds. Finally, we will onramp the launch providers, in which we invested and once certified, to achieve price competition. The ultimate goal is to have at least two domestic, commercially viable launch system providers that also meet all of our nation's NSS launch requirements. A sustained focus on rocket propulsion technology and the required launch systems allows the United States to operate in a broader trade space, helping to mitigate disruptive events affecting external supply lines. Also, launch systems with domestic engines will revitalize the launch and rocket propulsion industrial base, end reliance on a foreign supplier and aid the competitive outlook for the entire domestic launch industry. This will be a multi-year effort and require significant congressional support to maintain adequate funding in future years, particularly since this effort will require propulsion system integration.

Savings through Block Buys

Building on successful block buy acquisitions by the Advanced Extremely High Frequency (AEHF) and Evolved Expendable Launch Vehicle (EELV) teams in 2013, the Remote Sensing Systems Directorate negotiated a $2 billion satellite production contract to support the acquisition of two new Space-Based Infrared Systems (SBIRS) missile warning satellites. The SBIRS production and contracting team employed critical skills to negotiate and award the contract in June 2014. By leveraging OSD Better Buying Power initiatives and using a block buy strategy, the program office saved $1 billion compared to the OSD estimates, with an overall "should cost" savings of $591 million. These two new satellites are scheduled for delivery in September 2020 and July 2021, ensuring continuity of the Nation's critical missile warning capability.

Space Situational Awareness

Assured access is a priority, however, space situational awareness (SSA) underpins all we do in space from launch to disposal and supports the protection of critical space assets upon which our national leadership, warfighters and civil and commercial space operators depend. We have developed a foundational SSA architecture that will afford the best mix of near earth and deep space sensors, providing quality information to decision makers. While we are routinely tracking some 23,000 objects at the Joint Space Operations Center (JSpOC), our sensors are unable to detect and reliably track what we project to be more than 500,000 man-made objects in orbit today. Currently SSA sensors are tracking where we think objects should be. Space domain awareness is the next evolution, facilitated by the JSpOC Mission System (JMS), and will allow us to know where objects are, when they move unexpectedly, and provide the data for the Commander, Joint Functional Component Command for Space (JFCC-Space) and his forces to respond appropriately.

Joint Space Operations Center (JSpOC) Mission System (JMS)

JMS will provide persistent net-centric delivery of SSA and command and control services to other JFCCs, Joint Task Forces, the Intelligence Community, and SSA data sharing partners. In November 2014, the JMS Program team was successful in providing the requisite capability for the Fourteenth Air Force Commander, Lieutenant General Jay Raymond, to declare operational acceptance of JMS Service Pack 7 for use in the JSpOC; including a $1.1 million upgrade of all computers on the Air and Space Operations Center floor. This iteration of JMS lays the groundwork for the next step of the system's evolution – Service Pack 9, which will operationally transition the Space Catalog to JMS.

JMS is a mission system with an open architecture and a high performance computing environment, designed to give our operators a modern capability to integrate SSA data allowing for predictive awareness, timely threat assessment and mitigation towards true command and control of space forces. For today's warfighter, timely, accurate and actionable information is critical. JMS is laying the foundation, both for improved information architecture and foundational SSA capabilities with Increments 1 and 2. We must continue to drive forward toward Increment 3 and beyond in order to see this vision realized with the threat processing, decision support and enhanced command and control capabilities that include multi classification data fusion.

Geosynchronous Space Situational Awareness Program (GSSAP)/ Space Based Space Surveillance System (SBSS)

AFSPC is continually looking to improve our SSA posture. The first two GSSAP satellites successfully launched in July 2014 are going through checkout. Once complete, the constellation will revolutionize space-based space surveillance operations. It will give us the capability to perform persistent monitoring and neighborhood watch capability in geosynchronous Earth orbit (GEO).

Furthermore, its low Earth orbit (LEO) based predecessor, SBSS celebrated its fourth anniversary on orbit while continuing its tremendous contribution to the Space Surveillance Network.

Operationally Responsive Space (ORS) & SBSS Follow-On

The Air Force is committed to the ORS program office. We are working to launch ORS-4, which will be the first flight demonstration of a rail launcher delivering payloads to orbit. Using a rail launcher allows for a simpler rocket that is spin stabilized instead of using moveable

nozzles on the first stage motor. We are also supporting USSTRATCOM's urgent need for SSA with ORS-5, expected to launch in FY17, and ultimately SBSS Follow-On. ORS-5 started off well in 2014, successfully accomplishing a systems requirements review and one of three prototypes in the program. Additionally, the program office released a draft request for proposal for launch services. This program is a risk-reduction pathfinder to the SBSS Follow-on program.

We feel SBSS Follow-on can significantly benefit from the rapid acquisition and streamlined approach of ORS. It addresses critical USSTRATCOM needs for tracking high interest objects in multiple orbital regimes (GEO, medium Earth orbit (MEO) and HEO), with an emphasis on GEO. The program will meet all requirements, such as frequent revisit rates, better custody of space objects, more detailed event detection (including breakups and separations), as well as identifying emerging threats. While the space based sensors give us the ability to maintain custody and provide re-visit, there is still a need to discover and track smaller and more static objects while maintaining awareness on the larger population.

Space Fence

Another future contributor to the SSA mission is the Space Fence. This ground sensor will replace the already retired Air Force Space Surveillance System and is expected to greatly increase our ability to understand the battlespace and inform warfighter decisions. The increased Space Fence sensitivity, coupled with the increased computing capabilities of JMS, will yield a greater understanding of the space operating environment and associated threats while increasing our knowledge on over one-hundred thousand objects – including debris, active and inactive satellites, and the international space station. The uncued nature of the Space Fence will greatly increase the opportunity to discover satellite breakups, collisions, or unexpected satellite

maneuvers. The Air Force awarded the Space Fence contract to Lockheed Martin in June 2014, with a current projected initial operating capability in the second quarter of FY19.

The Space Fence will be the most significant improvement in near Earth SSA capability in nearly 50 years. It will work in conjunction with the JSpOC and the rest of the Space Surveillance Network to provide an integrated picture of the space operating environment for the warfighter. The delivery of the Kwajalein radar in 2019 will give JFCC-Space nearly complete coverage for detection of near Earth objects as well as improved ability to detect unforeseen or unannounced space events. The Space Fence will not solve all the near Earth needs alone, but will operate in conjunction with the legacy missile warning radars and other space surveillance network sensors.

Better Ways of Doing Business

AFSPC is operating on a budget of $2 billion less than we had two years ago, yet we continue to deliver foundational space capabilities. However, given the current fiscal and operational environment, we cannot simply maintain the status quo. When addressing the question of capability versus affordability, the first requirement is to develop resilient warfighting architectures in space to operate through any degraded environment. After that, we must work within our current budget to ensure the highest level of capability at an affordable and sustainable price.

Budget constraints are forcing us to review our existing space architectures and identify what we need to change in order to improve resiliency, flexibility and affordability. As we look at how we transition to these new architectures, we must take advantage of the opportunities presented by this new environment in the space enterprise while preserving the successes of the past. We have initiated studies to examine several configurations of lower cost satellites,

multiple spacecraft launched on a single booster and reducing the operations footprint through automation. This means looking at every constellation with resiliency and affordability in mind while not losing sight of our responsibility to define requirements correctly from inception.

Resilient Space Systems

Without exception, the first requirement is resilient warfighting architectures in space to operate through any degraded environment. We need a resilient space architecture that can fight through any threat in order to deter potential adversaries and preserve critical space capabilities for the warfighter. There are several methods to consider in achieving resilient space architecture. We're exploring disaggregation, hosted payloads, on-board satellite protection, defensive operations and leveraging commercial capabilities as possible ways to increase overall resiliency. Resiliency includes integrated real-time intelligence through enhanced SSA systems being shared internal to the government and with partner nations. Resilient architectures also include new technologies for enhanced survivability in order to give future operators options to dynamically respond to threats.

Benefiting resiliency, disaggregation is one concept of significant interest as we build future capabilities. Disaggregation is the dispersal of capability across multiple platforms to improve survivability. It complicates an adversary's targeting calculus and increases deterrence by providing a more survivable system solution. Improving the number and diversity of platforms has value regardless of whether the threat is hostile or a naturally occurring phenomenon such as orbital debris impact or satellite failure. Strategic and tactical protected satellite communications, currently provided by large, dedicated satellites such as Milstar and the AEHF constellations, could be separated and placed on smaller platforms as a hosted payload. For space-based sensors, such as SBIRS, the scanning and staring sensors could be flown on

different platforms assuming technology continues to develop as predicted. Finally, it is very likely that the smaller satellite theme will be carried over into the weather system follow-on program.

While disaggregation may help attain resiliency and keep costs down, it is important to remember it is not an all-inclusive answer nor appropriate for all mission areas. Therefore, with every mission area, we will bring forth an answer that incorporates disaggregation along with other capabilities to obtain the resilient capability we need in the future. Ultimately, we do not want to be in a position where the disruption or elimination of one satellite denies our forces the advantages of the warfighting capabilities derived from space. AFSPC completed a broad look into how a disaggregated architecture may affect the space launch enterprise in October 2014. The results of this effort will be incorporated into the Command's continued analysis of the operational and financial impacts related to disaggregation.

Another method of disaggregation is utilizing hosted payloads to provide resilient, affordable military space capabilities in an increasingly contested, congested and competitive space environment. The Air Force will use hosted payloads when it is architecturally feasible to lower cost and still deliver the capability. Hosted payloads can increase the Government's access to space and add resilience to U.S. military space systems through disaggregation, while reducing cost and improving schedule. Consequently, SMC has established a hosted payload office dedicated to examining the efficacy of this concept as an alternative to our current approach to satellites. In 2014, SMC awarded an indefinite-delivery-indefinite-quantity (IDIQ) contract under the Hosted Payload Solutions (HoPS) program. The multiple-award HoPS IDIQ contract provides a rapid and flexible means for the Government to acquire commercial hosting capabilities for government payloads. Award of the HoPS contracts created a pool of qualified

vendors and provides flexibility for up to six hosted payloads. Ultimately, the goal will be to create a streamlined and reproducible procurement vehicle to secure affordable and resilient access to space.

Confronting Budget Challenges

Although resiliency and disaggregation can help with certain aspects of our space budget, our portfolios are shrinking across the command. After making difficult decisions as a result of significant cuts to the Command's Operations and Maintenance (O&M) accounts in FY13, we greatly welcomed the short-term budget relief and flexibility represented in the FY14 and FY15 budgets. The relief provided some measure of recovery from FY13 and enabled our Airmen to make significant accomplishments in 2014 in support of the joint warfighter. I support the President's FY16 budget to help ensure we can sustain these critical space capabilities.

The President, the Secretary of Defense and the Chairman of the Joint Chiefs have all acknowledged the importance of space and cyberspace, but the fact remains there will be incredible competing priorities within the Department. With our Nation's increasing dependence on space and cyberspace, we must adjust to this new normal by challenging the status quo to meet growing demands in these two domains with innovation and dedication. We will scrutinize every contract to squeeze out as much value as we can, examine our acquisition process, and encourage competition at every possible avenue.

Impact of Sequestration

Should we return to funding levels as directed by the Budget Control Act (BCA) of 2011 and its mechanism of sequestration, AFSPC will have a difficult time meeting its operational requirements for the space and cyberspace systems in place today. Additionally, it has the

potential to reverse gains we made in FY14 and FY15 addressing infrastructure and range maintenance, readiness and modernization.

Sequestration's impact on the Launch Test Range System could mean reduced launch time on the ranges or a reduction in the number and types of assets available to range users, thus reducing redundant capabilities to a minimum and significantly increasing launch on time risks. These reductions would make range assets unavailable to the warfighter and it is important to note, similar actions in FY13 led to a multi-day launch slip.

Within the investment portfolio, sequestration threatens FY16 competitive launch opportunities. Programs such as SBIRS 5-6, AEHF 5-6 and Space Fence will incur significant cost impacts if program offices cannot meet contractual funding requirements due to fixed price contracts. A funding shortfall will make it necessary to renegotiate contracts resulting in cost increases and delays.

Additionally, sequestration will impact facility sustainment, restoration and modernization programs resulting in deferral of critically needed facilities and infrastructure maintenance and repair projects. For example, the range communications facility at Cape Canaveral Air Force Station is a 58-year-old structurally compromised facility prone to severe flooding creating mission risk for eastern range launch operations and putting recent equipment upgrades at risk. The FY16 funding request for Military Construction includes $21 million for the construction of a new, state of the art, multi-level facility to accommodate modern communications equipment. With congressional support, the construction of a new range communications facility will not only reduce energy and maintenance costs, but also increase safe execution of spacelift operations for all organizations launching out of the eastern range.

Conclusion

Space and cyberspace have not only become ubiquitous in our daily life, but have fundamentally changed how we fight and win wars. The integration of these domains will prove to be our success or failure. Therefore we must ensure unfettered delivery of these effects; effects from systems such as satellite communications, missile warning, position, navigation and timing, environmental sensing and supporting ground architecture. Given today's budget reality and looking forward, we will continue to work harder and smarter to meet warfighter demands while developing resilient warfighting architectures in space and cyberspace to operate through any degraded environment. We have overcome the challenges of the past with the ingenuity and dedication our Airmen are known for and stand ready to meet the future with the same commitment.

I look forward to working with Congress and this Subcommittee to keep you abreast of our efforts to provide resilient, capable and affordable space and cyberspace capabilities for the joint force and the Nation. Thank you for the opportunity to appear before this Subcommittee and for your continued support of AFSPC and our talented Airmen.

General John E. Hyten

Gen. John E. Hyten is Commander, Air Force Space Command, Peterson Air Force Base, Colorado. He is responsible for organizing, equipping, training and maintaining mission-ready space and cyberspace forces and capabilities for North American Aerospace Defense Command, U.S. Strategic Command and other combatant commands around the world. General Hyten oversees Air Force network operations; manages a global network of satellite command and control, communications, missile warning and space launch facilities; and is responsible for space system development and acquisition. The command comprises approximately 40,000 space and cyberspace professionals assigned to 134 locations worldwide. General Hyten also directs and coordinates the activities of the headquarters staff.

General Hyten attended Harvard University on an Air Force Reserve Officer Training Corps scholarship, graduated in 1981 with a bachelor's degree in engineering and applied sciences and was commissioned a second lieutenant. General Hyten's career includes assignments in a variety of space acquisition and operations positions. He served in senior engineering positions on both Air Force and Army anti-satellite weapon system programs.

The general's staff assignments include tours with the Air Force Secretariat, the Air Staff, the Joint Staff and the Commander's Action Group at Headquarters Air Force Space Command as Director. He served as mission director in Cheyenne Mountain and was the last active-duty commander of the 6th Space Operations Squadron at Offutt AFB, Nebraska. In 2006, he deployed to Southwest Asia as Director of Space Forces for operations Enduring Freedom and Iraqi Freedom. General Hyten commanded the 595th Space Group and the 50th Space Wing at Schriever AFB, Colo. Prior to assuming command of Air Force Space Command, he served as the Vice Commander, Air Force Space Command.

EDUCATION

1981 Bachelor's degree in engineering and applied sciences, Harvard University, Cambridge, Mass.
1985 Master of Business Administration degree, Auburn University, Montgomery, Ala.
1985 Distinguished graduate, Squadron Officer School, Maxwell AFB, Ala.
1994 Distinguished graduate, Air Command and Staff College, Maxwell AFB, Ala.
1999 National Defense Fellow, University of Illinois, Champaign, Ill.
2011 Senior Managers in Government Course, Harvard University, Cambridge, Mass

ASSIGNMENTS

1. November 1981 - December 1985, Configuration Management Officer and Chief, Configuration Management Division, Automated Systems Program Office, Gunter AFB, Ala.
2. December 1985 - July 1989, Chief, Software Development Branch; and Chief, Engineering and Acquisition Division, Space Defense Programs Office, Los Angeles AFB, Calif.
3. August 1989 - July 1990, Special Adviser to the U.S. Army, Kinetic Energy Anti-Satellite Program Office, U.S. Army Strategic Defense Command, Huntsville, Ala.
4. July 1990 - August 1991, Deputy for Engineering, Strategic Defense Initiatives Program Office, Los Angeles AFB, Calif.
5. August 1991 - May 1992, Executive Speechwriter and Systems Analyst, Assistant Secretary of the Air Force (Acquisition), the Pentagon, Washington, D.C.
6. May 1992 - July 1993, Program Element Monitor, Advanced Technology Programs, Assistant Secretary of the Air Force (Acquisition), the Pentagon, Washington, D.C.

7. July 1993 - June 1994, Student, Air Command and Staff College, Maxwell AFB, Ala.
8. July 1994 - June 1996, Mission Director, Space Operations Officer, and Chief, Command Center Training, U.S. Space Command, Cheyenne Mountain Air Force Station, Colo.
9. August 1996 - August 1998, Commander, 6th Space Operations Squadron, Offutt AFB, Neb.
10. August 1998 - June 1999, National Defense Fellow, University of Illinois, Champaign
11. June 1999 - June 2001, Operations Officer, and Chief, Space Branch, Defense and Space Operations Division, Deputy Director for Operations (Current Readiness and Capabilities), J3, Joint Staff, the Pentagon, Washington, D.C.
12. June 2001 - June 2003, Chief, Space Control Division, Directorate for Space Operations and Integration, Deputy Chief of Staff for Air and Space Operations, Headquarters U.S. Air Force, Washington, D.C.
13. June 2003 - July 2004, Director, Commander's Action Group, Headquarters Air Force Space Command, Peterson AFB, Colo.
14. July 2004 - April 2005, Commander, 595th Space Group, Schriever AFB, Colo.
15. April 2005 - May 2007, Commander, 50th Space Wing, Schriever AFB, Colo. (May 2006 - October 2006, Director of Space Forces, U.S. Central Command Air Forces, Southwest Asia)
16. May 2007- September 2009, Director of Requirements, Headquarters Air Force Space Command, Peterson AFB, Colo.
17. September 2009 - February 2010, Director, Cyber and Space Operations, Directorate of Operations. Deputy Chief of Staff for Operations, Plans and Requirements, Headquarters U.S. Air Force, Washington, D.C.
18. February 2010 - August 2010, Director, Space Acquisition, Office of the Under Secretary of the Air Force, the Pentagon, Washington, D.C.
19. September 2010 - May 2012, Director, Space Programs, Office of the Assistant Secretary of the Air Force for Acquisition, Washington, D.C.
20. May 2012 - Aug 2014, Vice Commander, Air Force Space Command, Peterson AFB, Colo.
21. Aug 2014 – present, Commander, Air Force Space Command, Peterson AFB, Colo.

SUMMARY OF JOINT ASSIGNMENTS
1. July 1994 - June 1996, Mission Director, Space Operations Officer, and Chief, Command Center Training, U.S. Space Command, Cheyenne Mountain Air Force Station, CO., as a major
2. June 1999 - June 2001, Operations Officer, and Chief, Space Branch, Defense and Space Operations Division, Deputy Director for Operations (Current Readiness and Capabilities), J3, Joint Staff, the Pentagon, Washington, D.C., as a lieutenant colonel

BADGES
Master Space Operations Badge
Master Cyberspace Operator Badge

MAJOR AWARDS AND DECORATIONS
Distinguished Service Medal
Legion of Merit with oak leaf cluster
Defense Meritorious Service Medal with two oak leaf clusters
Meritorious Service Medal with four oak leaf clusters
Air Force Commendation Medal Army Commendation Medal Joint Staff Achievement Medal Air Force Achievement Medal

OTHER ACHIEVEMENTS
1991 Recipient of the William Jump Award for Excellence within the Federal Government
1998 Recipient of a Laurels Award, Aviation Week and Space Technology Magazine
2009 Gen. Jerome F. O'Malley Distinguished Space Leadership Award

PUBLICATIONS
"A Sea of Peace or a Theater of War: Dealing with the Inevitable Conflict in Space," The Program in Arms Control, Disarmament, and International Security Occasional Paper, University of Illinois, 2000 "A Sea of Peace or a Theater of War," Air and Space Power Journal, Air University Press, 2002
"Moral and Ethical Decisions Regarding Space Warfare," with Dr. Robert Uy, Air and Space Power Journal, Air University Press, 2004

EFFECTIVE DATES OF PROMOTION
Second Lieutenant Aug. 23, 1981
First Lieutenant Aug. 23, 1983
Captain Aug. 23, 1985
Major May 1, 1993
Lieutenant Colonel Jan. 1, 1997
Colonel June 1, 2002
Brigadier General Oct. 1, 2007
Major General Nov. 10, 2010
Lieutenant General May 18, 2012
General Aug. 15, 2014

(Current as of August 2014)

STATEMENT OF

DOUGLAS LOVERRO
DEPUTY ASSISTANT SECRETARY OF DEFENSE
(SPACE POLICY)

BEFORE THE
HOUSE COMMITTEE ON ARMED SERVICES
SUBCOMMITTEE ON STRATEGIC FORCES

ON
FISCAL YEAR 2016 NATIONAL DEFENSE AUTHORIZATION BUDGET REQUEST FOR
NATIONAL SECURITY SPACE ACTIVITIES

MARCH 25, 2015

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.

Douglas L. Loverro
Deputy Assistant Secretary of Defense for Space Policy

Mr. Douglas L. Loverro, a member of the Senior Executive Service, is the Deputy Assistant Secretary of Defense for Space Policy. In this role, he is responsible for establishing policy and guidance to assure United States and allied warfighters the benefits of Space capabilities and to help guide the Department's strategy for addressing space-related issues. He also leads Departmental activities in international space cooperation.

Mr. Loverro most recently served as the Executive Director for Air Force Space Command's Space and Missile Systems Center where he also served as the Air Force's Deputy Program Executive Officer (PEO) for Space. In that capacity, he was responsible to the commander and PEO for the development, deployment, and sustainment of all Department of Air Force space systems and was a key spokesman for addressing the growing importance of space systems and the steps needed to assure them for the future. He has been involved in the planning and acquisition of Department of Defense (DoD) and Sace Intelligence systems for over twenty years, both in and out of uniform.

Mr. Loverro is credited with a wide-ranging list of accomplishments in aerospace development including the invention of the supersonic chemical oxygen-iodine laser, the initiation of the DoD's Global Broadcast Service, establishing the foundation for all Global Positioning System modernization, and leading the push for greater use of commercial manufacturing and capabilities for future DoD space and launch systems. He retired from active duty in February 2006 upon selection as a member of the Defense Intelligence Senior Executive Service. He assumed his current role in March 2013.

Mr. Loverro holds a B.S. in Chemistry from the United States Air Force Academy, an M.S. in Physics from the University of New Mexico, an M.S. in Political Science from Auburn University, and an M.B.A. from the University of West Florida. He was the top graduate from his class in the Industrial College of the Armed Forces and is a graduate of the JFK School of Government Senior Executives in National and International Security Program.

Mr. Loverro is married to Stephanie Loverro and they have two children, Adam and Kari. He is an avid triathlete and is in competition with his daughter, who is winning.

STATEMENT OF

MR. DYKE WEATHERINGTON
ACTING DEPUTY ASSISTANT SECRETARY OF DEFENSE
FOR SPACE, STRATEGIC, AND INTELLIGENCE SYSTEMS

BEFORE THE HOUSE COMMITTEE
ON ARMED SERVICES
SUBCOMMITTEE ON STRATEGIC FORCES

MARCH 25, 2015

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UNITED STATES HOUSE OF REPRESENTATIVES

Introduction

Chairman Rogers, Ranking Member Cooper, and Members of the Subcommittee, I am pleased to join General Hyten, Lt. General Raymond, Ms. Sapp, Mr. Cardillo and Mr. Loverro to testify on Department of Defense space programs.

The Nation's space-based systems are vital to U.S. warfighting, homeland security, and our way of life. In recent years, Program Executive Officers for Space have satisfied the Department's requirements for these space-based capabilities while simultaneously negotiating contracts that drive down the costs for these systems. However, our space systems today are facing demonstrated and rapidly evolving threats. In the face of these threats, we and our industrial partners need to think differently about how we prioritize requirements and develop, produce, and operate our next generation space capabilities.

The Threat:

Our dependence on space capabilities has increased as they have become integral to our national security enterprise. Further, although we maintain a substantial asymmetric advantage as a result of those investments, the rapid evolution and expansion of threats to our space capabilities in every orbit regime has highlighted the converse: an asymmetric disadvantage due to the inherent susceptibilities and increasing vulnerabilities of our space systems. Adapting to this new threat environment is driving an increasing mutual dependence between the Department and the Intelligence Community. The Department and the Intelligence Community will need to re-evaluate: (1) our prioritization among requirements for added capability and increased resiliency for future space acquisitions; (2) the areas of emphasis for our space Science and Technology efforts; (3) how we think about and conduct architectural planning for future space capabilities; (4) how and at what pace we develop and manufacture these capabilities and the resulting implications for the space industrial base; (5) how we think about access to space, space control--including space situational awareness, offensive and defensive space control, and intelligence support; and (6) related policy, strategy, doctrine, concepts of operations, and TTPs.

In May 2014, Deputy Secretary of Defense Work directed a Department-wide review, the Strategic Portfolio Review (SPR) for Space, to assess whether the Department's investments align properly with overarching policy and strategy goals in light of the evolving threat environment. In the first phase of the SPR, we worked closely with the Services and the Intelligence Community to develop integrated strategic goals, posture options, and frameworks necessary to align the space enterprise with the National Space Policy and the National Security Space Strategy. The Department's strategy emphasizes deterrence, but also assures warfighting effectiveness should deterrence fail. The Department expands FY2016 and future investments to: assure space capabilities against aggressive and comprehensive counterspace programs through resilient capabilities, agile defense, and reconstitution; and provide the space situational awareness to support our goals.

Budget:

The President's Fiscal Year 2016 budget includes targeted investments in modernized space capabilities geared toward countering emerging threats that could upend our technological superiority and our ability to project power. We can provide a full account of our proposed modernization investments, and the threats that compel them, in a classified setting. However, I would like to amplify details about a few specific programs that offer insight into how we are balancing our acquisition approaches with our look to the future:

Space Based Infrared System (SBIRS)

In June 2014, the Air Force awarded the SBIRS Geosynchronous Earth Orbit (GEO) satellites 5 and 6 production contract. SBIRS GEO satellites 5 and 6 are replenishment satellites for GEO satellite 1 and 2 currently in operation, on orbit. The fixed price incentive fee contract approach combined with the two satellite block-buy saved $980 million when compared to the Government's independent cost estimate. SBIRS continues to leverage Space Modernization Initiative (SMI) investments to improve affordability and to remain effective in the strategic environment. SBIRS has developed SMI strategies to invest in program efforts that create trade space for future

acquisition decisions through investments to sustain or improve their current Programs of Record and to plan for the future by exploring competition, affordable technology alternatives and architectures.

The SBIRS Follow-On AoA is being conducted to inform FY17 funding decisions related to the SBIRS program of record (POR). Concerns have been raised by Congress and within the Department regarding future obsolescence costs for the SBIRS POR as well as technology insertion to address future threats. Conducting this AoA will inform materiel solutions to maintain our technological edge in the mission areas addressed by SBIRS.

Space Fence

The continued growth in use of space coupled with irresponsible actions such as China's 2007 destructive anti-satellite test has resulted in an increasingly congested space domain. As an example of this challenge, just last month an inactive Defense Meteorological Satellite Program (DMSP) satellite exploded, producing 43 new tracked pieces of debris. The resulting space debris poses a significant risk to safe and effective, manned and unmanned space operations. Addressing the risk posed by orbital debris requires new capabilities to track and process positional information to support effective conjunction assessments and notifications to reduce the chance of on-orbit collisions. To address this challenge, the department included funding in the FY 2016 budget to accelerate the delivery of the Joint Space Operations Center Mission System (JMS). JMS will provide enhanced data fusion and processing capabilities needed to maintain a larger catalog of the smaller debris objects. In conjunction with JMS, Space Fence will provide dramatically enhanced uncued detection and surveillance capabilities of the most threatening small and medium objects in Low Earth Orbit (LEO). The primary mission of Space Fence is to identify objects in low-earth orbit that are potentially a danger to our space assets. Maintaining the catalog of all LEO objects, including active satellites, is a secondary Space Fence mission. The Air Force awarded the Space Fence contract in June 2014 and recently completed a successful Critical

Design Review. The program is on track to achieve Initial Operational Capability in FY 2019.

Evolved Expendable Launch Vehicle (EELV)

Our assured access to space provides national security decision-makers with unfettered global access and unprecedented advantages in national decision-making, military operations, and homeland security. Maintaining the benefits afforded to the United States by space is central to our national security, and enabling our space operations requires we have access to efficient and reliable space launch capabilities, that are robust, responsive and resilient. The DoD's focus on sound and disciplined systems engineering practices, what we call our Mission Assurance Process, emerged from very hard lessons learned from a string of costly failures in the late 1990's. Over the past 15 years, this National Security Space (NSS) Mission Assurance Process has proven to be exceptionally effective with an incredible record of 81 successful operational EELV missions since 2002 and 107 National Security missions since 1999. We champion mission assurance because the cost of a single launch failure, especially one with a multibillion dollar satellite on board, can very quickly overwhelm any savings achieved by overly aggressive cost-cutting acquisition strategies. This is why we consider certification of new entrants, and mission assurance for all launch service providers, to be essential elements of our Assured Access to Space. As we employ the certification process with new entrants to the EELV program, we continue this focus in cooperation with each of the prospective EELV new entrants. Our rigorous multi-step certification process ensures all new launch service providers meet the existing high NSS standards for design and operational reliability. We will continue to learn and evolve this process as new entrants are certified for the EELV program.

As a direct result of our concerted efforts to apply the Department's Better Buying Power principles to the EELV program, we successfully negotiated and awarded a long-term contract for new EELV launch services and the capability to launch previously procured services. This contract effectively stabilizes the U.S. launch industrial base

through 2019 while continuing to support a strategy that has saved the Department and taxpayers more than $4.4 billion.

The Air Force's strategy to introduce competition into the EELV program provides the opportunity for multiple potential launch providers to successfully complete the New Entrant Certification process through the joint development of New Entrant Certification Plans. The Air Force works cooperatively with all potential new providers to confirm their understanding of the certification process and its requirements while ensuring they meet the stringent mission assurance standards necessary to launch our Nation's national security payloads. In the FY 2016 Program Budget Review (PBR) the Department continues to work to increase, in the near term, the number of competitive launch service procurement opportunities available to industry.

The Department is deliberately working towards new entrant certification with Space X, expending significant manpower and funding on the effort. Certification is, by design, a rigorous, resource intensive, multistep process. The process uses sound systems engineering principles designed to ensure compliance with robust NSS Mission Assurance standards. This is the standard that has been a critical element of our launch successes over the last 15 years and it will continue to be applied to all EELV launch service providers.

Dependence on Russian Engines (RD-180)

Our NSS payloads are launched on vehicles acquired under the Evolved Expendable Launch Vehicle (EELV) program which currently uses the Atlas V and Delta IV families of launch vehicles. The Russian produced RD-180 rocket engine is the propulsion system used to power the Atlas V first stage and provides access to space for some of our most critical national security space payloads. There were sound policy and cost savings reasons for the original decision to allow the incorporation of this engine into a US launch vehicle. One of the considerations explicitly addressed at the time of that decision – and periodically since that time -- was the risk associated with utilizing a

non-US-manufactured article for a critical national security capability. Recent geo-political events have renewed our concerns about this practice.

We are working with Congress to eliminate our utilization of the RD-180 rocket engine. As we also work with industry to develop a new domestically-powered launch capability, the Department would like to make that transition as efficient and affordable as possible. Unfortunately the timing associated with the FY2015 National Defense Authorization Act (NDAA) section 1608 language causes some difficulty during the next phase of EELV procurements to the degree that precluding the use of the RD-180 engine could adversely impact our ability to conduct price based competition and adversely impact our goal of having two viable domestic providers capable of lifting the entire NSS manifest, thus increasing our domestic capabilities and providing opportunities for cost reductions. The ultimate goal is for the Department to have two or more commercially-viable launch service providers capable of launching the entire NSS manifest using domestically produced propulsion systems.

Military Satellite and Commercial Satellite Communications

The Department's current satellite communications capability is comprised of a mix of military communications satellites and commercial SATCOM (COMSATCOM) leases. DoD will continue to maximize the use of our MILSATCOM capabilities to satisfy enduring requirements and the exigencies of worldwide 24/7 access and control. The Department will also continue to use COMSATCOM when military capacity is unavailable, when user demand exceeds the supply of Wideband Global SATCOM (WGS) capacity, or when the users' ground infrastructure (e.g., ground stations) will only operate over commercial satellites. The current distribution of capability was driven by the exigencies of Operations Enduring Freedom (in Afghanistan) and Iraqi Freedom (in Iraq) and is partially funded with Overseas Contingency Operations (OCO) supplemental funds.

The Department is conducting an analysis of alternatives to inform the investment path towards a future protected satellite communications services design that is effective in the emerging, contested environment and provides the connectivity

required during crises. Although focused on providing a comparison of alternatives for protected satellite communications, the AoA considers contributions from the aerial and surface network layers as well. The analysis is still ongoing, but we expect the initial results to inform near-term acquisition decisions for AEHF and other programs that contribute to this most critical feature of our national defense posture.

The Department will explore alternative approaches to more cost-effectively procure COMSATCOM services through a series of pathfinders. DoD will report its pathfinder plan to Congress in its response to FY15 NDAA section 1605 – Pilot Program for Acquisition of Commercial Satellite Communication Services. The results of these and previous pathfinder activities are also informing the ongoing protected satellite communication Analysis of Alternatives.

Global Positioning System (GPS)

The Air Force launched four GPS IIF satellites in 2014 and has scheduled the next three space vehicles in the series for launch during 2015. GPS Block II Electronic Protection reached Initial Operating Capability (IOC) in 2014. This milestone provides the following Selective Availability Anti-Spoofing Module (SAASM) operations: Special Navigation, Over The Air Distribution and Over The Air Rekey, increasing resiliency and our ability to operate in increasingly hostile electronic environments. The next series of GPS satellites, GPS III, continued development on satellite vehicles (SV) 1 and 2 as well as the procurement for SV 10.

Our Next Generation Operational Control Segment (OCX), providing ground control for the GPS constellation, will provide enormous improvements to the system. For example, OCX will increase accuracy and lift the current limit on the number of satellites in the constellation, achieving better geometry in difficult to reach areas.

On February 5, 2015, USD (AT&L) conducted a Deep Dive Review of OCX to review the program cost, schedule, and performance. As a result of the meeting, the Air Force recommended establishment of cost and schedule "tripwires" for a future OSD program review. The GPS Program Office is currently conducting a Baseline review of

the current OCX program and will be submitting a revised baseline in the next three months.

Weather Satellite Follow-On (WSF)

During 2012 and 2013, the Department conducted a Space Based Environmental Monitoring (SBEM) Analysis of Alternatives (AoA). The AoA concluded that SBEM sensors operated by civil agencies and international partners could satisfy eight of eleven JROC-validated "weather gaps." The Air Force was directed to develop materiel solutions for the remaining three gaps: ocean surface vector winds, tropical cyclone intensity, and energetic charged particles. WSF is the acquisition program (pre-MDAP) that will provide this solution.

Conclusion

As I alluded to within this statement, the space domain has changed in fundamental ways. Space is no longer a sanctuary and we can no longer take space mission assurance for granted. Likewise, we can no longer invest and acquire our vital space capabilities under that same assumption.

Finally, I want to say a few words about sequestration and the Budget Control Act. Sequestration may very well return in Fiscal Year 2016 – and, even if it does not, the continuing threat of sequestration makes sound investments in space challenging. The rise of foreign counterspace capabilities, coupled with the overall decline in U.S. research and development investments, is jeopardizing our technological superiority. Sequestration can only harm our ability to address these concerns in an already constrained fiscal environment.

Dyke D. Weatherington
Principal Director, Space, Strategic and Intelligence Systems

Mr. Dyke Weatherington is the Principal Director, Space, Strategic and Intelligence Systems (SSI), Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD (AT&L)), Pentagon, Washington, D.C. He is responsible for acquisition shaping and oversight of space, strategic manned and unmanned aircraft, intelligence programs and treaty compliance executed by the DoD.

Mr. Weatherington's prior duties included Deputy Director, Intelligence, Surveillance and Reconnaissance in the SSI. His IC portfolio includes major system acquisition programs of the National Reconnaissance Office (NRO), National Geo-Spatial Agency (NGA), National Security Agency (NSA), and Defense Intelligence Agency (DIA). His DoD portfolio included Global Hawk, Triton NATO Alliance Ground Surveillance, Long Range Strike – Bomber and B-2, weapons systems. He serves as the SSI Senior Acquisition Officer and the primary liaison between Joint Staff, Services, Agencies, and Congress, facilitating actions to achieve cost, schedule, and performance goals and advising the Milestone Decision Authority on space, strategic, and intelligence program acquisition decisions. Mr. Weatherington was also the functional lead for the Deputy Secretary of Defense directed Unmanned Aircraft Systems Task Force that serves as a forum for the Military Departments to collaborate on UAS initiatives and resolve issues. He also serves as Chairman of the multi-agency UAS Executive Committee Senior Steering Group that addresses UAS access to the National Airspace System for the DoD, Federal Aviation Administration, Department of Homeland Security and National Aeronautics and Space Administration.

Prior to his assignment to SSI, Mr Weatherington was the Deputy Director, Unmanned Warfare and ISR, Strategic & Tactical Systems.

Mr. Weatherington holds a Bachelor of Science degree in engineering mechanics from the United States Air Force Academy (1981) and a Master of Arts in National Securities Studies from California State University (1993). He is also a graduate of the Air Force Air Command and Staff College and the Defense Systems Management College. He has been awarded numerous OSD and Air Force decorations including the Airman's Medal and OUSD Exceptional Civilian Service Award.

STATEMENT OF

LIEUTENANT GENERAL JOHN W. RAYMOND

COMMANDER

JOINT FUNCTIONAL COMPONENT COMMAND FOR SPACE

BEFORE THE HOUSE ARMED SERVICES SUBCOMMITTEE ON STRATEGIC FORCES

ON FISCAL YEAR 2016 NATIONAL DEFENSE AUTHORIZATION BUDGET REQUEST

FOR SPACE PROGRAMS

25 MARCH 2015

HOUSE ARMED SERVICES SUBCOMMITTEE ON STRATEGIC FORCES

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.

Lieutenant General John W. "Jay" Raymond

Lt. Gen. John W. "Jay" Raymond is Commander, 14th Air Force (Air Forces Strategic), Air Force Space Command; and Commander, Joint Functional Component Command for Space, U.S. Strategic Command, Vandenberg Air Force Base, Calif.

As the U.S. Air Force's operational space component to USSTRATCOM, General Raymond leads more than 20,500 personnel responsible for providing missile warning, space superiority, space situational awareness, satellite operations, space launch and range operations. As Commander, JFCC SPACE, he directs all assigned and attached USSTRATCOM space forces providing tailored, responsive, local and global space effects in support of national, USSTRATCOM and combatant commander objectives.

General Raymond was commissioned through the ROTC program at Clemson University in 1984. He has commanded the 5th Space Surveillance Squadron at Royal Air Force Feltwell, England; the 30th Operations Group at Vandenberg Air Force Base, Calif.; and the 21st Space Wing at Peterson AFB, Colo. He deployed to Southwest Asia as Director of Space Forces in support of operations Enduring Freedom and Iraqi Freedom. The general's staff assignments include Headquarters Air Force Space Command, United States Strategic Command, the Air Staff and the Office of Secretary of Defense. Prior to his current assignment, General Raymond was the Director of Plans and Policy, Headquarters United States Strategic Command, Offutt AFB, Neb.

EDUCATION

1984 Bachelor of Science degree in administrative management, Clemson University, S.C.
1990 Squadron Officer School, Maxwell AFB, Ala.
1990 Master of Science degree in administrative management, Central Michigan University
1997 Air Command and Staff College, Maxwell AFB, Ala.
2003 Master of Arts degree in national security and strategic studies, Naval War College, Newport, R.I.
2007 Joint Forces Staff College, Norfolk, Va.
2011 Combined Force Air Component Commander Course, Maxwell AFB, Ala.
2012 Joint Flag Officer Warfighting Course, Maxwell AFB, Ala.

ASSIGNMENTS

1. August 1985 - October 1989, Minuteman intercontinental ballistic missile crew commander; alternate command post; flight commander and instructor crew commander; and missile procedures trainer operator, 321st Strategic Missile Wing, Grand Forks AFB, N.D.
2. October 1989 - August 1993, operations center officer controller, 1st Strategic Aerospace Division, and executive officer, 30th Space Wing, Vandenberg AFB, Calif.
3. August 1993 - February 1996, Chief, Commercial Space Lift Operations, assistant Chief, Current Operations Branch, Headquarters Air Force Space Command, Peterson AFB, Colo.
4. February 1996 - August 1996, Deputy Director, Commander in Chief's Action Group, Headquarters Air Force Space Command, Peterson AFB, Colo.
5. August 1996 - June 1997, student, Air Command and Staff College, Air University, Maxwell AFB, Ala.
6. June 1997 - August 1998, space and missile force programmer, Headquarters U.S. Air Force, Washington, D.C.
7. September 1998 - April 2000, Chief, Expeditionary Aerospace Force Space and Program Integration, Expeditionary Aerospace Force Implementation Division, Headquarters U.S. Air Force, Washington, D.C.
8. April 2000 - June 2001, Commander, 5th Space Surveillance Squadron, Royal Air Force Feltwell, England

9. June 2001 - July 2002, Deputy Commander, 21st Operations Group, Peterson AFB, Colo.
10. July 2002- June 2003, student, Naval War College, Newport, R.I.
11. June 2003 - June 2005, transformation strategist, Office of Force Transformation, Office of the Secretary of Defense, Washington, D.C.
12. June 2005 - June 2007, Commander, 30th Operations Group, Vandenberg AFB, Calif. (September 2006 - January 2007, Director of Space Forces, Combined Air Operations Center, Southwest Asia)
13. June 2007 - August 2009, Commander, 21st Space Wing, Peterson AFB, Colo.
14. August 2009 - December 2010, Director of Plans, Programs and Analyses, Headquarters Air Force Space Command, Peterson AFB, Colo.
15. December 2010 - July 2012, Vice Commander, 5th Air Force, and Deputy Commander, 13th Air Force, Yokota Air Base, Japan
16. July 2012 – January 2014, Director of Plans and Policy (J5), U.S. Strategic Command, Offutt AFB, Neb.
17. January 2014 - present, Commander, 14th Air Force (Air Forces Strategic), Air Force Space Command, and Commander, Joint Functional Component Command for Space, USSTRATCOM, Vandenberg AFB, Calif.

SUMMARY OF JOINT ASSIGNMENTS
1. June 2003 - June 2005, transformation strategist, Office of Force Transformation, Office of Secretary of Defense, Washington, D.C., as a colonel
2. July 2012 – January 2014, Director of Plans and Policy (J5), U.S. Strategic Command, Offutt AFB, Neb.
3. January 2014 - present, Commander, Joint Functional Component Command for Space, USSTRATCOM, Vandenberg AFB, Calif., as a lieutenant general

OPERATIONAL INFORMATION
Badges: Master Space Operations Badge, Master Missile Operations Badge
Systems: Minuteman III, Deep Space Tracking System, Counter Communications System

MAJOR AWARDS AND DECORATIONS
Distinguished Service Medal Defense Superior Service Medal Legion of Merit with oak leaf cluster
Meritorious Service Medal with four oak leaf clusters
Air Force Commendation Medal
Combat Readiness Medal
Global War on Terror Expeditionary Medal
Global War on Terrorism Service Medal

OTHER ACHIEVEMENTS
2007 General Jerome F. O'Malley Distinguished Space Leadership Award, Air Force Association

EFFECTIVE DATES OF PROMOTION
Second Lieutenant July 20, 1984
First Lieutenant July 20, 1986
Captain July 20, 1988
Major July 1, 1996
Lieutenant Colonel July 1, 1999
Colonel July 1, 2004
Brigadier General Aug. 19, 2009
Major General May 4, 2012
Lieutenant General Jan. 31, 2014

(Current as of January 2014)

Statement for the Record

House Armed Services Committee

Subcommittee on Strategic Forces

Hearing on the

Fiscal Year 2016 Budget Request for National Security Space Programs

Robert Cardillo

Director, National Geospatial-Intelligence Agency

25 March 2015

INTRODUCTION

Chairman Rogers, Ranking Member Cooper and distinguished members of the Committee, thank you for the opportunity to appear alongside my colleagues to discuss defense space programs. Space capabilities have long provided strategic national security advantages for the United States. Their importance to geospatial intelligence, or GEOINT, cannot be undervalued.

The National Geospatial-Intelligence Agency (NGA) is the nation's primary provider of GEOINT for the Department of Defense (DoD) and the Intelligence Community (IC).

Every local, regional and global conflict, crisis or challenge — now and into the future — has geolocation at its heart. In a world where everything has a geolocation record, GEOINT delivers spatial awareness, temporal context, insight and ultimately understanding and security by exposing threats and revealing the unknown activities in a world of accelerating change and complexity.

In addition, whenever DoD sails a ship, flies an aircraft, makes a policy decision, responds to disasters, or even navigates with a smartphone, they rely on NGA and its continued access to space-based systems.

To do our work, NGA obtains data from a wide array of platforms to produce geospatial intelligence. These sensors we use are not exclusively space borne; however, our assured access to space and space services is critical to accomplishing NGA's diverse, worldwide missions. Our missions include foreign intelligence, mapping, targeting and safety of navigation, and provisioning geospatial information to first responders during natural disasters and relief operations.

We acquire our space-borne data through partnerships with U.S. government agencies, international agreements and commercial partnerships.

And we use space-based communications systems to manage a GEOINT enterprise that operates around the globe and where our data and finished products are consumed by customers around the world.

The President's Budget for Fiscal Year 2016 (FY16) supports our mission requirements for space and space-based systems and services.

I would like to highlight a few areas.

NGA AND GPS

One program that is critical to the DoD and NGA is the NAVSTAR Global Positioning System (GPS) operated by the U.S. Air Force. It is the most exploited space-based asset that the U.S. government has ever developed. As GPS provides space-based radio navigation for anyone with a GPS receiver, both civilian and military uses have increased exponentially.

U.S. national security, transportation and navigation safety, economic interests, and many scientific disciplines all rely on GPS. This increasing dependence demands that the coordinate information and reference system be both accurate and accessible. NGA plays an essential role in maintaining and improving the accuracy and reliability of GPS by providing the DoD with precise GPS orbits, satellite and station clock corrections, and Earth-orientation information. NGA is thus both a daily consumer of GPS as well as a robust contributor to the system.

NGA and its predecessor organizations have partnered with the DOD to develop and maintain the World Geodetic System 1984 (WGS 84) as the standard geodetic frame of reference. The WGS 84 global reference frame provides a mathematical representation of the Earth's shape, a 3-D coordinate system and a gravity model that is essential for computing satellite orbits and precise locations on, above or below the Earth's surface. This global reference information is what allows users to determine their locations on Earth based on the precise positions of GPS satellites in space. Without WGS 84, bombs would not be smart, maps would not be accurate and imagery would not be precise. In essence, WGS 84 provides the ability for the nation to assess intelligence and conduct modern military operations.

NATIONAL SYSTEMS

Turning to space-based reconnaissance, NGA relies heavily on platforms and services designed, built and launched by the National Reconnaissance Office (NRO). Their CORONA, GAMBIT and HEXGON programs were extraordinary achievements developed in an era when we enjoyed a monopoly on imagery from space and data was a strategic national asset during the Cold War. Their subsequent innovations have furnished a modern suite of space-borne sensors to meet the most demanding challenges of the 21st century.

In recent months, I can attest that NRO space-borne assets have met national security requirements that only such national technical means programs could accomplish.

As the functional manager for GEOINT, I oversee the formulation of current and future GEOINT requirements and evaluate the performance of sensor systems to meet those needs. As I look to the future, our task is less about finding the proverbial needle in a haystack, but finding — and then holding at risk — one particular needle in a stack of needles. The requirement for high-resolution images remains -- but of increasing importance is the requirement to dwell on, or revisit, a target often to maintain persistent awareness. The difference between dwell and revisit is driven by the rate of change of the observed activity as well as how critical continuous detection is to characterizing that activity. We must sustain the spatial and temporal access to ensure our customers understand and can respond to adversaries that continue to evolve and adapt.

COMMERCIAL IMAGERY

This budget request supports U.S. government acquisition of commercial imagery. This imagery enhances U.S. geospatial readiness and responsiveness, and complements national technical means collection for current high-interest areas and rarely imaged areas. This investment in commercial imagery funds a large percentage of our foundation GEOINT data and supports air and sea navigation and humanitarian assistance.

In addition, because commercial imagery is unclassified, it meets the growing demands for shareable GEOINT data and products across the government, with allies and nongovernmental partners.

NEW CHALLENGES AND OPPORTUNITIES

And this leads me to the challenge of this decade.

Today, there is an explosion of innovation across the geospatial community. It is one that NGA must embrace. I refer to this explosion as the "democratization" of geospatial information.

Two factors are driving this democratization: the rapidly spreading geography of the Internet and the "darkening of the skies" by small satellites.

First, the revolution that is the geography of the Internet and the emerging Internet of Things — creates a record of georeferenced activity that makes what NGA and our IC partners do — spatio-temporal analysis — the bridge to the future of commerce, cooperation, transparency and security.

Second, the skies will "darken" with the hundreds of small satellites to be launched by U.S. companies and as procedures are developed to allow safe operation of Unmanned Aerial Vehicles in civil airspace. We need to invest in the growing number of commercial satellite providers to enhance our persistence capabilities.

The questions that arise from the persistence of geospatial data streaming from hundreds of overhead platforms covering the earth multiple times a day are staggering.

The challenges of taking advantage of that data are daunting.

We cannot afford to store it all and we cannot afford the manpower to exploit it all. We have to go to a service model where we acquire only what we need, when we need it. Increasingly the commercial model focuses on the valuable information derived from the image and not the raw imagery data. This change puts a premium on tools that derive information from the image and the analytics that put it in the context of the business application or national security problem. And these are only the beginning of the questions we must answer — or even know to ask — about the impact of the revolution of sources. What questions can we answer with daily coverage of the planet? What choices will our adversaries make with daily coverage of the planet? What questions can we answer when we revisit locations as often and for as long as we need to stare? How will we maintain decision advantage in such a playing field? This is the primary challenge in space that NGA will face in the near future.

Over the next 10 years, our agency will become just as adept at using emerging information sources as we are with using existing government sources. The solution to key intelligence questions lies in maximizing the integration of all available GEOINT sources. The exponential growth in the quantity of data necessitates the automation of change detection to free up our analytic workforce from being data gatherers to data interpreters finding the meaning behind that data. The cumulative effect of this new data environment will be a persistence capability that is not just derived from the characteristics of a particular sensor but from a more robust synergistic knowledge base.

In 10 years, NGA will not be known for analyzing traditional reconnaissance imagery, a capability that will generally be available as a commodity. It will be known for application of geospatial analytics to big and extraordinarily diverse data. Analysts will not spend their days searching images, looking for and recording significant changes. They will instead model our national security problems and apply analytics to the massive collections of geo-referenced observations that we get from a multitude of sources – both traditional intelligence sources and open and commercial sources. They will make fewer intelligence assessments from direct observations and more from

discovering relationships hidden in the sum total of that collection; moving from anecdote-based observations to evidence-based understanding.

The combined possibilities of innovation in our national technical space architecture and the emergent commercial space market are inspiring us to seek new opportunities. We excelled in the past in a secure, closed system. Successful partnerships in the future will depend on transparency and openness to any sources that add insight. We must excel in the open by reducing barriers between our system and the explosion in the commercial market.

In closing, the demand for GEOINT knowledge is growing exponentially. The President's FY16 budget request provides us with the resources necessary to maintain access to a variety of space systems and space-borne products critical to our ability to support warning, targeting, mission planning, navigation and flight safety today, and to embark on this new playing field. My colleagues here today are invaluable teammates in all of our endeavors.

On behalf of the men and women of NGA, thank you for this opportunity to appear before the subcommittee and I look forward to addressing your questions.

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Robert Cardillo
Director, NGA

Mr. Robert Cardillo is the sixth Director of the National Geospatial-Intelligence Agency (NGA). Mr. Cardillo leads and directs NGA under the authorities of the Secretary of Defense and Director of National Intelligence. He became NGA's director on Oct. 3, 2014.

Prior to this assignment, Mr. Cardillo served as the first Deputy Director for Intelligence Integration, Office of the Director of National Intelligence, from 2010 to 2014. In addition, he served as the Deputy Director of the Defense Intelligence Agency (DIA) and the Deputy Director for Analysis, DIA, from 2006 to 2010. In the summer of 2009, Mr. Cardillo served as the Acting J2, a first for a civilian, in support of the Chairman of the Joint Chiefs of Staff. Before he moved to DIA, Mr. Cardillo led Analysis and Production as well as Source Operations and Management at NGA from 2002 to 2006. Mr. Cardillo's leadership assignments at NGA also included Congressional Affairs, Public Affairs, and Corporate Relations.

Mr. Cardillo began his career with DIA in 1983 as an imagery analyst, and he was selected to the Senior Executive Service in 2000. Mr. Cardillo earned a Bachelor of Arts in Government from Cornell University in 1983 and a Master of Arts in National Security Studies from Georgetown University in 1988.

Mr. Cardillo is the recipient of the Director of National Intelligence Distinguished Service Medal, the Presidential Rank of Distinguished Executive, the Presidential Rank of Meritorious Executive, and the Chairman of the Joint Chiefs of Staff Joint Meritorious Civilian Service Award.

Mr. Cardillo resides in Northern Virginia with his wife. They have three children and two grandchildren.

Oral Testimony

Ms. Betty Sapp

Director, National Reconnaissance Office

Before the House Armed Services Committee

Subcommittee on Strategic Forces

25 March 2015

NOT FOR PUBLICATION UNTIL RELEASED BY THE
HOUSE ARMED SERVICES COMMITTEE
STRATEGIC FORCES SUBCOMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

Chairman Rogers, Ranking Member Cooper, and distinguished Members of the Committee, I am pleased to appear before you today on behalf of the talented men and women of the National Reconnaissance Office to discuss National Security Space Activities.

I would like to begin with a few words about the state of the NRO today.

First, we manage the resources the Congress provides us very well. For the sixth year in a row, the NRO received a clean audit opinion on our Financial Statements.

Our acquisition programs remain "green" for performance.

Our Research and Development program remains vital to the NRO, allowing us revolutionary increases in collection capability and resiliency necessary to keep pace with changing targets and

threats at risk levels compatible with successful acquisition programs.

We directly support our warfighters. In addition to traditional NRO ISR systems and support, we provide a wide array of focused capabilities, products, and tools. For example, in 2014, our 24/7 operation centers at our ground stations handled more than 101,000 calls for help, creating more than 1.6 million specialized products in response, to include timely and critical support to 12 personnel recovery events.

The tremendous successes we've enjoyed in acquisition, R&D and in critical mission support activities, are a testament to the quality of the NRO workforce. The Workforce Stability Initiative, supported by the Congress, the CIA, and the DoD, is fundamental to maintaining that quality into the future.

I want to thank the Committee for the support you've shown me, and the men and women of the NRO. And, thank you again for the opportunity to be here today.

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Statement for the Record

Ms. Betty Sapp

Director, National Reconnaissance Office

Before the House Armed Services Committee

Subcommittee on Strategic Forces

25 March 2015

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UNCLASSIFIED

Introduction

Chairman Rogers, Ranking Member Cooper, and distinguished Members of the Committee, I am pleased to appear before you today on behalf of the National Reconnaissance Office (NRO) to discuss National Security Space Activities. It is an honor for me to appear alongside our mission partners from the Department of Defense (DoD), Mr. Douglas Loverro, Deputy Assistant Secretary of Defense for Space Policy; Mr. Dyke Weatherington, Principal Director for Space, Strategic and Intelligence Systems, Office of the Undersecretary of Defense for Acquisition, Technology and Logistics; Lt General John Raymond, Commander, United States Strategic Command, Joint Functional Component Command for Space; and General John Hyten, Commander, Air Force Space Command. I am also honored to appear alongside one of my primary mission partners from the Intelligence Community, Mr. Robert Cardillo, Director of the National Geospatial-Intelligence Agency. The NRO's close relationship and continuing collaboration with our mission partners are vital to maintaining our Nation's superiority in space.

The unclassified nature of today's hearing precludes me from discussing many details of NRO programs, as well as sharing some of our greatest successes. However, I welcome additional opportunities to meet in another setting to discuss with you NRO capabilities, and the value of NRO contributions to National Security.

Support to the Warfighter

I would like to start by highlighting the real bottom line for the NRO - our support to the warfighter. The NRO has become a key

global military operations enabler and many capabilities are integral to the conflict in Afghanistan and other theaters. In addition to traditional NRO ISR systems and support, we provide a wide array of focused capabilities to help solve specific, critical ISR needs for deployed personnel around the world. We've brought dozens of innovative ISR solutions to the fight. These services, products, and tools directly contribute to the highest priority missions, to include: countering Improvised Explosive Devices (IEDs); identifying and tracking High-Value Targets; and improving battlespace awareness.

One of the most important capabilities we provide to the fight is our people - our on-site problem-solvers. To ensure users are able to take advantage of NRO capabilities, we developed the Field Representative program that puts NRO subject matter experts, both military and civilian, at the combatant commands and in the theater battlespace. These men and women serve as technical liaison officers to units, and support specific NRO programs and capabilities focused on the warfighter. Every day, they have a direct and positive influence on combat operations and mission success, to include saving the lives of U.S. and Coalition forces.

I'll cover just a few highlights, and while the NRO's greatest successes may not be discussed in this setting, I am proud to share just a small part of what we bring to the fight. One of the most successful efforts against the IED threat is an NRO-developed program called RED DOT. RED DOT leverages multi-Intelligence sources to provide an integrated IED-risk situational picture that can be delivered directly to the warfighter in harm's way. From 2012 through

2014, RED DOT warnings resulted in the removal of more than 700 IEDs from the battlefield, saving countless lives and limbs. Now, it is being adopted for use by our Coalition partners, and other combatant commands.

Our Tactical Defense Space Reconnaissance (TacDSR) program has been highly effective in delivering NRO capabilities into military platforms, combat systems, and weapons for operational warfighters. TacDSR directly answers emerging war fighting intelligence requirements of the combatant commands, DoD services, agencies, joint staffs, and other tactical users.

A real strength of the NRO is our ability to fuse multi-intelligence data to support warfighter intelligence needs. We have helped the warfighter visualize large volumes of data temporally and spatially, establishing patterns of life, identifying the unusual within a multitude of fused data sets, and integrating full motion video data with automated multi-intelligence tipping, cueing, and alerting capabilities. Our cutting-edge solutions combine GEOINT and SIGINT, and span the space, air, and ground operational domains to provide the warfighter a comprehensive common operational picture, enhancing the ability to find, fix, and finish targets.

State of the NRO Today

We are committed to smart acquisition investments and practices to ensure continued global coverage and availability of our vital National Security systems and we work tirelessly to continue to deliver these systems on time and within budget. All of our major

system acquisitions are "green" in terms of acquisition performance and last year our acquisition programs successfully delivered and launched three new satellites into orbit. These successful launches are a visible testament to the diligent efforts of our program teams who successfully acquire and deliver these complex systems, and each one signifies enhanced intelligence capabilities for the warfighter and improved decision advantage for our analysts and policy-makers. The NRO also remains committed to maintaining the health of the launch vehicle industrial base for assured access to space. We partner closely with the Air Force on our launch service acquisitions and have developed a strategy that seeks to lower launch costs by re-introducing competition for National Security Space (NSS) missions, while meeting mission needs and maintaining mission success. The NRO Launch-79 (NROL-79) mission was the first launch service acquisition pursued as part of the combined Air Force and NRO competitive strategy for the Evolved Expendable Launch Vehicle (EELV) program. However, because no new entrants had completed certification, the Air Force determined it was in the best interest of the Government to cancel the NROL-79 competitive solicitation. We learned a tremendous amount during the Air Force certification and source selection activities, and we continue to improve and refine the process in cooperation with the Air Force. We are committed to working with the Air Force, NASA, and commercial space providers to ensure our Nation's launch and space industrial base remains strong enough to meet our mission requirements. In addition to developing, acquiring, launching, and operating the world's most technically advanced space systems, we have

also sustained our success in financial management. For the sixth year in a row, the NRO received a clean audit opinion on our financial statements, a truly unprecedented accomplishment within the IC. This positive outcome was the result of continued hard work across the NRO and the culmination of a diligently planned and executed effort to continue to improve our business processes. We hope to sustain this track record of clean audits into the future.

Priorities for the Future

The NRO remains committed to maintaining its stellar record of acquisition and program successes, while delivering a more capable, integrated, resilient, and affordable future NRO architecture to keep pace with changing targets and threats while assuring the U.S. an enduring decision advantage.

NRO systems assist national policy formulation, as well as intelligence, military, and homeland security operations, consistent with international law or convention. Using increasingly diverse sensor systems, the NRO provides customers with unprecedented flexibility, enabling intelligence integration, assessment, and problem-solving across geographic boundaries and intelligence domains. These capabilities contribute directly to our nation's ability to achieve diplomatic goals, deter aggression and the proliferation of weapons of mass destruction, combat terrorism, and conduct security operations worldwide. Over the coming years, the NRO will continue to incorporate revolutionary new technologies into our architecture - technologies necessary to keep pace with changing targets and changing

threats in space. These enhancements are made possible by our investments in research and development, and we will continue these strong investments to enable relevant and effective future capabilities. The NRO will also continue to emphasize improvements in ground systems necessary to support current operations in the Ukraine, Syria, as well as the broader fight against ISIL, while designing and developing the future ground system necessary to ensure we can bring the full force of our capabilities to bear on future intelligence problems.

The NRO's strategic intent is to ensure the right overhead sensor, or set of sensors, is available whenever it is needed and for as long as it is needed. Realizing that intent requires more persistence in space, and a ground system that can be an effective quarterback for the entire architecture.

Resilience

The NRO fully recognizes that space is an increasingly contested and congested environment. Foreign nations understand our country's reliance on space and seek means to deny our space advantage. For that reason, the NRO is committed to making its entire mission architecture more resilient, and we have made significant investments to that end. Those investments have been informed by detailed modeling and analysis, and driven by strategy. We have worked this collaboratively with the DoD, the IC, and the broader space community. We believe we've made the right investments to ensure operational

freedom and an enduring U.S. decision advantage - but those improvements are only possible with the full FY16 budget request.

Budget and Launch Concerns

As the pace of change in targets and threats facing our nation continues to accelerate, the threat of sequestration is the biggest threat to maintaining the U.S. advantage in space. We see what our adversaries are doing and how much they are investing in space-related capabilities. The question we must answer is whether we want to invest to maintain the space advantage - the decision advantage - we have today, or not.

We are also concerned about restrictions on the use of the RD-180 engine contained in Section 1608 of the FY 2015 NDAA. This language, as currently written, may delay or prevent meaningful competition for NRO launches, and could result in a multi-year gap without more than one competitive launch provider for our payloads. We are also concerned about the potential retirement of the Delta IV Medium and the impacts to the Delta IV Heavy launch vehicle, which we use for critical national security missions. The future of the Delta IV Heavy is especially important since it is currently the only demonstrated and certified launch vehicle providing Heavy lift capability for the nation. We are working with the Air Force and our industry partners to address these challenges. But, we need your help with Section 1608, and in ensuring necessary investment in U.S. space capabilities and resilience.

People

Our people are responsible for the tremendous successes of the past, and they must sustain that record of success into the future. Since the NRO was formed more than 50 years ago, we have "borrowed" all our personnel from across the DoD and the Intelligence Community (IC). That workforce model had become increasingly problematic. Thanks to the support of Congress and our community partners, the NRO established a Workforce Stability Initiative last year. Through this initiative, we have stabilized the Central Intelligence Agency (CIA) element of our engineering workforce by establishing the Office of Space Reconnaissance, and the DoD element by forming an NRO Cadre, recently approved by the Secretary of Defense. These elements represent about one-third of our government workforce and will provide us with enhanced stability across core NRO functions. We will also continue to leverage rotational personnel from the CIA and the DoD for their broad-based experience and innovation. By strengthening our core NRO workforce while also leveraging rotational workforce capabilities, the NRO will continue to have the people necessary to provide the Nation with the premier space reconnaissance capabilities for National security.

Conclusion

The men and women of the NRO embody our core values of Integrity and Accountability, Teamwork Built on Respect and Diversity, and Mission Excellence. It is our highly skilled personnel who go above and beyond to execute our mission to provide "Innovative Overhead

Intelligence Systems for National Security." Driven by our extraordinary people, the NRO will continue on the path of delivering acquisition and operations excellence, as well as the unparalleled innovation that is the hallmark of our history and the foundation of our future. We encourage you to continue visits to the NRO, our mission ground stations, and satellite factories for detailed discussions on how our systems directly support the national security of the United States.

Mr. Chairman and members of the Committee, thank you for your continued support of the National Reconnaissance Office and the opportunity to appear before you today.

Betty J. Sapp
Director, NRO

(U) Betty Sapp was appointed the 18th Director of the National Reconnaissance Office (DNRO) on July 6, 2012. The DNRO provides direction, guidance, and supervision over all matters pertaining to the NRO and executes other authorities specifically delegated by the Secretary of Defense and the Director of National Intelligence.

(U) Ms. Sapp began her government career as a United States Air Force officer in a variety of acquisition and financial management positions, including: business management positions in the NRO; Program Element Monitor at the Pentagon for the MILSTAR system; Program Manager for the FLTSATCOM program at the Space and Missile Systems Center in Los Angeles; and manager of a joint-service development effort for the A-10 engine at Wright-Patterson Air Force Base in Dayton, Ohio.

(U) In 1997, Ms. Sapp joined the Central Intelligence Agency. She was assigned to the NRO where she served in a variety of senior management positions. In 2005, she was appointed the Deputy Director, NRO for Business Plans and Operations. As such, she was responsible for all NRO business functions, including current-year financial operations, preparation of auditable financial statements, business systems development, budget planning, cost estimating, contracting, as well as all executive and legislative liaison activities.

(U) In May 2007, Ms. Sapp was appointed the Deputy Under Secretary of Defense (Portfolio, Programs and Resources), Office of the Under Secretary of Defense for Intelligence. In this position, she was responsible for: executive oversight of the multibillion-dollar portfolio of defense intelligence-related acquisition programs; the planning, programming, budgeting and execution of the multibillion dollar Military Intelligence Program; and the technology efforts critical to satisfying both current and future warfighter needs.

(U) In April 2009, Ms. Sapp was appointed the Principal Deputy Director, National Reconnaissance Office (PDDNRO). As PDDNRO, she provided overall day-to-day management of the NRO, with decision responsibility as delegated by the DNRO.

(U) Ms. Sapp holds a Bachelor of Arts, and an MBA, Management, both from the University of Missouri, Columbia. She is also Level III certified in Government Acquisition and was certified as a Defense Financial Manager. Ms. Sapp is a native of St. Louis, Missouri, and now resides in Alexandria, Virginia.

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MARCH 25, 2015

QUESTIONS SUBMITTED BY MR. ROGERS

Mr. ROGERS. What are the major acquisition challenges regarding the development, deployment, and sustainment of space systems?

What plans are in development and/or in place for addressing these challenges?

General HYTEN. We continue to improve in addressing affordability in the acquisition of space systems. We are actively pursuing revisions to our processes on how we acquire the space enterprise to include our satellites, ground systems, and launch services.

To improve our satellite acquisitions, we are implementing the Better Buying Power 3.0 (BBP 3.0) initiatives instituted by USD/AT&L. BBP 3.0 represents the Department's new increment of process improvement efforts intended to increase the buying power across all weapon systems. In satellite acquisition, we are adapting contracting strategies, such as the use of fixed priced contracts to not only control costs, but to also reduce the requirements creep common to cost reimbursable contracts. To that end, we are also pursuing initiatives to better define the government's role in owning the technical baseline of our contracts, such as identifying critical interfaces and required data rights.

Space ground systems will continue to provide the information pathway to and from orbit for our systems. A major ongoing effort is to create a common ground architecture that can communicate with multiple satellite systems. Such a ground system would leverage modular and open architectures to increase resiliency, and will significantly reduce the lifecycle cost by providing common operations across multiple mission areas.

In the launch enterprise, we are encouraging competition to invigorate the industrial base and eliminate sole source procurements. As a part of this effort, we are streamlining the certification process for potential new entrants. We are also taking a competitive approach to mitigating reliance on foreign entities with regard to our launch capability to maintain the United States' assured access to space.

In support of all of these initiatives, we are reevaluating how we manage risk. As we move forward and prepare for tomorrow's threat environment, we must focus on modernizing our constellations. In the past, we focused on minimizing the cost and schedule risks to our large programs by producing near copies of our development assets. Moving forward, we must continue to minimize the cost and schedule risks, but modernize our systems by smartly planning for incremental upgrades/improvements to our systems. Within the space enterprise, we are preparing for the future through the Space Modernization Initiative or SMI. SMI is a disciplined approach to planning for the system modernization of our largest programs by investing early in technology maturation to minimize future obsolescence and maximizing the warfighting utility of our existing systems. SMI is critical to the future of our weapon systems in order to ensure our systems are resilient against future threats. However, SMI is constantly in the cross hairs in a constrained fiscal environment. Our biggest challenge going forward will be being able to smartly prepare for tomorrow through SMI while simultaneously ensuring the capabilities we deliver today remain world class.

Mr. ROGERS. The Advanced Extremely High Frequency (AEHF) and Space Based Infrared System (SBIRS) programs are in the process of assessing options for future systems through Analyses of Alternatives (AOAs). Both programs face the reality of making acquisition decisions for future systems within the next several years. However, the AOA efforts have experienced delays.

a. To what extent will the AOA delays affect the DOD's ability to make informed acquisition decisions?

b. When do decisions need to be made for how to proceed with satellite systems, such as AEHF and SBIRS?

General HYTEN. Answer for AEHF: a. Service and acquisition authority representatives have participated extensively in the Protected Satellite Communication Services (PSCS) AOA, and are familiar with the findings. This knowledge has been factored into the Air Force FY16 President's Budget (PB) request planning efforts to ensure we remain consistent with the likely outcome of the AOA. MILSATCOM

acquisition plans and schedules allow time for results of the PSCS AOA to inform decisions for input to the FY17 PB.

b. Protected MILSATCOM capability need dates are driven by the need to sustain current capabilities (EPS, MILSTAR and AEHF services), and to satisfy new mission needs for which existing capabilities are inapplicable or insufficient.

c. Acquiring a new military satellite system with a traditional approach normally takes about 10–12 years from initial program directive, including satellite development and launch, and even 6–8 years for systems only involving ground assets. We need to explore alternative approaches otherwise decisions are needed by early 2016 for the Polar SATCOM Follow-on and to enable timely fielding of protected tactical SATCOM capabilities.

Answer for SBIRS: a. The AoA is nearing completion and will be undergoing Departmental deliberations this summer. This timing has no negative effects on the DOD's ability to make an informed acquisition decision for the SBIRS Follow-on program. In fact, this completion date is ahead of the need date in the first quarter of FY16 (shown on page 9, Figure 1 of the Air Force Congressional Report Space Modernization Initiative (SMI) Strategy and Goals, dated April 2014). While the AoA team's final report submission was delayed from the originally planned December 2014 goal, the delay allowed completion of comprehensive and accurate analysis of the architectural alternatives. The DOD and the Air Force are poised with the necessary analysis to support the SBIRS Follow-on decision and planned program start in FY18.

b. As described in the April 2014 SMI Congressional Report, the SBIRS Follow-on program must be started in FY18 to allow timely replenishment of the SBIRS constellation. Allowing for appropriate acquisition planning lead time, the final architectural decision for the SBIRS Follow-on program is required by the end of FY16, at the latest. The AoA completion earlier than the first quarter of FY16 allows the DOD to make the SBIRS Follow-on decision earlier and allows more time for deliberate planning of the acquisition strategy.

Mr. ROGERS. What are the plans for the Operationally Responsive Space program office?

General HYTEN. Consistent with the FY14 ORS Report to Congress the ORS Office will be maintained to execute critical Urgent Needs as identified by USSTRATCOM and approved by the Executive Committee. In FY15, the ORS Office will test the ORS–4 Super Strypi experimental launch vehicle and will continue the development of the ORS–5, Space Situational Awareness operational demonstration satellite, in conjunction with SMC/SY. The 22 April 2015 EXCOM approved the ORS office to mitigate gaps in space based environmental monitoring. The ORS Office and SMC/RS will jointly execute the program. Funding will go to the AFSPC Weather Mission program element. The program will address two JROC validated capability gaps: the 2015 gap for "Ocean Surface Vector Winds" and the 2021 gap for "Tropical Cyclone Intensity." SMC/RS will pursue the most responsive option to minimize the impending gaps which is expected to be a passive space-based microwave solution as the operational gap filler. The program team will also work with USSTRATCOM and Joint Staff to prioritize the requirements for the program by June 2015. Lifecycle Sustainment will be addressed by SMC/RS. These programs are consistent with the stated AFSPC goal of integrating the principles of operationally responsive space into AFPSC missions.

Mr. ROGERS. Several systems continue to experience synchronization problems (such as Global Positioning System [GPS] III, GPS Next Generation Operational Control System, and Military GPS User Equipment; Advanced Extremely High Frequency satellites and Family of Advanced Beyond Line-of-Sight Terminals; Mobile User Objective System and the user terminals; and the Space Based Infrared System and its supporting ground system). What is being done to avoid these alignment issues in the future? What have the opportunity costs been as a result of these delays?

General HYTEN. Answer for Global Positioning System [GPS] III, GPS Next Generation Operational Control System, and Military GPS User Equipment:

Through the GPS Enterprise Integrator, the Air Force executes rigorous systems engineering and integration, synchronizing GPS capabilities to ensure programs meet warfighter requirements and identifying mitigation steps when synchronization fails. Delays to the delivery of the GPS III satellites and the GPS Next-Generation Operational Control Segment (OCX) have challenged synchronization, but mitigation efforts are being executed. For example, incremental deliveries such as the OCX program's Launch and Early Checkout System (LCS) will support the first GPS III satellite launch and its checkout expected in FY17. Furthermore, battery life extension on the GPS IIR satellites extended the health of the current constellation and has so far avoided any opportunity cost from the OCX/GPS III delay.

An additional effort to synchronize the GPS Enterprise is the acceleration of the Military GPS User Equipment (MGUE) program to ensure new anti-jam capabilities offered by the M-Code signal can be used at the earliest possible time. The M-Code signal is currently transmitted by 7 GPS IIR–M and 9 GPS IIF satellites (for a total of 16 M-Code transmitting satellites), nearing the necessary 18 satellites for 24-hour coverage. Today, the GPS system is broadcasting a modernized GPS test message that supports this MGUE acceleration by enabling early risk reduction events and operational demonstrations. The live-sky test signals also support critical space, ground, and user equipment development, integration and testing for the new civilian signals, L2C and L5. Since MGUE is ahead of schedule, there has been no opportunity costs associated with the user equipment.

Answer for Advanced Extremely High Frequency satellites and Family of Advanced Beyond Line-of-Sight Terminals:

The Family of Beyond Line-of-Sight Terminal (FAB–T) is the planned command and control terminal for the Milstar and Advanced Extremely High Frequency (AEHF) satellite constellation. FAB–T development experienced technical difficulties leading the Department to open the production contract to competition. The competition led to lower cost terminal, however the fielding date was delayed. The AEHF Program currently delivers EHF capability to the warfighter through the Navy Multiband Terminal and the Army's Secure Mobile Anti-Jam Reliable Tactical Terminal and all legacy Milstar terminals. The National Security Satellite Communications Systems Synchronization Roadmap indicates that the AEHF terminal fielding is synchronized with AEHF Initial Operational Capability (IOC). 20% of Extended Data Rate (XDR) capable terminals were fielded in FY13 (2 years before IOC) and 49% of AEHF XDR capable terminals will be fielded by the AEHF IOC date this summer.

The opportunity costs associated with the delay of FAB–T fielding are difficult to accurately quantify. A FAB–T delay forces a risk due to reliance on current, hard to maintain, and poor performing systems, which increases operational risk. However, the delay did require the AEHF Program to develop an interim constellation command and control terminal. The program modified the planned design for AEHF Calibration Facility test terminals to meet nuclear hardening and operational suitability requirements. The AEHF Program produced and delivered six Interim Command and Control (IC2) terminals, which cost $50M to develop and $6M/year more to maintain than a FAB–T terminal.

Answer for SBIRS:

After overcoming early satellite and ground development delays, SBIRS has established a stable ground baseline and stable production delivery schedules for GEO satellites 3 and 4 which has allowed for improved synchronization of the space and ground segments. The current SBIRS program is synchronized with final space and ground systems being delivered in FY18. Three of the five mobile survivable/endurable ground systems will also be operational by 2018. The two remaining are programmed in FY16 for delivery in 2020. Moving forward, the space and ground segments will remain synchronized as the future GEO 5/6 production effort focuses on replenishment of the existing architecture.

The opportunity costs related to ground development delays are difficult to accurately quantify. A portion of the planned ground capability had to be accelerated to provide interim operations to support the GEO 1 launch in 2011. This development was approximately 17% ($334M) of the total contractual effort between 2008–2011 ($1,936M), the actual opportunity cost of the acceleration cannot be discretely identified from the development cost. Additionally, the interim on-orbit sustainment efforts have successfully extended the life of the DSP constellation which enabled avoidance of opportunity costs from the SBIRS delays. In addition, starter data has been provided to Battlespace Awareness (BA)/Technical Intelligence (TI) users since FY2014 and will be certified as an independent source for BA/TI by the National Geospatial-Intelligence Agency (NGA) in July 2015.

Mr. ROGERS. When does the Air Force plan to finalize its acquisition strategy for the next phase, phase 2 starting in fiscal year 2018, of the EELV program? Please describe the options being considered for that strategy.

General HYTEN. During phase 2, the Air Force plans to transition off the Russian RD–180 by investing in launch systems that enable assured access to space by allowing the Air Force to acquire launch services from two or more domestic, commercially viable launch providers. The Air Force plans to use a four step plan that both invests in industry's emerging launch system development and procures the phase 2 launch services starting in FY2018. Step 1, the Technical Maturation and Risk Reduction addressing the highest technical risks associated with transitioning off the RD–180, is underway. The acquisition strategy for steps 2 and 3, which is the Government investment in industry's Rocket Propulsion Systems (Step 2) and the

associated Launch Systems (Step 3), was signed by the Air Force Service Acquisition Executive on 5 June 2015. The development of the acquisition strategy for step 4, procuring the launch services starting in FY2018, will begin later this year. Therefore the final acquisition strategy for step 4 will likely not be approved in late FY2016 or early FY2017. Regardless, the goal of the strategy will be to assure access to space with two or more launch systems available at all times, while leveraging competition to the maximum extent possible.

Mr. ROGERS. With the delays of both GPS III and OCX, when does the Air Force plan to deploy Military code (M-code) signal capability?

General HYTEN. M-Code test and user equipment integration capability is available today, with 16 satellites broadcasting M-Code messages provided by a test capability attached to the ground system. The current estimate for the space segment to attain 18 satellites broadcasting M-Code is 4QCY2015 with GPS IIF–11. The ground segment full command and control capability (OCX Block 1) is scheduled for delivery July 2019. The Military GPS User Equipment (MGUE) is based on service schedules, however the first platform scheduled to complete is the B–2 in 2017.

Mr. ROGERS. Given the GPS III and OCX delays, what is the risk of not sustaining the current, as well as required, levels of GPS service, and what is being done about this risk?

General HYTEN. The required GPS level of service is at risk if capability is not delivered by the constellation sustainment need date. This date is currently driven by GPS III Space Vehicle 01 (SV01) entering the operational constellation, which requires GPS III SV01 to be ready to launch as well as having a ground system ready to launch, checkout, and operationally command the satellite. The GPS Next Generation Operational Control System (OCX) is under development to provide the ground launch, checkout, and command and control capability.

The current schedules for both OCX Block 1 and GPS III SV01 project delivery in time to meet the constellation sustainment need date and maintain the required levels of GPS service. In the event of future schedule delays to the OCX Block 1 ground system, the program office initiated development of a short-term GPS III Contingency Operations capability that will enable interim on-orbit operation of GPS III satellites and reduce risk of diminished levels of PNT services should OCX Block 1 delivery be further delayed. Although the GPS III satellite development has been delayed more than 2 years, we are seeing progress and believe it will be delivered prior to the constellation sustainment need date with margin.

Mr. ROGERS. The Advanced Extremely High Frequency (AEHF) and Space Based Infrared System (SBIRS) programs are in the process of assessing options for future systems through Analyses of Alternatives (AOAs). Both programs face the reality of making acquisition decisions for future systems within the next several years. However, the AOA efforts have experienced delays.

a. To what extent will the AOA delays affect the DOD's ability to make informed acquisition decisions?

b. When do decisions need to be made for how to proceed with satellite systems, such as AEHF and SBIRS?

Mr. LOVERRO. Both the Protected Satellite Communications (SATCOM) Advanced Extremely High Frequency (AEHF) and Space-Based Infrared System (SBIRS) Analyses of Alternatives (AoAs) will conclude this summer, and although this is later than originally planned, there has been minimal effect on the Department's ability to make informed acquisition decisions. Acquisition decisions for both follow-on capabilities will benefit from the additional comprehensive analysis of architectural alternatives. Military Department and capability acquisition representatives have participated extensively in both AoA processes, and they have used this knowledge to inform their Fiscal Year 2016–2020 President's Budget request submissions.

Both AoAs will have concluded prior to the Department needing to begin making decisions on future acquisitions. Initial acquisition decisions are needed in early 2016 for a polar SATCOM follow-on capability and to enable timely fielding of protected tactical SATCOM capabilities. Based on constellation replenishment needs dates, the Department will need to make a decision for both the AEHF follow-on capability and the SBIRS follow-on decision to support program starts by FY2018.

Mr. ROGERS. What are the plans for the Operationally Responsive Space program office?

Mr. LOVERRO. The Operationally Responsive Space Program Office will continue to provide a transformational way by which DOD designs, builds, and launches national security satellites. Specifically, the Program Office is intended to ensure rapid development and deployment capability for satellites in response to unanticipated needs and persistent threats in space. The FY 2016 DOD Budget Request requests $6.5M for the Program Office to continue its work on this mandate. The Air Force Space and Missile Systems Center is working with the Program Office to incor-

porate transformational concepts into its own acquisition and development processes, and retains the possibility of utilizing the Program Office to meet warfighter requirements on a rapid timeline if the need arises.

Mr. ROGERS. Several systems continue to experience synchronization problems (such as Global Positioning System [GPS] III, GPS Next Generation Operational Control System, and Military GPS User Equipment; Advanced Extremely High Frequency satellites and Family of Advanced Beyond Line-of-Sight Terminals; Mobile User Objective System and the user terminals; and the Space Based Infrared System and its supporting ground system). What is being done to avoid these alignment issues in the future? What have the opportunity costs been as a result of these delays?

Mr. LOVERRO. The Department takes seriously all program delays and issues with systems synchronization. To address these issues and avoid them in the future, in late 2014 the Department conducted a comprehensive study to look at these programs and their associated synchronization issues. The study found that many of the synchronization issues are the result of insufficiently defined measures and processes for system alignment. To address these issues, the study provided standardized Department-wide metrics for whole-of-system synchronization. DOD is now implementing a standard assessment of integration and synchronization efforts across the space portfolio to ensure that issues are addressed early in the development and acquisition process and are successfully resolved.

Beyond the establishment of standard metrics of assessment, tangible mitigating efforts are being implemented to ensure future synchronization. For example, the Space-Based Infrared System is now operating on a stable delivery schedule for its third and fourth Geosynchronous Earth Orbit satellites, and the current program has effectively synchronized space and ground system development for delivery of additional capability in FY2018. Furthermore, a lack of synchronization between the Global Positioning System (GPS)-III constellation and its Next-Generation Operational Control Segment has largely been mitigated by extending the battery life on current GPS IIR satellites.

Mr. ROGERS. What are the major acquisition challenges regarding the development, deployment, and sustainment of space systems?

a. What plans are in development and/or in place for addressing these challenges?

Mr. WEATHERINGTON. The major acquisition challenges to space systems are driven by the increasingly contested space environment. With the emergence of new threats to satellite systems from China and Russia, resiliency has become a top requirement for our space architectures to ensure those capabilities will be there when needed. The need for resilience has driven the Department to examine a range of alternate future architectures for our space capabilities. The major challenge will be to transition to these more resilient architectures, across several mission areas, while maintaining current capabilities and services. Specifically, 1) our development and deployment timelines must be aligned with need dates, 2) our new architecture must, in some cases, be compatible with existing ground and user infrastructure, and 3) our architecture decisions must be coordinated and synchronized across related mission areas. All of this must be accomplished against the backdrop of a challenged industrial base and constantly evolving threat environment.

At the same time, the increase in both private sector and international activity in space provides opportunity. The Department may be able to achieve more of its space-based capability needs through agreements and collaboration with foreign strategic partners and emerging private sector space-based services. Fully exploring and leveraging these opportunities, however, will require increased acquisition agility to keep pace with the private sector decision timelines. We must also develop new approaches to risk management; putting sufficient safeguards in place to ensure national security objectives can be achieved even in the event of bankruptcy, strikes, partner nation budget fluctuations and other uncertainties.

Mr. ROGERS. The Advanced Extremely High Frequency (AEHF) and Space Based Infrared System (SBIRS) programs are in the process of assessing options for future systems through Analyses of Alternatives (AOAs). Both programs face the reality of making acquisition decisions for future systems within the next several years. However, the AOA efforts have experienced delays.

a. To what extent will the AOA delays affect the DOD's ability to make informed acquisition decisions?

b. When do decisions need to be made for how to proceed with satellite systems, such as AEHF and SBIRS?

Mr. WEATHERINGTON. The delays will impact the DOD, but in a positive manner. Our experience gained from the recent AoAs have resulted in a higher level of collaboration and understanding across the DOD for these informational needs and various perspectives, and added attention to resiliency driven by increased threats.

As part of the Department's decision process, insights from AoAs complement other important information derived from national security strategy and future challenges, relationships to future plans and programs, knowledge of current and projected capabilities and gaps, current and projected intelligence and threat assessments. The results of these AoAs should strengthen DOD's decision making process from the perspective of capabilities/needs assessment, PPBE, and acquisition.

The SBIRS Follow-On AoA has completed the analysis phase and the Air Force is synthesizing the insights including cost, schedule, performance, and resiliency, to inform architectural deliberations across the Department this summer. Similarly, the Department expects to gain important insights from the Protected Satellite Communications AoA when its analysis phase concludes later this summer.

The decisions for these systems need to be made by Fall 2015/early in FY 2016. More specifically, the formal acquisition decisions for the aforementioned systems depend on the selected architecture, functional availability analysis of the existing SBIRS, AEHF and Enhanced Polar System constellations, and the transition strategies from today's architectures to the future architectures. The results of the Department's deliberations this summer will inform decisions potentially as early as FY2016 and guide pre-acquisition activities in advance of formal program initiation.

Mr. ROGERS. What are the plans for the Operationally Responsive Space program office?

Mr. WEATHERINGTON. The Department of Defense included $6.5M in its FY16 Budget Request for the Operationally Responsive Space (ORS) Office. The program office has a unique mandate and acquisition authorities to drive down cost and decrease delivery time for urgently needed space capabilities, thus enabling a broad range of replenishment and reconstitution options.

Two examples where the Air Force looks to integrate ORS concepts are Weather System Follow-On (WSF) and Space Based Space Surveillance Follow-On (SBSS–FO). These candidate programs have well defined funding and requirements, good commercial small system concepts, and will benefit from streamlined acquisition authorities.

The WSF program plans to use flight proven technologies and designs for a low risk solution to satisfy weather capability gaps. It also plans to utilize ORS contractual vehicles that allow for a responsive procurement of a commercial satellite bus and responsive acquisition practices to deliver the operational capability over two years sooner. The SBSS–FO mission is a cost-constrained program using mature "commercial-like" technologies to meet a current space surveillance system end-of-life capability gap. It is utilizing technology from the prototype ORS–5 mission in order to provide reuse of government reference designs.

Mr. ROGERS. Several systems continue to experience synchronization problems (such as Global Positioning System [GPS] III, GPS Next Generation Operational Control System, and Military GPS User Equipment; Advanced Extremely High Frequency satellites and Family of Advanced Beyond Line-of-Sight Terminals; Mobile User Objective System and the user terminals; and the Space Based Infrared System and its supporting ground system). What is being done to avoid these alignment issues in the future? What have the opportunity costs been as a result of these delays?

Mr. WEATHERINGTON. USD(AT&L) constantly strives to eliminate synchronization issues in our acquisition efforts. The Department determined the definition and metrics for "synchronization" across space mission areas did not exist. The Department is implementing a standard assessment of integration/synchronization across the space portfolio more closely integrated with the budget formulation and deliberation process. As Mr. Kendall indicated in his January 26, 2015 letter to the congressional defense committees, the Department will be submitting an initial exemplar report covering a single representative program (Space Based Infrared System) in June 2015, and a comprehensive initial annual report with submission of the FY 2017 President's Budget. Additionally, this approach can be applied for future programs being approved at Milestone B in order to fulfill the statutory requirements contained in the FY 2013 NDAA.

As Chairman Rogers noted, significant opportunity costs have resulted from the lack of synchronization. An example of this problem is the Mobile User Objective System (MUOS) waveform capable user terminals. The legacy transponder payload side of the MUOS satellite is being used for operations, but the full operational use of the MUOS satellites will not be possible until a significant number of terminals of different types are fielded. Synchronization of MUOS and the user terminals is highly complex and has significant challenges. Despite these challenges, the Navy, in close coordination with the Army, has successfully integrated the MUOS waveform with the Army's Handheld, Manpack, Small Formfit (HMS) Manpack terminal. As much as the Department has recognized the synchronization problems with

MUOS, we have also identified synchronization issues in other space mission areas. In addition to the measures identified herein, the Department will continue to work diligently to close these synchronization issues across the space enterprise.

Mr. ROGERS. What is your perspective on the importance of having a capability to support urgent warfighter space requirements, as the Operationally Responsive Space office was intended?

General RAYMOND. It is imperative that the warfighter has access to responsive space-based capabilities in this increasingly contested, congested and competitive space environment. The Operationally Responsive Space Office is a great asset that anticipates, and responds to, challenges within the space domain. The office also addresses urgent warfighter requirements that can be met with space-based assets, and helps us to extend our advantages in space and increase resiliency. The importance of having this capability will increase as the trend toward smaller operationally relevant CubeSats materializes.

Mr. ROGERS. Are there any space capabilities that you currently rely on from the Air Force, in order to most effectively and efficiently perform your mission? Please describe these capabilities and dependency relationships, the plan going forward, and the impact on the warfighter.

Mr. CARDILLO. [The information referred to is classified and retained in the committee files.]

Mr. ROGERS. What are the major acquisition challenges regarding the development, deployment, and sustainment of space systems?

a. What plans are in development and/or in place for addressing these challenges?

Ms. SAPP. The operating environment in which the NRO finds itself continues to grow in complexity. Targets are becoming increasingly vague and fleeting, and our adversaries are aggressively pursuing denial and deception techniques. They are developing capabilities to threaten our collection assets, and the pace of change is as rapid as it has ever been. Therefore, we must continually seek increasingly innovative approaches to keep pace and improve our capabilities. At NRO, we are thinking outside the box to create unusual or unexpected uses of existing sensor systems. Our adversaries continue to develop new and improved means to destroy our freedom of action in space, so we must develop collection systems with enhanced survivability built in from the beginning. We must also factor in affordability; we are designing architectures, systems, and technologies to increase intelligence collection value, to improve efficiency, and to reduce cost of ownership. Innovation enables us to meet these challenges and lead the world in intelligence dominance. To ensure that we are always on the leading edge with the newest technologies, the NRO has one office, the Advanced Systems and Technology Directorate (AS&T), focused on research and development. AS&T explores, tests, and develops, and transitions revolutionary new capabilities to our current and future architecture. AS&T hosts a variety of forums and collaborative research programs with industry, government, and academia, always searching for the most promising technologies. Another mechanism to address acquisition challenges is having a strong acquisition workforce, which applies best practices and maintains and close and enduring partnership with our industry partners. A critical NRO organizational asset is the Acquisition Center of Excellence (ACE). For the past 17 years, ACE has provided targeted acquisition training; acquisition support services; and helped to ensure open communications with industry. ACE provides vital acquisition support services to the NRO workforce, particularly for competitive acquisitions. It provides the facilities, tools, and support for competitive source selection processes. In doing this, ACE helps to ensure the NRO selects the best value solution to its mission requirements. Additionally, ACE provides a communication capability with our industry partners. Within the ACE is the Acquisition Research Center, which provides classified and unclassified web sites as portals for industry into NRO business opportunities, including upcoming solicitations and on-going acquisitions. The ARC allows industry to access data on upcoming NRO acquisitions and helps ACE reach a broader industry base for NRO's mission requirements. The ARC capability enables industry to communicate with the NRO early in the acquisition planning phase. This is extremely important since early industry input can help us revise our requirements to attract the widest industry interest.

QUESTIONS SUBMITTED BY MR. LAMBORN

Mr. LAMBORN. We know that civil agencies can get OPIR data, such as that from SBIRS, at a classified level. This is useful where those civil agencies can declassify the data. However, there are agencies who need the data, but who cannot declassify the data and/or who do not have appropriate clearances. What is the Air Force doing

to advance policy and technical solutions that meet the civil needs for declassified OPIR data, such as for use in fighting forest fires in Colorado and other high-risk states?

General HYTEN. Air Force Space Command (AFSPC) is in the process of completing a review and updating our security classification guidance across all programs to ensure that we provided consistent guidance with the appropriate classification risk levels. Specifically, we are conducting a review and in the process of updating Space Based Infrared System (SBIRS) security classification guide. Today, AFSPC units provide OPIR data and reports to DOD and civil agencies where they are able to interpret the data and provide the appropriate context in conjunction with other data sources. In accordance with our current security guidance, when SBIRS derived products are combined with data from other sources, from areas where there is enough viable sources to provide plausible deniability, the end products would be unclassified.

Mr. LAMBORN. We have read the recent press about the Air Force's desire to turn Wideband Global SATCOM operations over to industry. How is the Air Force posturing itself to take advantage of this and other opportunities, such as enabling AFSCN connectivity to commercial antenna networks?

General HYTEN. Air Force Space Command (AFSPC) continues to explore opportunities to partner with commercial industry to provide uninterrupted space effects to the US warfighter. The initial space operation effort focuses on transitioning from purely military operations to a proper mixture of military and contractor personnel, with Global Positioning System (GPS) as the pathfinder. Additional potential manpower savings, either military or contractor can be gained through enhanced automation opportunities of ground command and control systems.

Concerning the Air Force's desire to transition Wideband Global SATCOM (WGS) satellite vehicle operations from military operations to industry operations, AFSPC has not determined a specific timeline to potentially transition WGS Satellite operations from military to commercial industry. Lessons learned from GPS effort will inform decisions on future opportunities in other space capability areas.

Concerning the Air Force Satellite Control Network (AFSCN), AFSPC conducted a preliminary study on AFSCN Commercial Provisioning, but there is more work to do. There is an independent review underway to explore broader options that could include AFSCN that should culminate later this year.

Mr. LAMBORN. The performance issues with Raytheon's OCX contract have been well documented, particularly in recent weeks. How is Air Force Space Command reducing risk and creating potential GPS III ground control requirement off-ramps should Raytheon continue to perform poorly?

General HYTEN. The Space and Missile Systems Center, Global Positioning Systems Directorate has initiated a short-term GPS III Contingency Operations capability development to allow GPS III satellites to support the constellation sustainment need date. This provides risk reduction in the event of late GPS Next Generation Command and Control System (OCX) delivery.

On 9 February 2015, a Federal Business Opportunities (FBO) announcement was released for this activity. Anticipated contract award is in 2QFY16. The program office is also studying a long-term solution to provide executable options in the event an off-ramp is needed. The Air Force will balance the affordability of the current strategy versus the regrets of pursuing an off-ramp strategy.

Mr. LAMBORN. We know that civil agencies can get OPIR data, such as that from SBIRS, at a classified level. This is useful where those civil agencies can declassify the data. However, there are agencies who need the data, but who cannot declassify the data and/or who do not have appropriate clearances. What is the Air Force doing to advance policy and technical solutions that meet the civil needs for declassified OPIR data, such as for use in fighting forest fires in Colorado and other high-risk states?

Mr. LOVERRO. The Air Force, through Air Space Command, provides Overhead Persistent Infrared (OPIR) data throughout DOD and to civil agencies for data interpretation and analysis. The Air Force understands that there is an issue with the release of classified OPIR data to U.S. departments and agencies without appropriate security clearances. To address this issue, Air Force Space Command is conducting a review of its security classification guidance, especially for data from the Space-Based Infrared System (SBIRS). Once this review is complete, the Department expects to be able to release more unclassified SBIRS data to U.S. departments and agencies that require access to the data.

Mr. LAMBORN. We have read the recent press about the Air Force's desire to turn Wideband Global SATCOM operations over to industry. How is the Air Force posturing itself to take advantage of this and other opportunities, such as enabling AFSCN connectivity to commercial antenna networks?

Mr. WEATHERINGTON. Air Force Space Command (AFSPC) and Space and Missile Systems Center (SMC) are exploring ways to contract for commercial services to operate Wideband Global SATCOM (WGS) and AFSCN Telemetry, Tracking, and Command (TT&C) to take advantage of industry efficiencies. Currently, AFSPC and SMC are analyzing the results of a recently completed Commercial Provisioning study that will be used to develop future options based on mission requirements. This will also require legal review of the options to ascertain if there are any barriers to various approaches.

Mr. LAMBORN. The performance issues with Raytheon's OCX contract have been well documented, particularly in recent weeks. How is Air Force Space Command reducing risk and creating potential GPS III ground control requirement off-ramps should Raytheon continue to perform poorly?

Mr. WEATHERINGTON. Air Force Space Command has initiated a short-term GPS III Contingency Operations ground system capability development to reduce the constellation sustainment risk associated with any additional delays to OCX. Contingency Operations will allow the Air Force, prior to the full OCX functionality, to launch and checkout the initial GPS III satellites and make their signals operationally available to GPS users. The Air Force is also studying a potential long-term solution for meeting all validated OCX requirements should intractable problems with the current acquisition program require the Service to pursue an alternative strategy.

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